South Fork Wind Farm and South Fork Export Cable Air Emissions Inventory - Calculations and Methodology

Prepared for

South Fork Wind Farm

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Introduction

The following document describes the methodology used to calculate air emissions from the South Fork Wind Farm (SFWF) and South Fork Export Cable (SFEC). The operation of the wind turbines will not itself emit any contaminants, but there are emissions associated with installation of the turbines and other activities associated with construction, operations and maintenance (O&M), and the decommissioning of the Project. Emissions have been estimated for construction, O&M, and decommissioning activities.

The SFWF includes the following components, all of which are located on the outer continental shelf (OCS) within the area of Renewable Energy Lease Number OCS-A 0486:

- Up to 15 wind turbine generators (WTGs) and associated foundations
- One offshore substation, constructed on similar foundation as the WTG
- Inter-array cables connecting the WTGs and the offshore substation

The SFEC is divided into an offshore segment and an onshore segment. Each segment includes the following components:

- SFEC – Offshore: a submarine export cable located in both federal waters (SFEC – OCS) and New York State territorial waters (SFEC – NYS), and the sea-to-shore transition vault located in East Hampton, New York. The export cable connects the SFWF offshore substation to the sea-to-shore transition vault.
- SFEC – Onshore: an underground export cable located in East Hampton, New York, from the sea--to--shore transition vault to a new interconnection facility (SFEC – Interconnection Facility) also located in East Hampton, New York.

The Project emissions are subject to review under the Clean Air Act (CAA) and the National Environmental Policy Act (NEPA). Deepwater Wind South Fork, LLC (DWSF) will be required to obtain an U.S. Environmental Protection Agency (EPA) Outer Continental Shelf (OCS) Air Permit pursuant to the provisions of Section 328 of the CAA and the *Code of Federal Regulations* (CFR) Title 40, Part 55. Bureau of Ocean Energy Management (BOEM) is required to review the Project in accordance with the General Conformity Rule as codified in Title 40 CFR Part 51, Subpart W and Part 93, Subpart B, as well as in accordance NEPA and the implementing regulations of the Council of Environmental Quality.

OCS Permit Emissions: Pursuant to 40 CFR 55, project air emission estimates in the OCS Air Permit application must include emissions from OCS sources, vessels while within the SFWF, and vessels traveling to and from the SFWF when within 25 miles (mi) (40.2 kilometers [km]) of the SFWF's center (the 25-mi [40.2 km] centroid or the OCS centroid).

General Conformity Emissions: The General Conformity Rule ensures that federal actions do not interfere with a state's plan to attain or maintain the National Ambient Air Quality Standard (NAAQS) in areas that have been out of compliance with that contaminant's standards. Before determining whether the General Conformity Rule is applicable, BOEM first must estimate emissions from the Project, which will not include those emissions already accounted for in the OCS permit. General Conformity air emissions include onshore emissions and those within 25-nautical miles (nm) (46.3 km) of the shore, but outside the 25-mi (40.2-km) centroid. Emissions outside of the OCS permit area are included in the air emission inventory for impact assessment purposes to support BOEM's obligations under the Clean Air Act and NEPA.

Air pollution from the Project is associated primarily with fuel combustion from the various vessels and support equipment used in the installation equipment at the SFWF, as well as the cable laying equipment and construction equipment used for the onshore interconnection facility. The details of the equipment and usage are discussed in Section 2.

The following pollutants were included in the air emissions inventory:

- Nitrogen oxides (NOx)
- Volatile organic compounds (VOCs)
- Carbon monoxide (CO)
- Particulate matter smaller than 10 microns (PM_{10})
- Particulate matter smaller than 2.5 microns ($PM_{2.5}$, a subset of PM_{10})
- Sulfur dioxide (SO_2)
- Lead (Pb)
- Black carbon

Greenhouse gas emissions including nitric oxide (N_2O), methane (CH_4), carbon dioxide (CO_2), and total greenhouse gases expressed as carbon dioxide equivalent (CO_2e).

A summary of the methodology used to calculate the emissions inventory for each of the contaminants, vessels, air permit (OCS, General Conformity), and Project phase are discussed in Section 2. All air emissions associated with the Project are summarized in Attachment A and tables of calculation spreadsheets for each type of vessel, equipment, and Project phase are presented in Attachment B.

Air Emissions Estimation Methodology

Air emission estimates in the OCS Air Permit application must include air emissions from OCS sources, which include vessels at the SFWF, and vessels traveling to and from the SFWF when within 25 mi (40.2 km) of the SFWF centroid.

Direct and indirect emissions that are outside the 25-mi (40.2-km) OCS Air Permit Boundary are estimated for the purposes of determining General Conformity. For the purposes of estimating project emissions for the determination of conformity, emissions within 25 nautical miles (46.3 km) of the seaward boundary of a state were included. The estimate of the Project's potential air emissions assumed the installation of 16 foundations (15 wind turbine generators, one offshore substation).

2.1 Wind Turbine Construction Methods

DWSF is will be installing the WTG and OSS using a monopile foundation. The construction methods associated with the installation of the monopile foundation, including: equipment, engine ratings, travel speeds and other relevant parameters are shown in Attachment B.

2.2 Description of Air Emission Sources

2.2.1 Vessels, Cable laying and Substation Construction

Most air emissions from the Project will come from the main and auxiliary engines of various construction equipment and vessels for the SFWF and SFEC, which include the onshore interconnection facility in East Hampton, New York and cable laying between the offshore sea-to-shore transition and the SFWF offshore substation as well as the SFWF inter-array cables. A summary of air emission sources for the monopile foundation method as well as cable laying and substation construction are shown in Table 1. The types of vessels expected to be used in the Project are listed and were classified as consistent with the equipment types used within the BOEM emission estimating tool.[1] The equipment used for the monopile foundation option are presented in Attachment B.

Table 1. Types of Vessels and Equipment for Installation Activities included in the Emissions Inventory

Monopile Installations	Cable Laying	Substation Construction
Emission Sources		
Floating/Jackup Crane Barge	Transportation Barge	Cranes
Towing Tug	Fuel Bunkering Vessel	Excavator
Material Barge	Towing Tug	Front-end Loader
Anchor Handling Tug	Material Barge	Trenchers
Crew Transport Vessel	Anchor Handling Tug	Dump and Bucket Trucks

[1] See the discussion about the emission estimating tool in Chang, R., B. Do, and R. Billings. 2017. *Technical Summary for the Offshore Wind Energy Facilities Emission Estimating Tool.* U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Sterling, VA. OCS Study BOEM 2017-079. 9 pp.

Table 1. Types of Vessels and Equipment for Installation Activities included in the Emissions Inventory

Monopile Installations	Cable Laying	Substation Construction
Support Vessel/Inflatable Boats	Cable Laying Vessel	Heavy Duty Trucks
Helicopter	Work Vessel and Support Tug	Caterpillar D7 Bulldozer
Feeder Barge: Monco 335	Crew Transport Vessel	Pickup Trucks
Rock dumping Vessel (Monopile)	Support Vessel/Inflatable	HDD Boring Machine
Fuel Bunkering Vessel		Forklift

Note:

HDD = horizontal directional drilling

2.2.2 Onshore Emissions

Onshore emissions include emissions from SFEC onshore cable installation and interconnection facility construction, as well as project-specific port activities including loading/unloading of materials, equipment, and crew during the construction and decommissioning of the SFWF and SFEC. Emission estimates for onshore cable and interconnection facility construction were based on usage of construction equipment, including cranes, excavator, front-end loader, trenchers, dump trucks, heavy-duty trucks, and HDD boring machine.

Emission estimates have been provided for port activities, including port worker commuting, construction staging work (including crane work), parts delivery, and use of the self-propelled modular transporter (SPMT). Attachment B shows the emission factors used, along with the usage hours, utilization rates, and number of equipment used.

2.3 Details of Emission Calculations

Recently, BOEM created a tool for estimating offshore wind energy emissions; the most current version is V1.2.[2] The purpose of the tool is to provide consistent sets of air quality emission factors for proponents preparing OCS and conformity permits, and the emission estimates required for each. The emission factors used in this report are consistent with the BOEM tool emission factors and were used in the independent air emission estimations. A summary of the emission factors for the equipment and vessels listed in Table 1, along with the classification of each type of equipment and number of vessels expected for use, is shown in Attachment B.

2.3.1 Emission Calculation Equations

The general equation for calculating the emissions from a vessel:

Vessel Emissions (tons) =

[**Main** Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW -hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)]

+ [**Auxiliary** Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)]

[2] *Ibid.*

The equation for offshore emergency generator:

Generator Emissions (tons) = Engine Power Rating (kW) x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

The equation for helicopter use emissions:

Helicopter Emissions (tons) = Activity Hours (hours) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Emissions from on-vessel and onshore equipment (as applicable) were estimated using U.S. Environmental Protection Agency (EPA) Federal Nonroad compression-ignition engine emission factors (Exhaust Emission Standards [EPA-420-B-16-022, March 2016]), while hazardous air pollutants (HAPs) were estimated using AP-42 Section 3.3 emission factors (EPA, 1996). Details of the emission factors used are presented in Attachment B. A discussion of each parameter in the equations used for the air emission estimates follows.

2.3.2 Engine Power Rating

The main and auxiliary engine power ratings for each vessel type are shown in Attachment B. These power ratings represent the full load rating for each type of engine, main or auxiliary.

2.3.3 Distance Traveled and Hours of Operation

Consistent with the BOEM Emission Estimating Tool, vessel air emissions were calculated based on vessels' hours of operation at the SFWF, distance traveled, speed, total number of trips, engine size, load factor, and emission factor. For each vessel, the following calculations were made:

- Emissions from the main and auxiliary engines while in transit
- Emissions from the main and auxiliary engines while maneuvering at SFWF

For the OCS air emissions estimates, the distance traveled by each vessel was based on the number of one--way trips each vessel made to and from the ports (discussed below), beginning at the edge of the 25-mi (40.2-km) OCS Air Permit Boundary to the OCS centroid of the SFWF. Any distance traveled beyond the 25-mi (40.2-km) OCS Air Permit Boundary was excluded from the distance traveled. Consequently, the OCS Air Permit emissions estimate does not depend on the port(s) used during construction or O&M.

Total hours for transit within the 25-mi centroid (40.2-km) and outside the 25-mi (40.2-km) centroid were based on the number of supply trips estimated by Deepwater Wind for each vessel type and the speed of travel of the vessels. Total hours of vessel usage were based on estimated days of work for each type of vessel multiplied by the engine utilization factor. For onsite maneuvering, the hours were estimated as the difference between total hours of use and hours spent in transit.

Emissions outside the OCS 25-mi (40.2-km) centroid were estimated as General Conformity. In this project, these emissions all occur within a 25-nm (46.3 km) of the seaward boundary of a state, as shown in Attachment A. Therefore, these emissions are calculated to provide the conformity emission estimate that supports BOEM's air resources impact assessments.

Figure 1 shows the location of the SFWF and the ports that are located with closer proximity to the SFWF selected for use for estimating worse-case construction and O&M emissions. Figure 2 shows the location of the SFWF and the ports that are located in further proximity to the SFWF. An entire list of all of the possible ports that may be used for construction, O&M and decommissioning is included in Table 3.1-5 of the main COP text. The path for cable laying from the SFWF and the onshore interconnection

facility, located on Long Island, is also shown on the figure. For construction emissions, it was assumed that all construction and decommissioning activities could be equally possible from one port in each of the states (Massachusetts, Rhode Island, Connecticut, New Jersey, Maryland and Virginia), except New York. New York ports would be used for O&M emission estimates. As such and as indicated on the figure, one port in each of the six states were used to estimate the worse-case air construction and decommissioning emissions for the project. These ports, which were the likely port choices for each state are the New Bedford Marine Commerce Terminal in the City of New Bedford, MA, Port of Providence, Providence, RI, Port of New London, New London, CT, Paulsboro Marine Terminal, Paulsboro, NJ, Port of Baltimore, Sparrows Point, MD and Norfolk International Terminal, Norfolk, VA.

Shinnecock Fish Dock Port in Hampton Bays, NY was chosen from among the New York ports for worse-case O&M emissions because that would result in greater emissions in New York than the other choices of Greenport and Montauk. This would provide a maximum, or worse-case modeled impact for each of the potential ports and would also allow worse-case conformity assessment because a maximum emission total would be provided to BOEM for each of the onshore states. Thus, using those seven port locations, all potential impacts for both the OCS permit and conformity can be conservatively estimated.

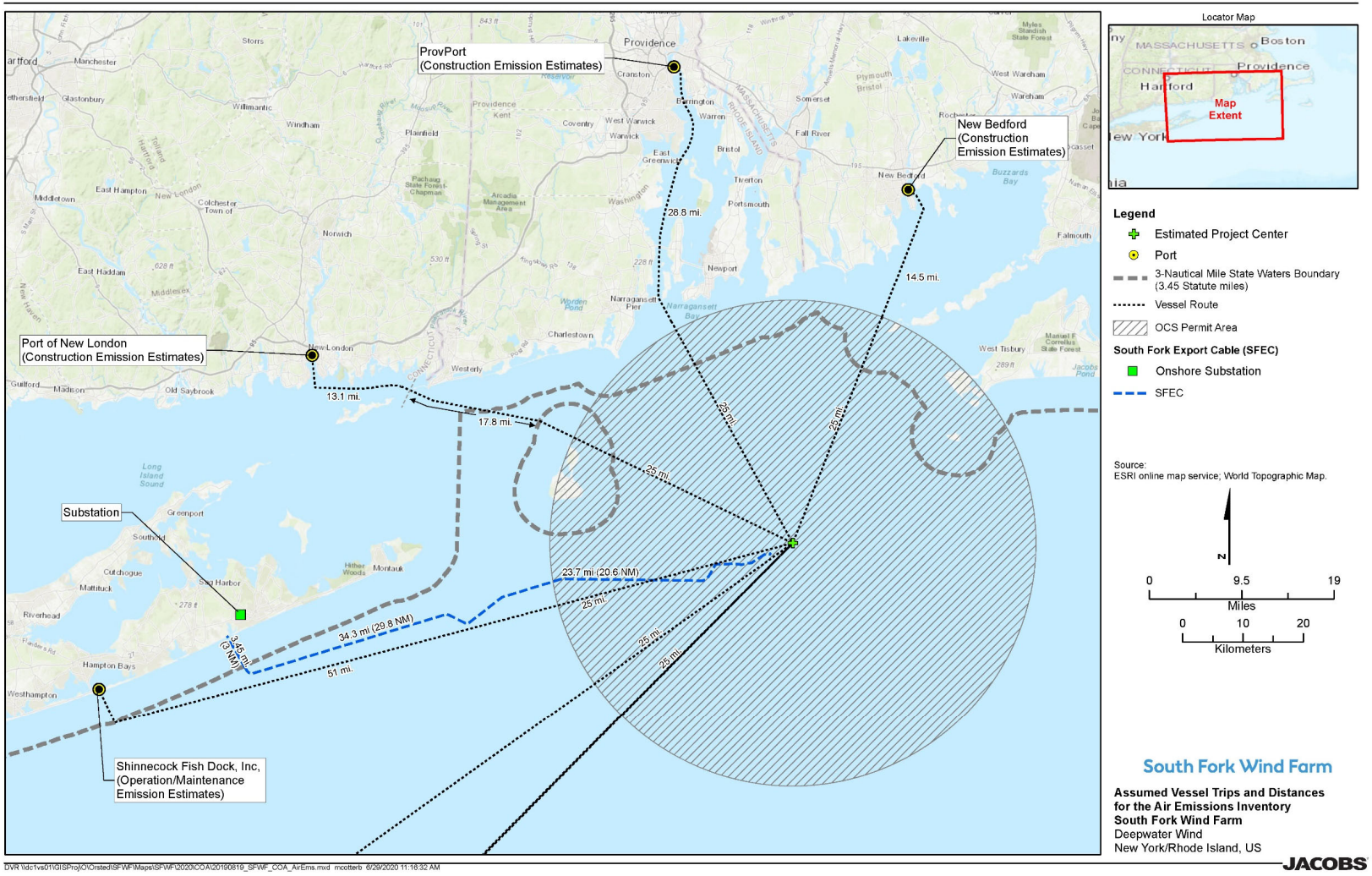

Figure 1: Distances from South Fork Wind Farm Centroid to Close Proximity Ports considered for the Air Emissions Inventory

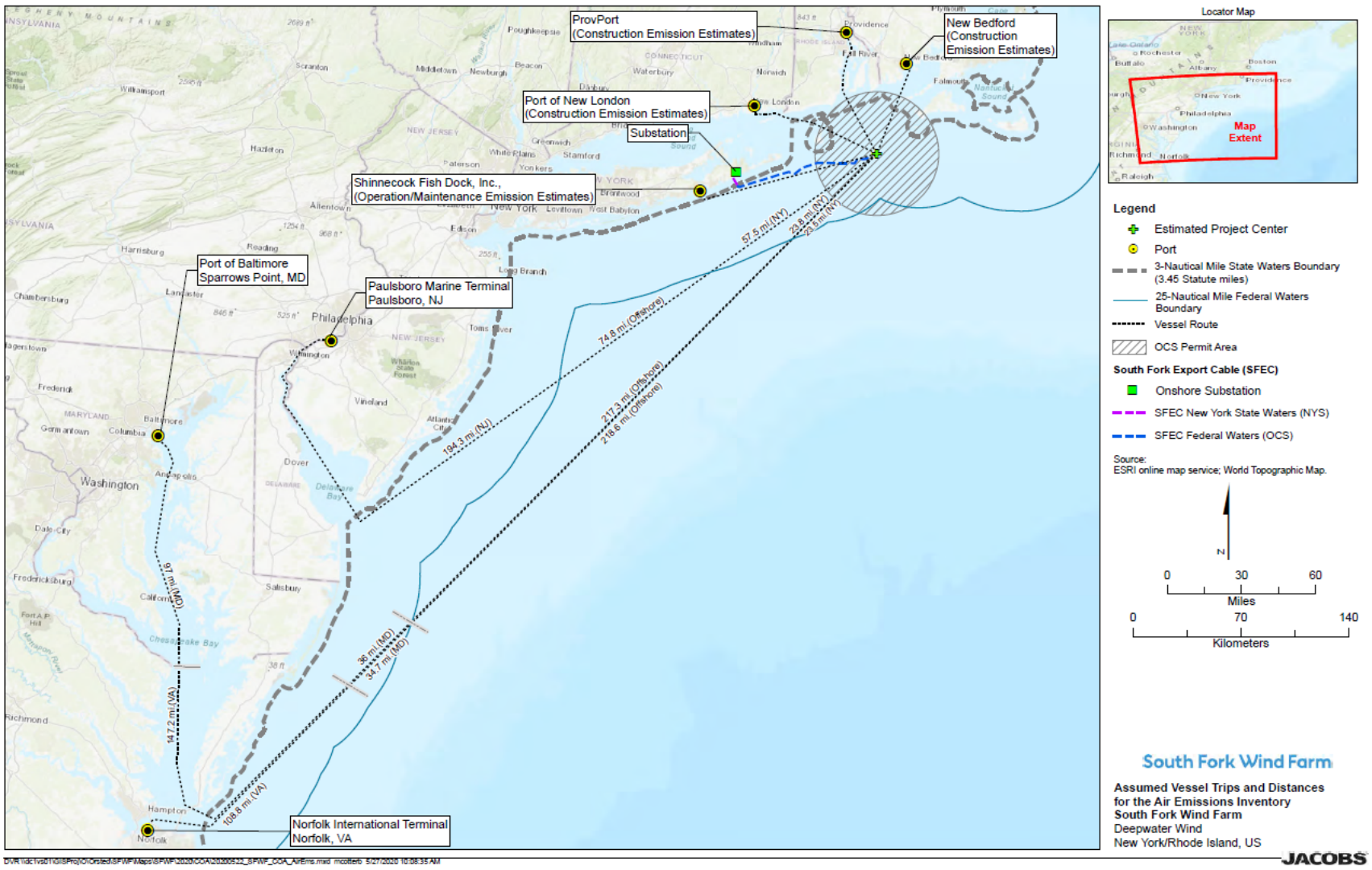

Figure 2: Distances from South Fork Wind Farm Centroid to Far Proximity Ports considered for the Air Emissions Inventory

Table 2 shows the distances of travel from each of the ports assumed for estimating construction and decommissioning emissions. Shinnecock Fish Dock was used in the O&M vessel traffic estimates. There is an additional 20.7 mi (33.3 km) of inter-array cable laying at the SFWF between the wind turbines over and above the SFEC, which leads from the SFWF to the onshore interconnection facility.

Table 2 summarizes where the emissions for each segment are allocated.

Table 2. Distances Used in Emission Calculations and Allocation

Distance Segment Description	Distance	Emission Allocation
Centroid of SFWF to OCS Air Permit Boundary	25 mi (40.2 km)	OCS
SFWF Inter-array Cable Laying	20.7 mi (33.3 km)	OCS
OCS Air Permit Boundary to New Bedford (all in MA waters) Within OCS Boundary and in MA State water	14.5 mi (23.3 km) 5.7 mi (9.2 km)	Conformity Conformity
OCS Air Permit Boundary to Providence (all in RI water) Within OCS Air Permit Boundary and in RI State water	28.8 mi (46.3 km) 4.04 mi (6.5 km)	Conformity Conformity
OCS Air Permit Boundary to New London (in RI and CT water) Within OCS Air Permit Boundary and in RI State water	17.7 mi (28.5 km) – RI 13.2 mi (21.2 km) – CT 4.5 mi (7.2 km) - RI	Conformity Conformity Conformity
Vessel travel to/from Shinnecock beyond OCS and within 25 nm (46.3 km) of New York	51 mi (82.1 km)	Conformity
Cable Laying Path beyond OCS and within 25 nm (46.3 km) of New York	37.75 mi (60.8 km)	Conformity

2.3.4 Load Factors

The BOEM emission estimating tool provides a default load factor of 0.82 for main engines in transit and 0.2 in maneuvering. These values were used in the assessment. The auxiliary engine load factor was assumed to be 1.0 in both transit and maneuvering, which is consistent with the BOEM emission tool.

2.4 Allocation of Air Emissions

Emission estimates are presented in Tables A1 – A7 in Attachment A of this report. Construction emissions are presented in Tables A1-A4. Operations and maintenance emissions are presented in Table A5. Decommissioning emissions are presented in Tables A6-A7.

2.4.1 Construction

The emissions for the various equipment, activities, and Project phases were allocated as OCS air emissions, or conformity air emissions (indicated by state). Emissions in federal water due to the SFEC export cable construction were allocated to conformity totals. For construction emissions, the construction-related activities and areas presented in Table 3 were assessed, along with the respective air permit (if applicable).

Table 3. Construction Activities and Emissions Allocation

Activity	Emission Allocation
Transit within 25 mi (40.2 km) of the SFWF	OCS
On-vessel equipment usage	OCS
Onsite maneuvering	OCS
Export and inter-array cable laying within 25 mi (40.2 km) of SFWF	OCS
Transit outside of 25 mi (40.2 km) of SFWF and within 25 nm (46.3 km) of Rhode Island, Connecticut, Massachusetts, New Jersey, Maryland and Virginia state seaward boundary	Conformity
Onshore port emissions in Rhode Island, Connecticut, Massachusetts, New Jersey, Maryland and Virginia	Conformity
Onshore cable and interconnection facility construction/duct bank/HDD in New York	Conformity
Cable laying outside of 25 mi (40.2 km) of SFWF and within 25 nm (46.3 km) of New York state seaward boundary	Conformity

2.4.2 Operations and Maintenance

For operations and maintenance emissions, the O&M activities and areas presented in Table 4 were assessed, as well as the respective air permit (if applicable).

Table 4. O&M Activities and Emissions Allocation

Activity	Emission Allocation
Transit within 25-mi (40.2 km) of the SFWF	OCS
Onsite generator	OCS
Onsite maneuvering	OCS
Transit outside of 25 mi (40.2 km) of SFWF and within 25 nm (46.3 km) of Rhode Island, Connecticut, Massachusetts, New Jersey, Maryland and Virginia state seaward boundary	Conformity
Transit emissions outside of 25 mi (40.2 km) of SFWF and within 25 nm (46.3 km) of New York state seaward boundary	Conformity
Onshore emissions at interconnection facility in New York	Conformity

2.4.3 Decommissioning

For decommissioning, emissions were estimated based on a 20 percent scaling factor for all vessels and equipment usage hours, and trips made used during the construction phase. However, the rock-dumping vessel and onshore port activities at the ports during construction were assumed not to occur during decommissioning. Due to the similarity of construction and decommissioning emission estimating methods, only construction calculation spreadsheets are shown in Attachment B, although a summary of decommissioning emissions is provided in Attachment A.

2.5 Duration of Construction and Operations and Maintenance Periods

The construction emissions estimates shown in Attachment A are estimated for construction completed over a one-year construction period to estimate worst case emissions. Emission estimates are presented for a monopile foundation installation method by port location.

For the operations and maintenance phase estimates, the emissions are presented as tons/year of contaminant, based on the number of trips and usage expected over one year of SFWF operation and maintenance. The decommissioning phase is expected to be completed within a single year and therefore, the emissions are presented as tons per year (i.e., total) of contaminant.

SECTION 3

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Attachment A
Air Emissions Summary

Attachment A1 - SFWF Construction Emission Summary

Table A1-1. Monopile Installation Construction Total Emissions (tons) – Port of New Bedford, MA

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site (OCS Permit)**	**28959**	**0.2**	**1.4**	**10.9**	**66.9**	**442.283**	**14.837**	**14.298**	**2.796**	**0.002**	**9.5**
	SFWF WTG installation supply trips (transit)	1980	0.0	0.1	0.9	5.2	34.801	1.168	1.111	0.467	0.000	1.1
	SFWF cable vessel supply trips (transit)	842	0.0	0.0	0.3	2.8	12.384	0.424	0.409	0.046	0.000	0.2
	SFWF on-vessel equipment	386	0.0	0.0	0.0	1.9	3.370	0.110	0.110	0.689	0.000	0.8
	SFWF onsite maneuvering	8124	0.1	0.4	3.1	17.3	130.093	4.164	4.013	0.567	0.001	2.4
	SFWF inter-array cable installation	4319	0.0	0.2	1.6	9.6	64.125	2.199	2.121	0.252	0.000	1.2
	SFEC installation emissions	12886	0.1	0.6	4.9	28.7	191.318	6.560	6.328	0.752	0.001	3.6
	SFEC cable vessel supply trips (transit)	421	0.0	0.0	0.2	1.4	6.192	0.212	0.205	0.023	0.000	0.1
2	**Emissions within 25 NM of MA (Conformity Determination)**	**3767**	**0.0**	**0.2**	**1.3**	**12.3**	**57.0**	**1.9**	**1.8**	**1.3**	**0.000**	**2.4**
	SFWF transit emissions	1598	0.0	0.1	0.7	4.2	28.1	0.9	0.9	0.4	0.000	0.9
	SFWF cable vessel supply trips (transit)	679	0.0	0.0	0.3	2.2	10.0	0.3	0.3	0.0	0.000	0.2
	SFEC cable vessel supply trips (transit)	340	0.0	0.0	0.1	1.1	5.0	0.2	0.2	0.0	0.000	0.1
	Onshore port activities	1151	0.0	0.0	0.2	4.8	14.0	0.5	0.5	0.9	0.000	1.2
3	**Emissions within 25 NM of NY (Conformity Determination)**	**19732**	**0.0**	**0.4**	**3.0**	**76.8**	**218.6**	**7.4**	**7.3**	**21.5**	**0.001**	**27.6**
	SFEC construction emissions	7903	0.0	0.4	3.0	17.6	117.3	4.0	3.9	0.5	0.001	2.2
	Onshore cable/substation	11829				59.2	101.3	3.4	3.4	21.1		25.4

Table A1-2. Monopile Installation Construction Total Emissions (tons) – Port of Providence, RI

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site (OCS Permit)**	**29075**	**0.2**	**1.4**	**11.0**	**67.2**	**444.205**	**14.902**	**14.360**	**2.816**	**0.002**	**9.6**
	SFWF WTG installation supply trips (transit)	2052	0.0	0.1	0.9	5.4	36.1	1.2	1.2	0.5	0.000	1.1
	SFWF cable vessel supply trips (transit)	872	0.0	0.0	0.3	2.9	12.8	0.4	0.4	0.0	0.000	0.2
	SFWF on-vessel equipment	386	0.0	0.0	0.0	1.9	3.4	0.1	0.1	0.7	0.000	0.8
	SFWF onsite maneuvering	8124	0.1	0.4	3.1	17.3	130.1	4.2	4.0	0.6	0.001	2.4
	SFWF inter-array cable installation	4319	0.0	0.2	1.6	9.6	64.1	2.2	2.1	0.3	0.000	1.2
	SFEC installation emissions	12886	0.1	0.6	4.9	28.7	191.3	6.6	6.3	0.8	0.001	3.6
	SFEC cable vessel supply trips (transit)	436	0.0	0.0	0.2	1.4	6.4	0.2	0.2	0.0	0.000	0.1
2	**Emissions within 25 NM of RI (Conformity Determination)**	**5405**	**0.0**	**0.2**	**2.0**	**17.0**	**84.0**	**2.8**	**2.7**	**1.6**	**0.000**	**3.1**
	SFWF transit emissions	2598	0.0	0.1	1.1	6.8	45.6	1.5	1.5	0.6	0.000	1.4
	SFWF cable vessel supply trips (transit)	1104	0.0	0.1	0.4	3.6	16.2	0.6	0.5	0.1	0.000	0.3
	SFEC cable vessel supply trips (transit)	552	0.0	0.0	0.2	1.8	8.1	0.3	0.3	0.0	0.000	0.2
	Onshore port activities	1151	0.0	0.0	0.2	4.8	14.0	0.5	0.5	0.9	0.000	1.2
3	**Emissions within 25 NM of NY (Conformity Determination)**	**19732**	**0.0**	**0.4**	**3.0**	**76.8**	**218.6**	**7.4**	**7.3**	**21.5**	**0.001**	**27.6**
	SFEC construction emissions	7903	0.0	0.4	3.0	17.6	117.3	4.0	3.9	0.5	0.001	2.2
	Onshore cable/substation	11829				59.2	101.3	3.4	3.4	21.1		25.4

Table A1-3. Monopile Installation Construction Total Emissions (tons) – Port of New London, CT

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site (OCS Permit)**	**31385**	**0.2**	**1.5**	**11.8**	**72.8**	**477.578**	**16.028**	**15.435**	**3.180**	**0.002**	**10.5**
	SFWF WTG installation supply trips (transit)	3462	0.0	0.2	1.5	9.0	60.8	2.0	1.9	0.8	0.000	1.9
	SFWF cable vessel supply trips (transit)	1472	0.0	0.1	0.6	4.8	21.6	0.7	0.7	0.1	0.000	0.4
	SFWF on-vessel equipment	386	0.0	0.0	0.0	1.9	3.4	0.1	0.1	0.7	0.000	0.8
	SFWF onsite maneuvering	8124	0.1	0.4	3.1	17.3	130.1	4.2	4.0	0.6	0.001	2.4
	SFWF inter-array cable installation	4319	0.0	0.2	1.6	9.6	64.1	2.2	2.1	0.3	0.000	1.2
	SFEC installation emissions	12886	0.1	0.6	4.9	28.7	191.3	6.6	6.3	0.8	0.001	3.6
	SFEC cable vessel supply trips (transit)	736	0.0	0.0	0.2	1.4	6.2	0.2	0.2	0.0	0.000	0.1
2	**Emissions within 25 NM of RI (Conformity Determination)**	**4036**	**0.0**	**0.2**	**1.4**	**13.1**	**61.4**	**2.1**	**2.0**	**1.4**	**0.000**	**2.5**
	SFWF transit emissions	1762	0.0	0.1	0.8	4.6	31.0	1.0	1.0	0.4	0.000	0.9
	SFWF cable vessel supply trips (transit)	749	0.0	0.0	0.3	2.5	11.0	0.4	0.4	0.0	0.000	0.2
	SFEC cable vessel supply trips (transit)	374	0.0	0.0	0.1	1.2	5.5	0.2	0.2	0.0	0.000	0.1
	Onshore port activities	1151	0.0	0.0	0.2	4.8	14.0	0.5	0.5	0.9	0.000	1.2
3	**Emissions within 25 NM of CT (Conformity Determination)**	**2844**	**0.0**	**0.1**	**0.9**	**9.7**	**41.8**	**1.4**	**1.4**	**1.2**	**0.000**	**2.0**
	SFWF transit emissions	1034	0.0	0.1	0.4	2.7	18.2	0.6	0.6	0.2	0.000	0.6
	SFWF cable vessel supply trips (transit)	439	0.0	0.0	0.2	1.4	6.5	0.2	0.2	0.0	0.000	0.1
	SFEC cable vessel supply trips (transit)	220	0.0	0.0	0.1	0.7	3.2	0.1	0.1	0.0	0.000	0.1
	Onshore port activities	1151	0.0	0.0	0.2	4.8	14.0	0.5	0.5	0.9	0.000	1.2
4	**Emissions within 25 NM of NY (Conformity Determination)**	**19732**	**0.0**	**0.4**	**3.0**	**76.8**	**218.6**	**7.4**	**7.3**	**21.5**	**0.001**	**27.6**
	SFEC construction emissions	7903	0.0	0.4	3.0	17.6	117.3	4.0	3.9	0.5	0.001	2.2
	Onshore cable/substation	11829				59.2	101.3	3.4	3.4	21.1		25.4

Table A1-4. Monopile Installation Construction Total Emissions (tons) - Paulsboro Marine Terminal, NJ

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site (OCS Permit)**	**33772**	**0.2**	**1.6**	**12.9**	**80.7**	**521.5**	**17.5**	**16.9**	**3.6**	**0.002**	**11.7**
	SFWF WTG installation supply trips (transit)	4919	0.0	0.2	2.1	12.9	86.4	2.9	2.8	1.2	0.000	2.6
	SFWF cable vessel supply trips (transit)	2091	0.0	0.1	0.8	6.9	30.8	1.1	1.0	0.1	0.000	0.6
	SFWF on-vessel equipment	386	0.0	0.0	0.0	1.9	3.4	0.1	0.1	0.7	0.000	0.8
	SFWF onsite maneuvering	8124	0.1	0.4	3.1	17.3	130.1	4.2	4.0	0.6	0.001	2.4
	SFWF inter-array cable installation	4319	0.0	0.2	1.6	9.6	64.1	2.2	2.1	0.3	0.000	1.2
	SFEC installation emissions	12886	0.1	0.6	4.9	28.7	191.3	6.6	6.3	0.8	0.001	3.6
	SFEC cable vessel supply trips (transit)	1046	0.0	0.1	0.4	3.4	15.4	0.5	0.5	0.1	0.000	0.3
2	**Emissions within 25 NM of NJ (Conformity Determination)**	**26358**	**0.2**	**1.3**	**10.6**	**77.2**	**428.8**	**14.5**	**13.9**	**5.1**	**0.002**	**12.3**
	SFWF transit emissions	15392	0.1	0.8	6.6	40.2	270.5	9.1	8.6	3.6	0.001	8.3
	SFWF cable vessel supply trips (transit)	6543	0.0	0.3	2.4	21.4	96.2	3.3	3.2	0.4	0.000	1.8
	SFEC cable vessel supply trips (transit)	3272	0.0	0.2	1.2	10.7	48.1	1.6	1.6	0.2	0.000	0.9
	Onshore port activities	1151	0.0	0.0	0.2	4.8	14.0	0.5	0.5	0.9	0.000	1.2
3	**Emissions within 25 NM of NY (Conformity Determination)**	**27192**	**0.1**	**0.7**	**6.0**	**98.2**	**341.4**	**11.6**	**11.2**	**22.8**	**0.001**	**30.9**
	SFWF transit emissions	4555	0.0	0.2	2.0	11.9	80.0	2.7	2.6	1.1	0.000	2.4
	SFWF cable vessel supply trips (transit)	1936	0.0	0.1	0.7	6.3	28.5	1.0	0.9	0.1	0.000	0.5
	SFEC cable vessel supply trips (transit)	968	0.0	0.0	0.4	3.2	14.2	0.5	0.5	0.1	0.000	0.3
	SFEC construction emissions	7903	0.0	0.4	3.0	17.6	117.3	4.0	3.9	0.5	0.001	2.2
	Onshore cable/substation	11829				59.2	101.3	3.4	3.4	21.1		25.4
4	**Emissions in other water beyond 25 NM**	**9704**	**0.1**	**0.5**	**4.0**	**27.9**	**159.7**	**5.4**	**5.2**	**1.6**	**0.001**	**4.3**
	SFWF transit emissions	5925	0.0	0.3	2.6	15.5	104.1	3.5	3.3	1.4	0.000	3.2
	SFWF cable vessel supply trips (transit)	2519	0.0	0.1	0.9	8.3	37.1	1.3	1.2	0.1	0.000	0.7
	SFEC cable vessel supply trips (transit)	1259	0.0	0.1	0.5	4.1	18.5	0.6	0.6	0.1	0.000	0.4

Table A1-5. Monopile Installation Construction Total Emissions (tons) - Sparrows Point, MD

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site (OCS Permit)**	**31878**	**0.2**	**1.5**	**12.1**	**75.2**	**490.3**	**16.5**	**15.9**	**3.3**	**0.002**	**10.8**
	SFWF WTG installation supply trips (transit)	3763	0.0	0.2	1.6	9.8	66.1	2.2	2.1	0.9	0.000	2.0
	SFWF cable vessel supply trips (transit)	1600	0.0	0.1	0.6	5.2	23.5	0.8	0.8	0.1	0.000	0.5
	SFWF on-vessel equipment	386	0.0	0.0	0.0	1.9	3.4	0.1	0.1	0.7	0.000	0.8
	SFWF onsite maneuvering	8124	0.1	0.4	3.1	17.3	130.1	4.2	4.0	0.6	0.001	2.4
	SFWF inter-array cable installation	4319	0.0	0.2	1.6	9.6	64.1	2.2	2.1	0.3	0.000	1.2
	SFEC installation emissions	12886	0.1	0.6	4.9	28.7	191.3	6.6	6.3	0.8	0.001	3.6
	SFEC cable vessel supply trips (transit)	800	0.0	0.0	0.3	2.6	11.8	0.4	0.4	0.0	0.000	0.2
2	**Emissions within 25 NM of MD (Conformity Determination)**	**18405**	**0.1**	**0.9**	**7.3**	**54.4**	**297.9**	**10.1**	**9.6**	**3.8**	**0.001**	**8.8**
	SFWF transit emissions	10536	0.1	0.5	4.6	27.5	185.1	6.2	5.9	2.5	0.001	5.7
	SFWF cable vessel supply trips (transit)	4479	0.0	0.2	1.7	14.7	65.9	2.3	2.2	0.2	0.000	1.3
	SFEC cable vessel supply trips (transit)	2239	0.0	0.1	0.8	7.3	32.9	1.1	1.1	0.1	0.000	0.6
	Onshore port activities	1151	0.0	0.0	0.2	4.8	14.0	0.5	0.5	0.9	0.000	1.2
3	**Emissions within 25 NM of VA (Conformity Determination)**	**20247**	**0.1**	**1.0**	**8.1**	**59.6**	**328.2**	**11.1**	**10.6**	**4.1**	**0.001**	**9.6**
	SFWF transit emissions	11661	0.1	0.6	5.0	30.5	204.9	6.9	6.5	2.8	0.001	6.3
	SFWF cable vessel supply trips (transit)	4957.1	0.0	0.2	1.9	16.2	72.9	2.5	2.4	0.3	0.000	1.4
	SFEC cable vessel supply trips (transit)	2478.6	0.0	0.1	0.9	8.1	36.5	1.2	1.2	0.1	0.000	0.7
	Onshore port activities	1151	0.0	0.0	0.2	4.8	14.0	0.5	0.5	0.9	0.000	1.2
4	**Emissions within 25 NM of NY (Conformity Determination)**	**22820**	**0.1**	**0.5**	**4.3**	**85.7**	**269.4**	**9.1**	**8.9**	**22.1**	**0.001**	**29.0**
	SFWF transit emissions	1885	0.0	0.1	0.8	4.9	33.1	1.1	1.1	0.4	0.000	1.0
	SFWF cable vessel supply trips (transit)	801	0.0	0.0	0.3	2.6	11.8	0.4	0.4	0.0	0.000	0.2
	SFEC cable vessel supply trips (transit)	401	0.0	0.0	0.1	1.3	5.9	0.2	0.2	0.0	0.000	0.1
	SFEC construction emissions	7903	0.0	0.4	3.0	17.6	117.3	4.0	3.9	0.5	0.001	2.2
	Onshore cable/substation	11829				59.2	101.3	3.4	3.4	21.1		25.4
5	**Emissions in other water beyond 25 NM**	**28191**	**0.2**	**1.4**	**11.5**	**81.0**	**464.0**	**15.7**	**15.0**	**4.7**	**0.002**	**12.3**
	SFWF transit emissions	17214	0.1	0.9	7.4	45.0	302.5	10.2	9.7	4.1	0.001	9.3
	SFWF cable vessel supply trips (transit)	7318	0.0	0.4	2.7	24.0	107.6	3.7	3.6	0.4	0.001	2.1
	SFEC cable vessel supply trips (transit)	3659	0.0	0.2	1.4	12.0	53.8	1.8	1.8	0.2	0.000	1.0

Table A1-6. Monopile Installation Construction Total Emissions (tons) - Port of Norfolk, VA

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site (OCS Permit)**	**31852**	**0.2**	**1.5**	**12.1**	**75.2**	**489.9**	**16.4**	**15.8**	**3.3**	**0.002**	**10.8**
	SFWF WTG installation supply trips (transit)	3747	0.0	0.2	1.6	9.8	65.8	2.2	2.1	0.9	0.000	2.0
	SFWF cable vessel supply trips (transit)	1593	0.0	0.1	0.6	5.2	23.4	0.8	0.8	0.1	0.000	0.4
	SFWF on-vessel equipment	386	0.0	0.0	0.0	1.9	3.4	0.1	0.1	0.7	0.000	0.8
	SFWF onsite maneuvering	8124	0.1	0.4	3.1	17.3	130.1	4.2	4.0	0.6	0.001	2.4
	SFWF inter-array cable installation	4319	0.0	0.2	1.6	9.6	64.1	2.2	2.1	0.3	0.000	1.2
	SFEC installation emissions	12886	0.1	0.6	4.9	28.7	191.3	6.6	6.3	0.8	0.001	3.6
	SFEC cable vessel supply trips (transit)	796	0.0	0.0	0.3	2.6	11.7	0.4	0.4	0.0	0.000	0.2
2	**Emissions within 25 NM of VA (Conformity Determination)**	**15266**	**0.1**	**0.7**	**6.0**	**45.3**	**246.3**	**8.3**	**8.0**	**3.2**	**0.001**	**7.4**
	SFWF transit emissions	8619	0.1	0.4	3.7	22.5	151.5	5.1	4.8	2.0	0.000	4.6
	SFWF cable vessel supply trips (transit)	3664	0.0	0.2	1.4	12.0	53.9	1.8	1.8	0.2	0.000	1.0
	SFEC cable vessel supply trips (transit)	1832	0.0	0.1	0.7	6.0	26.9	0.9	0.9	0.1	0.000	0.5
	Onshore port activities	1151	0.0	0.0	0.2	4.8	14.0	0.5	0.5	0.9	0.000	1.2
3	**Emissions within 25 NM of MD (Conformity Determination)**	**4502**	**0.0**	**0.2**	**1.8**	**12.9**	**74.1**	**2.5**	**2.4**	**0.7**	**0.000**	**2.0**
	SFWF transit emissions	2748.8	0.0	0.1	1.2	7.2	48.3	1.6	1.5	0.6	0.000	1.5
	SFWF cable vessel supply trips (transit)	1168.6	0.0	0.1	0.4	3.8	17.2	0.6	0.6	0.1	0.000	0.3
	SFEC cable vessel supply trips (transit)	584.3	0.0	0.0	0.2	1.9	8.6	0.3	0.3	0.0	0.000	0.2
4	**Emissions within 25 NM of NY (Conformity Determination)**	**22781**	**0.1**	**0.5**	**4.2**	**85.5**	**268.8**	**9.1**	**8.9**	**22.1**	**0.001**	**29.0**
	SFWF transit emissions	1862	0.0	0.1	0.8	4.9	32.7	1.1	1.0	0.4	0.000	1.0
	SFWF cable vessel supply trips (transit)	791	0.0	0.0	0.3	2.6	11.6	0.4	0.4	0.0	0.000	0.2
	SFEC cable vessel supply trips (transit)	396	0.0	0.0	0.1	1.3	5.8	0.2	0.2	0.0	0.000	0.1
	SFEC construction emissions	7903	0.0	0.4	3.0	17.6	117.3	4.0	3.9	0.5	0.001	2.2
	Onshore cable/substation	11829				59.2	101.3	3.4	3.4	21.1		25.4
5	**Emissions in other water beyond 25 NM**	**28359**	**0.2**	**1.4**	**11.6**	**81.4**	**466.7**	**15.8**	**15.1**	**4.7**	**0.002**	**12.4**
	SFWF transit emissions	17317	0.1	0.9	7.5	45.3	304.3	10.2	9.7	4.1	0.001	9.3
	SFWF cable vessel supply trips (transit)	7362	0.0	0.4	2.8	24.1	108.3	3.7	3.6	0.4	0.001	2.1
	SFEC cable vessel supply trips (transit)	3681	0.0	0.2	1.4	12.1	54.1	1.9	1.8	0.2	0.000	1.0

Attachment A2 - SFWF Operations and Maintenance Emission Summary

Table A2-1. WTG O&M based on Shinnecock NY; Major Component Setup based on Port of New Bedford, MA

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site**	**5160**	**0.03**	**0.3**	**2.0**	**15.7**	**83.3**	**2.7**	**2.6**	**0.5**	**0.00033**	**1.7**
	Transit emissions	2030	0.01	0.1	0.7	6.8	29.9	1.0	1.0	0.1	0.00014	0.5
	Onsite maneuvering	3128	0.02	0.2	1.2	9.0	53.4	1.7	1.6	0.4	0.00019	1.2
	Onsite Emergency generator	2	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00000	0.0
2	**Emissions within 25 miles of MA (Conformity)**	**303**	**0.00**	**0.0**	**0.1**	**0.9**	**5.2**	**0.2**	**0.2**	**0.0**	**0.00002**	**0.1**
	Transit emissions	303	0.00	0.0	0.1	0.9	5.2	0.2	0.2	0.0	0.00002	0.1
3	**Emissions within 25 miles of NY (Conformity)**	**1154**	**0.01**	**0.1**	**0.4**	**4.0**	**16.0**	**0.5**	**0.5**	**0.1**	**0.00008**	**0.3**
	Transit emissions	1109	0.01	0.1	0.4	3.8	15.7	0.5	0.5	0.0	0.00008	0.2
	Onshore Emissions at the substation (NY)	45	0.00	0.0	0.0	0.2	0.3	0.0	0.0	0.1	0.00000	0.1

Table A2-2. WTG O&M based on Shinnecock NY; Major Component Setup based on Port of Providence, RI

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site**	**5173**	**0.03**	**0.3**	**2.0**	**15.8**	**83.5**	**2.7**	**2.6**	**0.5**	**0.00033**	**1.7**
	Transit emissions	2043	0.01	0.1	0.7	6.8	30.1	1.0	1.0	0.1	0.00014	0.5
	Onsite maneuvering	3128	0.02	0.2	1.2	9.0	53.4	1.7	1.6	0.4	0.00019	1.2
	Onsite Emergency generator	2	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00000	0.0
2	**Emissions within 25 miles of RI (Conformity)**	**492**	**0.00**	**0.0**	**0.2**	**1.4**	**8.5**	**0.3**	**0.3**	**0.1**	**0.00003**	**0.2**
	Transit emissions	492	0.00	0.0	0.2	1.4	8.5	0.3	0.3	0.1	0.00003	0.2
3	**Emissions within 25 miles of NY (Conformity)**	**1154**	**0.01**	**0.1**	**0.4**	**4.0**	**16.0**	**0.5**	**0.5**	**0.1**	**0.00008**	**0.3**
	Transit emissions	1109	0.01	0.1	0.4	3.8	15.7	0.5	0.5	0.0	0.00008	0.2
	Onshore Emissions at the substation (NY)	45	0.00	0.0	0.0	0.2	0.3	0.0	0.0	0.1	0.00000	0.1

Table A2-3. WTG O&M based on Shinnecock NY; Major Component Setup based on Port of New London, CT

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site**	**5440**	**0.03**	**0.3**	**2.1**	**16.5**	**88.1**	**2.8**	**2.7**	**0.5**	**0.00035**	**1.8**
	Transit emissions	2310	0.01	0.1	0.8	7.6	34.7	1.1	1.1	0.1	0.00016	0.6
	Onsite maneuvering	3128	0.02	0.2	1.2	9.0	53.4	1.7	1.6	0.4	0.00019	1.2
	Onsite Emergency generator	2	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00000	0.0
2	**Emissions within 25 miles of RI (Conformity)**	**334**	**0.00**	**0.0**	**0.1**	**1.0**	**5.7**	**0.2**	**0.2**	**0.0**	**0.00002**	**0.1**
	Transit emissions	334	0.0	0.0	0.1	1.0	5.7	0.2	0.2	0.0	0.00002	0.1
3	**Emissions within 25 miles of CT (Conformity)**	**196**	**0.00**	**0.0**	**0.1**	**0.6**	**3.4**	**0.1**	**0.1**	**0.0**	**0.00001**	**0.1**
	Transit emissions	196	0.0	0.0	0.1	0.6	3.4	0.1	0.1	0.0	0.00001	0.1
4	**Emissions within 25 miles of NY (Conformity)**	**1154**	**0.01**	**0.1**	**0.4**	**4.0**	**16.0**	**0.5**	**0.5**	**0.1**	**0.00008**	**0.3**
	Transit emissions	1109	0.0	0.1	0.4	3.8	15.7	0.5	0.5	0.0	0.00008	0.2
	Onshore Emissions at the substation (NY)	45	0.00	0.0	0.0	0.2	0.3	0.0	0.0	0.1	0.00000	0.1

Table A2-4. WTG O&M based on Shinnecock NY; Major Component Setup based on Paulsboro Marine Terminal, NJ

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site**	**5716**	**0.04**	**0.3**	**2.2**	**17.3**	**92.9**	**3.0**	**2.8**	**0.5**	**0.00037**	**1.9**
	Transit emissions	2586	0.02	0.1	1.0	8.4	39.5	1.3	1.2	0.1	0.00018	0.7
	Onsite maneuvering	3128	0.02	0.2	1.2	9.0	53.4	1.7	1.6	0.4	0.00019	1.2
	Onsite Emergency generator	2	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00000	0.0
2	**Emissions within 25 miles of NJ (Conformity)**	**2915**	**0.02**	**0.1**	**1.1**	**8.4**	**50.1**	**1.5**	**1.5**	**0.4**	**0.00018**	**1.1**
	Transit emissions	2915	0.0	0.1	1.1	8.4	50.1	1.5	1.5	0.4	0.00018	1.1
3	**Emissions in Other Water offshore**	**1122**	**0.01**	**0.1**	**0.4**	**3.2**	**19.3**	**0.6**	**0.6**	**0.1**	**0.00007**	**0.4**
	Transit emissions	1122	0.0	0.1	0.4	3.2	19.3	0.6	0.6	0.1	0.00007	0.4
4	**Emissions within 25 miles of NY (Conformity)**	**2017**	**0.01**	**0.1**	**0.7**	**6.5**	**30.8**	**1.0**	**1.0**	**0.2**	**0.00013**	**0.7**
	Transit emissions	1972	0.0	0.1	0.7	6.3	30.5	1.0	1.0	0.1	0.00013	0.6
	Onshore Emissions at the substation (NY)	45	0.0	0.0	0.0	0.2	0.3	0.0	0.0	0.1	0.00000	0.1

Table A2-5. WTG O&M based on Shinnecock NY; Major Component Setup based on Port of Sparrows Point, MD

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site**	**5497**	**0.03**	**0.3**	**2.1**	**16.7**	**89.1**	**2.8**	**2.7**	**0.5**	**0.00035**	**1.8**
	Transit emissions	2367	0.01	0.1	0.9	7.7	35.7	1.2	1.1	0.1	0.00016	0.6
	Onsite maneuvering	3128	0.02	0.2	1.2	9.0	53.4	1.7	1.6	0.4	0.00019	1.2
	Onsite Emergency generator	2	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00000	0.0
2	**Emissions within 25 miles of MD (Conformity)**	**1995**	**0.01**	**0.1**	**0.8**	**5.7**	**34.3**	**1.1**	**1.0**	**0.3**	**0.00012**	**0.8**
	Transit emissions	1995	0.0	0.1	0.8	5.7	34.3	1.1	1.0	0.3	0.00012	0.8
3	**Emissions within 25 miles of VA (Conformity)**	**2208**	**0.0**	**0.1**	**0.9**	**6.4**	**37.9**	**1.2**	**1.1**	**0.3**	**0.00014**	**0.8**
	Transit emissions	2208	0.0	0.1	0.9	6.4	37.9	1.2	1.1	0.3	0.00014	0.8
4	**Emissions in Other Water offshore**	**3260**	**0.02**	**0.2**	**1.3**	**9.4**	**56.0**	**1.7**	**1.7**	**0.4**	**0.00020**	**1.2**
	Transit emissions	3260	0.0	0.2	1.3	9.4	56.0	1.7	1.7	0.4	0.00020	1.2
5	**Emissions within 25 miles of NY (Conformity)**	**1511**	**0.01**	**0.1**	**0.5**	**5.1**	**22.1**	**0.7**	**0.7**	**0.1**	**0.00010**	**0.5**
	Transit emissions	1466	0.0	0.1	0.5	4.8	21.9	0.7	0.7	0.1	0.00010	0.4
	Onshore Emissions at the substation (NY)	45	0.0	0.0	0.0	0.2	0.3	0.0	0.0	0.1	0.00000	0.1

Table A2-6. WTG O&M based on Shinnecock NY; Major Component Setup based on Port of Norfolk, VA

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site**	**5494**	**0.03**	**0.3**	**2.1**	**16.7**	**89.1**	**2.8**	**2.7**	**0.5**	**0.00035**	**1.8**
	Transit emissions	2364	0.01	0.1	0.9	7.7	35.6	1.2	1.1	0.1	0.00016	0.6
	Onsite maneuvering	3128	0.02	0.2	1.2	9.0	53.4	1.7	1.6	0.4	0.00019	1.2
	Onsite Emergency generator	2	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00000	0.0
2	**Emissions within 25 miles of VA(Conformity)**	**521**	**0.0**	**0.0**	**0.2**	**1.5**	**8.9**	**0.3**	**0.3**	**0.1**	**0.00003**	**0.2**
	Transit emissions	521	0.0	0.0	0.2	1.5	8.9	0.3	0.3	0.1	0.00003	0.2
3	**Emissions within 25 miles of MD (Conformity)**	**521**	**0.0**	**0.0**	**0.2**	**1.5**	**8.9**	**0.3**	**0.3**	**0.1**	**0.00003**	**0.2**
	Transit emissions	521	0.0	0.0	0.2	1.5	8.9	0.3	0.3	0.1	0.00003	0.2
4	**Emissions in Other Water Offshore**	**3279**	**0.0**	**0.2**	**1.3**	**9.5**	**56.3**	**1.7**	**1.7**	**0.4**	**0.00020**	**1.2**
	Transit emissions	3279	0.0	0.2	1.3	9.5	56.3	1.7	1.7	0.4	0.00020	1.2
5	**Emissions within 25 miles of NY (Conformity)**	**1507**	**0.0**	**0.1**	**0.5**	**5.1**	**22.0**	**0.7**	**0.7**	**0.1**	**0.00010**	**0.5**
	Transit emissions	1462	0.0	0.1	0.5	4.8	21.8	0.7	0.7	0.1	0.00010	0.4
	Onshore Emissions at the substation (NY)	45	0.0	0.0	0.0	0.2	0.3	0.0	0.0	0.1	0.00000	0.1

Attachment A3 - SFWF Decommissioning Emission Summary

Table A3-1. Monopile Decommissioning Total Emissions (tons) – Port of New Bedford, MA

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site (OCS Permit)**	**5296**	**0.0**	**0.3**	**2.0**	**12.7**	**81.0**	**2.7**	**2.6**	**0.5**	**0.000**	**1.8**
	SFWF WTG Decommissioning supply trips (transit)	456	0.0	0.0	0.2	1.2	8.1	0.3	0.3	0.1	0.000	0.3
	SFWF cable vessel supply trips (transit)	184	0.0	0.0	0.1	0.6	2.7	0.1	0.1	0.0	0.000	0.1
	SFWF on-vessel equipment	77	0.0	0.0	0.0	0.4	0.7	0.0	0.0	0.1	0.000	0.2
	SFWF onsite maneuvering	1096	0.0	0.1	0.4	2.7	17.8	0.5	0.5	0.0	0.000	0.3
	SFWF inter-array cable Decommissioning	851	0.0	0.0	0.3	1.9	12.6	0.4	0.4	0.0	0.000	0.2
	SFEC Decommissioning emissions	2539	0.0	0.1	1.0	5.6	37.7	1.3	1.2	0.1	0.000	0.7
	SFEC cable vessel supply trips (transit)	92	0.0	0.0	0.0	0.3	1.4	0.0	0.0	0.0	0.000	0.0
2	**Emissions within 25 NM of MA (Conformity Determination)**	**841**	**0.0**	**0.0**	**0.3**	**2.7**	**12.9**	**0.4**	**0.4**	**0.3**	**0.000**	**0.5**
	SFWF transit emissions	368	0.0	0.0	0.2	1.0	6.6	0.2	0.2	0.1	0.000	0.2
	SFWF cable vessel supply trips (transit)	149	0.0	0.0	0.1	0.5	2.2	0.1	0.1	0.0	0.000	0.0
	SFEC cable vessel supply trips (transit)	74	0.0	0.0	0.0	0.2	1.1	0.0	0.0	0.0	0.000	0.0
	Onshore port activities	250	0.0	0.0	0.1	1.0	3.0	0.1	0.1	0.2	0.000	0.3
3	**Emissions within 25 NM of NY (Conformity Determination)**	**3720**	**0.0**	**0.1**	**0.6**	**14.3**	**41.3**	**1.4**	**1.4**	**3.9**	**0.000**	**5.1**
	SFEC Decommissioning emissions	1557	0.0	0.1	0.6	3.5	23.1	0.8	0.8	0.1	0.000	0.4
	Onshore cable/substation	2163				10.8	18.2	0.6	0.6	3.9		4.6

Table A3-2. Monopile Decommissioning Total Emissions (tons) – Port of Providence, RI

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site (OCS Permit)**	**5322**	**0.0**	**0.3**	**2.0**	**12.8**	**81.4**	**2.7**	**2.6**	**0.5**	**0.000**	**1.8**
	SFWF WTG Decommissioning supply trips (transit)	472	0.0	0.0	0.2	1.3	8.4	0.3	0.3	0.1	0.000	0.3
	SFWF cable vessel supply trips (transit)	191	0.0	0.0	0.1	0.6	2.8	0.1	0.1	0.0	0.000	0.1
	SFWF on-vessel equipment	77	0.0	0.0	0.0	0.4	0.7	0.0	0.0	0.1	0.000	0.2
	SFWF onsite maneuvering	1096	0.0	0.1	0.4	2.7	17.8	0.5	0.5	0.0	0.000	0.3
	SFWF inter-array cable Decommissioning	851	0.0	0.0	0.3	1.9	12.6	0.4	0.4	0.0	0.000	0.2
	SFEC Decommissioning emissions	2539	0.0	0.1	1.0	5.6	37.7	1.3	1.2	0.1	0.000	0.7
	SFEC cable vessel supply trips (transit)	95	0.0	0.0	0.0	0.3	1.4	0.0	0.0	0.0	0.000	0.0
2	**Emissions within 25 NM of RI (Conformity Determination)**	**1210**	**0.0**	**0.1**	**0.4**	**3.8**	**19.0**	**0.6**	**0.6**	**0.4**	**0.000**	**0.7**
	SFWF transit emissions	598	0.0	0.0	0.3	1.6	10.7	0.4	0.3	0.2	0.000	0.3
	SFWF cable vessel supply trips (transit)	242	0.0	0.0	0.1	0.8	3.6	0.1	0.1	0.0	0.000	0.1
	SFEC cable vessel supply trips (transit)	121	0.0	0.0	0.0	0.4	1.8	0.1	0.1	0.0	0.000	0.0
	Onshore port activities	250	0.0	0.0	0.1	1.0	3.0	0.1	0.1	0.2	0.000	0.3
3	**Emissions within 25 NM of NY (Conformity Determination)**	**3720**	**0.0**	**0.1**	**0.6**	**14.3**	**41.3**	**1.4**	**1.4**	**3.9**	**0.000**	**5.1**
	SFEC Decommissioning emissions	1557	0.0	0.1	0.6	3.5	23.1	0.8	0.8	0.1	0.000	0.4
	Onshore cable/substation	2163				10.8	18.2	0.6	0.6	3.9		4.6

Table A3-3. Monopile Decommissioning Total Emissions (tons) – Port of New London, CT

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site (OCS Permit)**	**5843**	**0.0**	**0.3**	**2.2**	**14.0**	**89.1**	**3.0**	**2.9**	**0.6**	**0.000**	**2.0**
	SFWF WTG Decommissioning supply trips (transit)	797	0.0	0.0	0.3	2.1	14.2	0.5	0.5	0.2	0.000	0.5
	SFWF cable vessel supply trips (transit)	322	0.0	0.0	0.1	1.0	4.7	0.2	0.2	0.0	0.000	0.1
	SFWF on-vessel equipment	77	0.0	0.0	0.0	0.4	0.7	0.0	0.0	0.1	0.000	0.2
	SFWF onsite maneuvering	1096	0.0	0.1	0.4	2.7	17.8	0.5	0.5	0.0	0.000	0.3
	SFWF inter-array cable Decommissioning	851	0.0	0.0	0.3	1.9	12.6	0.4	0.4	0.0	0.000	0.2
	SFEC Decommissioning emissions	2539	0.0	0.1	1.0	5.6	37.7	1.3	1.2	0.1	0.000	0.7
	SFEC cable vessel supply trips (transit)	161	0.0	0.0	0.0	0.3	1.4	0.0	0.0	0.0	0.000	0.0
2	**Emissions within 25 NM of RI (Conformity Determination)**	**901**	**0.0**	**0.0**	**0.3**	**2.9**	**13.9**	**0.5**	**0.4**	**0.3**	**0.000**	**0.6**
	SFWF transit emissions	405.5	0.0	0.0	0.2	1.1	7.2	0.2	0.2	0.1	0.000	0.2
	SFWF cable vessel supply trips (transit)	163.9	0.0	0.0	0.1	0.5	2.4	0.1	0.1	0.0	0.000	0.0
	SFEC cable vessel supply trips (transit)	81.9	0.0	0.0	0.0	0.3	1.2	0.0	0.0	0.0	0.000	0.0
	Onshore port activities	250	0.0	0.0	0.1	1.0	3.0	0.1	0.1	0.2	0.000	0.3
3	**Emissions within 25 NM of CT (Conformity Determination)**	**635**	**0.0**	**0.0**	**0.2**	**2.2**	**9.4**	**0.3**	**0.3**	**0.3**	**0.000**	**0.5**
	SFWF transit emissions	240	0.0	0.0	0.1	0.6	4.3	0.1	0.1	0.1	0.000	0.1
	SFWF cable vessel supply trips (transit)	97	0.0	0.0	0.0	0.3	1.4	0.0	0.0	0.0	0.000	0.0
	SFEC cable vessel supply trips (transit)	48	0.0	0.0	0.0	0.2	0.7	0.0	0.0	0.0	0.000	0.0
	Onshore port activities	250	0.0	0.0	0.1	1.0	3.0	0.1	0.1	0.2	0.000	0.3
4	**Emissions within 25 NM of NY (Conformity Determination)**	**3720**	**0.0**	**0.1**	**0.6**	**14.3**	**41.3**	**1.4**	**1.4**	**3.9**	**0.000**	**5.1**
	SFEC Decommissioning emissions	1557	0.0	0.1	0.6	3.5	23.1	0.8	0.8	0.1	0.000	0.4
	Onshore cable/substation	2163				10.8	18.2	0.6	0.6	3.9		4.6

Table A3-4. Monopile Decommissioning Total Emissions (tons) – Paulsboro Marine Terminal, NJ

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site (OCS Permit)**	**6382**	**0.0**	**0.3**	**2.4**	**15.8**	**99.1**	**3.3**	**3.2**	**0.7**	**0.000**	**2.3**
	SFWF WTG Decommissioning supply trips (transit)	1132	0.0	0.1	0.5	3.0	20.2	0.7	0.6	0.3	0.000	0.6
	SFWF cable vessel supply trips (transit)	458	0.0	0.0	0.2	1.5	6.7	0.2	0.2	0.0	0.000	0.1
	SFWF on-vessel equipment	77	0.0	0.0	0.0	0.4	0.7	0.0	0.0	0.1	0.000	0.2
	SFWF onsite maneuvering	1096	0.0	0.1	0.4	2.7	17.8	0.5	0.5	0.0	0.000	0.3
	SFWF inter-array cable Decommissioning	851	0.0	0.0	0.3	1.9	12.6	0.4	0.4	0.0	0.000	0.2
	SFEC Decommissioning emissions	2539	0.0	0.1	1.0	5.6	37.7	1.3	1.2	0.1	0.000	0.7
	SFEC cable vessel supply trips (transit)	229	0.0	0.0	0.1	0.7	3.4	0.1	0.1	0.0	0.000	0.1
2	**Emissions within 25 NM of NJ (Conformity Determination)**	**5941**	**0.0**	**0.3**	**2.4**	**17.3**	**98.0**	**3.3**	**3.2**	**1.3**	**0.000**	**2.9**
	SFWF transit emissions	3543	0.0	0.2	1.6	9.4	63.3	2.1	2.0	0.9	0.000	2.0
	SFWF cable vessel supply trips (transit)	1432	0.0	0.1	0.5	4.6	21.1	0.7	0.7	0.1	0.000	0.4
	SFEC cable vessel supply trips (transit)	716	0.0	0.0	0.3	2.3	10.6	0.4	0.3	0.0	0.000	0.2
	Onshore port activities	250	0.0	0.0	0.1	1.0	3.0	0.1	0.1	0.2	0.000	0.3
3	**Emissions within 25 NM of NY (Conformity Determination)**	**5405**	**0.0**	**0.2**	**1.3**	**19.1**	**69.4**	**2.4**	**2.3**	**4.3**	**0.000**	**5.9**
	SFWF transit emissions	1048	0.0	0.1	0.5	2.8	18.7	0.6	0.6	0.3	0.000	0.6
	SFWF cable vessel supply trips (transit)	424	0.0	0.0	0.2	1.4	6.2	0.2	0.2	0.0	0.000	0.1
	SFEC cable vessel supply trips (transit)	212	0.0	0.0	0.1	0.7	3.1	0.1	0.1	0.0	0.000	0.1
	SFEC Decommissioning emissions	1557	0.0	0.1	0.6	3.5	23.1	0.8	0.8	0.1	0.000	0.4
	Onshore cable/substation	2163				10.8	18.2	0.6	0.6	3.9		4.6
4	**Emissions in other water beyond 25 NM**	**2191**	**0.0**	**0.1**	**0.9**	**6.3**	**36.6**	**1.2**	**1.2**	**0.4**	**0.000**	**1.0**
	SFWF transit emissions	1364	0.0	0.1	0.6	3.6	24.4	0.8	0.8	0.4	0.000	0.8
	SFWF cable vessel supply trips (transit)	551	0.0	0.0	0.2	1.8	8.1	0.3	0.3	0.0	0.000	0.2
	SFEC cable vessel supply trips (transit)	276	0.0	0.0	0.1	0.9	4.1	0.1	0.1	0.0	0.000	0.1

Table A3-5. Monopile Decommissioning Total Emissions (tons) – Sparrows Point, MD

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site (OCS Permit)**	**5955**	**0.0**	**0.3**	**2.3**	**14.6**	**92.0**	**3.1**	**3.0**	**0.6**	**0.000**	**2.1**
	SFWF WTG Decommissioning supply trips (transit)	866	0.0	0.0	0.4	2.3	15.5	0.5	0.5	0.2	0.000	0.5
	SFWF cable vessel supply trips (transit)	350	0.0	0.0	0.1	1.1	5.2	0.2	0.2	0.0	0.000	0.1
	SFWF on-vessel equipment	77	0.0	0.0	0.0	0.4	0.7	0.0	0.0	0.1	0.000	0.2
	SFWF onsite maneuvering	1096	0.0	0.1	0.4	2.7	17.8	0.5	0.5	0.0	0.000	0.3
	SFWF inter-array cable Decommissioning	851	0.0	0.0	0.3	1.9	12.6	0.4	0.4	0.0	0.000	0.2
	SFEC Decommissioning emissions	2539	0.0	0.1	1.0	5.6	37.7	1.3	1.2	0.1	0.000	0.7
	SFEC cable vessel supply trips (transit)	175	0.0	0.0	0.1	0.6	2.6	0.1	0.1	0.0	0.000	0.0
2	**Emissions within 25 NM of MD (Conformity Determination)**	**4145**	**0.0**	**0.2**	**1.7**	**12.2**	**68.0**	**2.3**	**2.2**	**0.9**	**0.000**	**2.1**
	SFWF transit emissions	2425	0.0	0.1	1.1	6.5	43.3	1.5	1.4	0.6	0.000	1.4
	SFWF cable vessel supply trips (transit)	980	0.0	0.0	0.4	3.1	14.4	0.5	0.5	0.1	0.000	0.3
	SFEC cable vessel supply trips (transit)	490	0.0	0.0	0.2	1.6	7.2	0.2	0.2	0.0	0.000	0.1
	Onshore port activities	250	0.0	0.0	0.1	1.0	3.0	0.1	0.1	0.2	0.000	0.3
3	**Emissions within 25 NM of VA (Conformity Determination)**	**4561**	**0.0**	**0.2**	**1.8**	**13.4**	**74.9**	**2.5**	**2.4**	**1.0**	**0.000**	**2.3**
	SFWF transit emissions	2684	0.0	0.1	1.2	7.1	48.0	1.6	1.5	0.7	0.000	1.5
	SFWF cable vessel supply trips (transit)	1084.8	0.0	0.1	0.4	3.5	16.0	0.5	0.5	0.1	0.000	0.3
	SFEC cable vessel supply trips (transit)	542.4	0.0	0.0	0.2	1.7	8.0	0.3	0.3	0.0	0.000	0.2
	Onshore port activities	250	0.0	0.0	0.1	1.0	3.0	0.1	0.1	0.2	0.000	0.3
4	**Emissions within 25 NM of NY (Conformity Determination)**	**4418**	**0.0**	**0.1**	**0.9**	**16.3**	**52.9**	**1.8**	**1.8**	**4.1**	**0.000**	**5.4**
	SFWF transit emissions	434	0.0	0.0	0.2	1.2	7.8	0.3	0.2	0.1	0.000	0.2
	SFWF cable vessel supply trips (transit)	175	0.0	0.0	0.1	0.6	2.6	0.1	0.1	0.0	0.000	0.1
	SFEC cable vessel supply trips (transit)	88	0.0	0.0	0.0	0.3	1.3	0.0	0.0	0.0	0.000	0.0
	SFEC Decommissioning emissions	1557	0.0	0.1	0.6	3.5	23.1	0.8	0.8	0.1	0.000	0.4
	Onshore cable/substation	2163				10.8	18.2	0.6	0.6	3.9		4.6
5	**Emissions in other water beyond 25 NM**	**6364**	**0.0**	**0.3**	**2.6**	**18.2**	**106.2**	**3.6**	**3.4**	**1.2**	**0.000**	**3.0**
	SFWF transit emissions	3962	0.0	0.2	1.7	10.5	70.8	2.4	2.3	1.0	0.000	2.3
	SFWF cable vessel supply trips (transit)	1601	0.0	0.1	0.6	5.1	23.6	0.8	0.8	0.1	0.000	0.5
	SFEC cable vessel supply trips (transit)	801	0.0	0.0	0.3	2.6	11.8	0.4	0.4	0.0	0.000	0.2

Table A3-6. Monopile Decommissioning Total Emissions (tons) – Port of Norfolk, VA

	Areas where emissions occur	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
1	**Emissions within 25 miles of SFWF site (OCS Permit)**	**5949**	**0.0**	**0.3**	**2.3**	**14.6**	**91.9**	**3.1**	**3.0**	**0.6**	**0.000**	**2.1**
	SFWF WTG Decommissioning supply trips (transit)	862	0.0	0.0	0.4	2.3	15.4	0.5	0.5	0.2	0.000	0.5
	SFWF cable vessel supply trips (transit)	349	0.0	0.0	0.1	1.1	5.1	0.2	0.2	0.0	0.000	0.1
	SFWF on-vessel equipment	77	0.0	0.0	0.0	0.4	0.7	0.0	0.0	0.1	0.000	0.2
	SFWF onsite maneuvering	1096	0.0	0.1	0.4	2.7	17.8	0.5	0.5	0.0	0.000	0.3
	SFWF inter-array cable Decommissioning	851	0.0	0.0	0.3	1.9	12.6	0.4	0.4	0.0	0.000	0.2
	SFEC Decommissioning emissions	2539	0.0	0.1	1.0	5.6	37.7	1.3	1.2	0.1	0.000	0.7
	SFEC cable vessel supply trips (transit)	174	0.0	0.0	0.1	0.6	2.6	0.1	0.1	0.0	0.000	0.0
2	**Emissions within 25 NM of VA (Conformity Determination)**	**3437**	**0.0**	**0.2**	**1.4**	**10.2**	**56.2**	**1.9**	**1.8**	**0.8**	**0.000**	**1.8**
	SFWF transit emissions	1984	0.0	0.1	0.9	5.3	35.4	1.2	1.1	0.5	0.000	1.1
	SFWF cable vessel supply trips (transit)	802	0.0	0.0	0.3	2.6	11.8	0.4	0.4	0.0	0.000	0.2
	SFEC cable vessel supply trips (transit)	401	0.0	0.0	0.2	1.3	5.9	0.2	0.2	0.0	0.000	0.1
	Onshore port activities	250	0.0	0.0	0.1	1.0	3.0	0.1	0.1	0.2	0.000	0.3
3	**Emissions within 25 NM of MD (Conformity Determination)**	**1016**	**0.0**	**0.0**	**0.4**	**2.9**	**17.0**	**0.6**	**0.5**	**0.2**	**0.000**	**0.5**
	SFWF transit emissions	632.7	0.0	0.0	0.3	1.7	11.3	0.4	0.4	0.2	0.000	0.4
	SFWF cable vessel supply trips (transit)	255.7	0.0	0.0	0.1	0.8	3.8	0.1	0.1	0.0	0.000	0.1
	SFEC cable vessel supply trips (transit)	127.9	0.0	0.0	0.0	0.4	1.9	0.1	0.1	0.0	0.000	0.0
4	**Emissions within 25 NM of NY (Conformity Determination)**	**4409**	**0.0**	**0.1**	**0.9**	**16.3**	**52.8**	**1.8**	**1.8**	**4.1**	**0.000**	**5.4**
	SFWF transit emissions	429	0.0	0.0	0.2	1.1	7.7	0.3	0.2	0.1	0.000	0.2
	SFWF cable vessel supply trips (transit)	173	0.0	0.0	0.1	0.6	2.6	0.1	0.1	0.0	0.000	0.0
	SFEC cable vessel supply trips (transit)	87	0.0	0.0	0.0	0.3	1.3	0.0	0.0	0.0	0.000	0.0
	SFEC Decommissioning emissions	1557	0.0	0.1	0.6	3.5	23.1	0.8	0.8	0.1	0.000	0.4
	Onshore cable/substation	2163				10.8	18.2	0.6	0.6	3.9		4.6
5	**Emissions in other water beyond 25 NM**	**6403**	**0.0**	**0.3**	**2.7**	**18.3**	**106.8**	**3.6**	**3.4**	**1.2**	**0.000**	**3.0**
	SFWF transit emissions	3986	0.0	0.2	1.7	10.6	71.2	2.4	2.3	1.0	0.000	2.3
	SFWF cable vessel supply trips (transit)	1611	0.0	0.1	0.6	5.1	23.7	0.8	0.8	0.1	0.000	0.5
	SFEC cable vessel supply trips (transit)	805	0.0	0.0	0.3	2.6	11.9	0.4	0.4	0.0	0.000	0.2

Attachment B
Air Emissions Calculation Spreadsheets

SFWF Construction Phase Emission Worktabs

Table B1 Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Monopile Installation

Type of Equipment/Emission Source Description (list others as needed)	No. of Each Type of Vessel	Main Engine Rating (HP)	Auxillary Engine Rating (HP)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to Prov Port	Percentage of Trips to New Bedford	Percentage of Trips to Quonset	Total Number of Miles Traveled
Floating/Jack-up Crane Barge	1	40,000	4,100	10	24	33	594	75	0	0	4	100	0	0	
Towing Tug	2	15,000	600	11	24	33	356.4	45	0	0	15	100	0	0	
Material Barge	2	200	0	4	24	5	96	30	0	50	5	100	0	0	
Anchor Handling Tug	1	8,000	450	11	24	33	356.4	45	0	0	30	100	0	0	
Rock Dumping Vessel	1	20,000	6,000	6.5	24	24	460.8	30	0	50	10	100	0	0	
Crew Transport Vessel:	2	2,000	50	23	24	50	600	25	0	25	15	100	0	0	
Support Vessel/Inflatable	1	500	0	23	24	25	390	45	5	15	25	100	0	0	
Helicopter:	1	3700	0	165	24	5	24	10	0	10	91	100	0	0	
Feeder Barge: Monco 335	2	8,000	1,500	4	24	33	356.4	45	0	0	15	100	0	0	
Bunkering vessel	1	8000	450	11	24	33	80	9	1	0	8	100	0	0	

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

- Work Duration is for a build-out of 16 turbines

Cable Installation

Type of Equipment/Emission Source Description (list others as needed)	No. of Each Type of Vessel	Main Engine Rating (HP)	Auxillary Engine Rating (HP)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to Prov Port	Percentage of Trips to New Bedford	Percentage of Trips to Quonset	Total Number of Miles Traveled
Transportation Barge:	1	200	0	4	24	5	72	0	0	60	0	100	0	0	
Fuel Bunkering Vessel:	1	2020	3500	11	24	100	720	25	5	0	6	100	0	0	
Towing Tug:	2	15,000	600	11	24	33	158.4	20	0	0	8	100	0	0	
Material Barge:	1	200	0	4	24	5	96	20	0	60	8	100	0	0	
Anchor Handling Tug:	1	8,000	450	11	24	33	158.4	20	0	0	8	100	0	0	
Cable Laying Vessel:	1	3100	5200	12.4	24	100	1680	60	10	0	6	100	0	0	
Work Vessel:	1	15,000	100	10	24	33	356.4	45	0	0	30	100	0	0	
Work Vessel Support Tug:	1	15,000	600	11	24	33	356.4	45	0	0	30	100	0	0	
Crew Transport Vessel:	2	2,700	50	23	24	50	1440	60	0	60	30	100	0	0	
Support Vessel/Inflatable	1	500	0	23	24	30	432	30	15	15	20	100	0	0	

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

Table B1 Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Onshore

					Construction						Decommissioning					
Type of Equipment/Emission Source Description (list others as needed)	No. of Each Type of Vessel	Main Engine Rating (HP)	Auxillary Engine Rating (HP)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters
Onshore Substation Installation (138kV/69kV Substation with Power transformer and shunt reactors)																
Cranes: Description: For landfall transition and onshore construction and decommissioning	1	1400	200	N/A	12	50	720	0	120	0	12	50	360	0	60	0
Excavator: Description: For landfall transition and onshore construction	1	800	0	N/A	12	50	720	0	120	0	12	50	360	0	60	0
Front-end Loader: Description: For landfall transition and onshore construction	1	1000	0	N/A	12	50	720	0	120	0	12	50	360	0	60	0
Trenchers: Description: For use during onshore construction	1	100	0	N/A	12	75	1080	0	120	0	0	0	0	0	60	0
Dump Trucks: Description: For use during onshore construction	2	2500	0	N/A	12	75	1080	0	120	0	12	50	360	0	60	0
Bucket Trucks	1	200	0	N/A	12	50	720	0	120	0	12	25	180	0	60	0
Lull Telescopic Forklift	1	150	0	N/A	12	50	720	0	120	0	12	50	360	0	60	0
Heavy-duty Trucks: Description: For use during onshore construction	1	200	0	N/A	6	25	180	0	120	0	12	25	180	0	60	0
Catapiller D7 Bulldozer	1	250	0	N/A	12	50	540	0	120	0	12	25	540	0	60	0
Pickup Trucks: Description: For activities/transport of crew to/from worksite during construction, operation, and decommissioning	4	200	0	N/A	6	50	360	0	120	0	6	50	180	0	60	0
Onshore Duct Bank (138kV Duct Bank ~5 miles)																
Cranes: Description: For landfall transition and onshore construction and decommissioning	1	1400	200	N/A	12	50	360	0	60	0	12	75	0	0	0	0
Excavator: Description: For landfall transition and onshore construction	1	800	0	N/A	12	50	360	0	60	0	12	50	0	0	0	0
Front-end Loader: Description: For landfall transition and onshore construction	1	1000	0	N/A	12	50	360	0	60	0	12	50	0	0	0	0

Table B1 Information on engines used for construction, maintenance and deconstruction vessels/vehicles

					Construction						Decommissioning					
Type of Equipment/Emission Source Description (list others as needed)	No. of Each Type of Vessel	Main Engine Rating (HP)	Auxillary Engine Rating (HP)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters
Trenchers: Description: For use during onshore construction	1	100	0	N/A	12	75	540	0	60	0	0	75	0	0	0	0
Dump Trucks: Description: For use during onshore construction	2	2500	0	N/A	12	50	360	0	60	0	12	50	0	0	0	0
Heavy-duty Trucks: Description: For use during onshore construction	1	200	0	N/A	12	25	180	0	60	0	12	25	0	0	0	0
Catapiller D7 Bulldozer	1	250	0	N/A	12	50	540	0	60	0	12	50	540	0	0	0
Pickup Trucks: Description: For activities/transport of crew to/from worksite during construction, operation, and decommissioning	4	200	0	N/A	12	50	360	0	60	0	12	50	0	0	0	0
HDD Boring Machine: Description: For boring of shore landing HDD	1	400	0	N/A	16	100	960	0	60	0	0	100	0	0	0	0
Beach Lane HDD (3000 foot @138kV)																
Cranes: Description: For landfall transition and onshore construction and decommissioning	1	1400	200	N/A	12	50	540	0	90	0	12	50	0	0	0	0
Excavator: Description: For landfall transition and onshore construction	1	800	0	N/A	12	50	540	0	90	0	12	50	0	0	0	0
Front-end Loader: Description: For landfall transition and onshore construction	1	1000	0	N/A	12	50	540	0	90	0	12	50	0	0	0	0
Dump Trucks: Description: For use during onshore construction	2	2500	0	N/A	12	50	540	0	90	0	12	50	0	0	0	0
Heavy-duty Trucks: Description: For use during onshore construction	1	200	0	N/A	12	25	270	0	90	0	12	25	0	0	0	0
Catapiller D7 Bulldozer	1	250	0	N/A	12	50	540	0	90	0	12	50	540	0	0	0
Pickup Trucks: Description: For activities/transport of crew to/from worksite during construction, operation, and decommissioning	4	200	0	N/A	12	50	540	0	90	0	12	50	0	0	0	0
HDD Boring Machine: Description: For boring of shore landing HDD	1	400	0	N/A	16	100	1440	0	90	0	0	100	0	0	0	0

Table B1 Information on engines used for construction, maintenance and deconstruction vessels/vehicles

					Construction						Decommissioning					
Type of Equipment/Emission Source Description (list others as needed)	No. of Each Type of Vessel	Main Engine Rating (HP)	Auxillary Engine Rating (HP)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters
Montauk Highway HDD (300 foot @ 138kV)																
Cranes: Description: For landfall transition and onshore construction and decommissioning	1	1400	200	N/A	12	50	240	0	40	0	12	50	0	0	0	0
Excavator: Description: For landfall transition and onshore construction	1	800	0	N/A	12	50	240	0	40	0	12	50	0	0	0	0
Front-end Loader: Description: For landfall transition and onshore construction	1	1000	0	N/A	12	50	240	0	40	0	12	50	0	0	0	0
Dump Trucks: Description: For use during onshore construction	2	2500	0	N/A	12	50	240	0	40	0	12	50	0	0	0	0
Heavy-duty Trucks: Description: For use during onshore construction	1	200	0	N/A	12	25	120	0	40	0	12	25	0	0	0	0
Catapiller D7 Bulldozer	1	250	0	N/A	12	50	540	0	40	0	12	50	540	0	0	0
Pickup Trucks: Description: For activities/transport of crew to/from worksite during construction, operation, and decommissioning	4	200	0	N/A	12	50	240	0	40	0	12	50	0	0	0	0
HDD Boring Machine: Description: For boring of shore landing HDD	1	400	0	N/A	16	100	640	0	40	0	0	100	0	0	0	0

Table B2a - Information (for worst-case conformity emission estimates) on engines used for construction, maintenance and deconstruction vessels/vehicles - associated with Port locations

Nautical Mile (M)
1 km = 0.5399555 M
1 mile = 0.8689741 M

	Transit distance												Cable Route											
	New London, CT			New Bedford, MA			ProvPort, RI			Shinnecock, NY			Paulsboro Marine Terminal, NJ			Sparrows Point, MD			Port of Norfolk, VA			substation in NY		
	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (M)	%	Trip Distances (mile)	Trip Distances (M)	%	Trip Distances (mile)	Trip Distances (M)	%	Trip Distances (mile)	Trip Distances (NM)	%	
Total distance to port	55.79	48.5		39.47	34.30		53.8	46.7		76.0	66.0		351.6	305.5		546.3	474.7		410.6	356.8		82.2	71.4		
																						20.7	18.0	25%	interarray cable lay within 25 mile of SFWF
Within 25-mile of SFWF outside State Water	20.5	17.81	37%	19.3	16.77	49%	21.0	18.2	39%	25.0	21.7	33%	25	21.7	7%	25.0	21.7	5%	25.0	21.7	6%	23.7	20.6	29%	Within 25-mile of SFWF outside State Water
Outside 25-mile of SFWF and in state water inside 25-mile of SFWF	35.29	30.67	63%	20.2	17.53	51%	32.8	28.5	61%	51.0	44.3	67%	326.6	283.8	93%	521.3	453.0	95%	385.6	335.1	94%	37.8	32.8	46%	Outside 25-mile of SFWF and in state water inside 25-mile of SFWF
outside 25 mile of SFWF and within 25mi of MA				20.2	17.53	51%																			outside 25 mile of SFWF and within 25 mile of MA
outside 25 mile of SFWF and within 25mi of RI	22.2	19.33	40%				32.8	28.5	61%																outside 25 mile of SFWF and within 25-mile of RI
outside 25 mile of SFWF and within 25mi of NY										51.0	44.27	67%	57.5	50.0	16%	23.8	20.7	4%	23.5	20.4	6%	37.8	32.80	46%	outside 25 mile of SFWF and within 25-mile of NY
outside 25 mile of SFWF and within 25mi of CT	13.1	11.34	23%																						outside 25 mile of SFWF and within 25-mile of CT
outside 25 mile of SFWF and within 25mi of NJ													194.3	168.8	55%	0.0	0.0	0%	0.0	0.0	0%				outside 25 mile of SFWF and within 25mi of NJ
outside 25 mile of SFWF in Other Water Offshore													74.8	65.0	21%	217.3	188.8	40%	218.6	190.0	53%				outside 25 mile of SFWF in Other Water Offshore
outside 25 mile of SFWF and within 25mi of MD																133.0	115.6	24%	34.7	30.2	8%				outside 25 mile of SFWF and within 25mi of MD
outside 25 mile of SFWF and within 25mi of VA																147.2	127.9	27%	108.8	94.5	26%				outside 25 mile of SFWF and within 25mi of VA

Trip Distances (NM)					
New London	New Bedford	ProvPort	Paulsboro Marine	Sparrows Point	Port of Norfolk
48.5	34.3	46.7	305.5	474.7	356.8

Table 1a. - Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Monopile Installation (tons) - Port of New Bedford, MA

Please provide manufacturer catalog cut sheets for each engine, as available

Crew vessels Crane work Parts delivery

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-array cable installation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Floating/Jack-up Crane Barge	Jackup	1	40,000	29828	4100	3057	10	24	33	596	7	7.0	575	7.0	0	0	0	0	0	0	0	0						4	0	100	0	0	0	0	0	137
Towing Tug	Tug	2	15,000	11186	600	447	11	24	33	364	24	25.5	288	25.5	0	0	0	0	0	0	0	0						16	0	100	0	0	0	0	0	549
Material Barge	Barge	2	200	149	0	0	4	24	5	104	25	26.3	26	26.3	0	0	0	0	0	0	0	0						6	0	100	0	0	0	0	0	206
Anchor Handling Tug	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	370	46	47.8	229	47.8	0	0	0	0	0	0	0	0						30	0	100	0	0	0	0	0	1029
Rock Dumping Vessel	Dredging	1	20,000	14914	6000	4474	6.5	24	24	469	26	27.0	389	27.0	0	0	0	0	0	0	0	0						10	0	100	0	0	0	0	0	343
Crew Transport Vessel:	Crew	2	2,000	1491	50	37	23	24	50	604	12	12.2	568	12.2	0	0	0	0	0	0	0	0						16	0	100	0	0	0	0	0	549
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	25	396	19	19.8	337	19.8	0	0	0	0	0	0	0	0						26	0	100	0	0	0	0	0	892
Helicopter:	Helicopter	1	3700	2759	0	0	165	24	5	29	9	9.8	0	9.8	0	0	0	0	0	0	0	0						92	0	100	0	0	0	0	0	3155
Feeder Barge: Monco 335	Barge	2	8,000	5966	1500	1119	4	24	33	377	67	70.1	170	70.1	0	0	0	0	0	0	0	0						16	0	100	0	0	0	0	0	549
Bunkering vessel	Shuttle Tanker	1	8,000	5966	450	336	25	24	33	82	8	8.4	58	8.4	0	0	0	0	0	0	0	0						12	0	100	0	0	0	0	0	412

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines***

Table 1b. - Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Monopile Installation (tons) - Port of Providence, RI

Please provide manufacturer catalog cut sheets for each engine, as available

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-array cable installation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Floating/Jack-up Crane Barge	Jackup	1	40,000	29828	4100	3057	10	24	33	594	7	11	575	0	11	0	0	0	0	0	0	0				75	0	0	4	0	0	100	0	0	0	187
Towing Tug	Tug	2	15,000	11186	600	447	11	24	33	356.4	26	41	288	0	41	0	0	0	0	0	0	0				45	0	0	16	0	0	100	0	0	0	747
Material Barge	Barge	2	200	149	0	0	4	24	5	96	27	43	26	0	43	0	0	0	0	0	0	0				30	0	50	6	0	0	100	0	0	0	280
Anchor Handling Tug	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	356.4	50	78	229	0	78	0	0	0	0	0	0	0				45	0	0	30	0	0	100	0	0	0	1401
Rock Dumping Vessel	Dredging	1	20,000	14914	6000	4474	6.5	24	24	460.8	28	44	389	0	44	0	0	0	0	0	0	0				30	0	50	10	0	0	100	0	0	0	467
Crew Transport Vessel:	Crew	2	2,000	1491	50	37	23	24	50	600	13	20	568	0	20	0	0	0	0	0	0	0				25	0	25	16	0	0	100	0	0	0	747
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	25	390	21	32	337	0	32	0	0	0	0	0	0	0				45	5	15	26	0	0	100	0	0	0	1214
Helicopter:	Helicopter	1	3700	2759	0	0	165	24	5	24	10	16	0	0	16	0	0	0	0	0	0	0				10	0	10	92	0	0	100	0	0	0	4297
Feeder Barge: Monco 335	Barge	2	8,000	5966	1500	1119	4	24	33	356.4	73	114	170	0	114	0	0	0	0	0	0	0				45	0	0	16	0	0	100	0	0	0	747
Bunkering vessel	Shuttle Tanker	1	8,000	5966	450	336	25	24	33	80	9	14	58	0	14	0	0	0	0	0	0	0				9	1	0	12	0	0	100	0	0	0	560

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines***

Table 1c. - Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Monopile Installation (tons) - Port of New London, CT

Please provide manufacturer catalog cut sheets for each engine, as available

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-array cable installation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Floating/Jack-up Crane Barge	Jackup	1	40,000	29828	4100	3057	10	24	33	607	7	12	575	0	8	0	5	0	0	0	0	0							4	100	0	0	0	0	0	194
Towing Tug	Tug	2	15,000	11186	600	447	11	24	33	404	26	45	288	0	28	0	16	0	0	0	0	0							16	100	0	0	0	0	0	776
Material Barge	Barge	2	200	149	0	0	4	24	5	145	27	46	26	0	29	0	17	0	0	0	0	0							6	100	0	0	0	0	0	291
Anchor Handling Tug	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	445	49	84	229	0	53	0	31	0	0	0	0	0							30	100	0	0	0	0	0	1454
Rock Dumping Vessel	Dredging	1	20,000	14914	6000	4474	6.5	24	24	511	27	47	389	0	30	0	17	0	0	0	0	0							10	100	0	0	0	0	0	485
Crew Transport Vessel:	Crew	2	2,000	1491	50	37	23	24	50	623	12	21	568	0	13	0	8	0	0	0	0	0							16	100	0	0	0	0	0	776
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	25	427	20	35	337	0	22	0	13	0	0	0	0	0							26	100	0	0	0	0	0	1260
Helicopter:	Helicopter	1	3700	2759	0	0	165	24	5	44	10	17	0	0	11	0	6	0	0	0	0	0							92	100	0	0	0	0	0	4460
Feeder Barge: Monco 335	Barge	2	8,000	5966	1500	1119	4	24	33	486	71	123	170	0	77	0	45	0	0	0	0	0							16	100	0	0	0	0	0	776
Bunkering vessel	Shuttle Tanker	1	8,000	5966	450	336	25	24	33	96	9	15	58	0	9	0	5	0	0	0	0	0							12	100	0	0	0	0	0	582

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines***

Table B2a - Information (for worst-case conformity emission estimates) on engines used for construction, maintenance and deconstruction vessels/vehicles - associated with Port locations

Table 1d. - Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Monopile Installation (tons) - Paulsboro Marine Terminal, NJ

Please provide manufacturer catalog cut sheets for each engine, as available

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Floating/Jack-up Crane Barge	Jackup	1	40,000	29828	4100	3057	10	24	33	811	9	114	575	0	0	20	0	68	26	0	0							4	0	0	0	100	0	0	1222
Towing Tug	Tug	2	15,000	11186	600	447	11	24	33	1146	32	413	288	0	0	73	0	246	95	0	0							16	0	0	0	100	0	0	4889
Material Barge	Barge	2	200	149	0	0	4	24	5	910	33	426	26	0	0	75	0	253	97	0	0							6	0	0	0	100	0	0	1833
Anchor Handling Tug	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	1836	59	774	229	0	0	136	0	460	177	0	0							30	0	0	0	100	0	0	9166
Rock Dumping Vessel	Dredging	1	20,000	14914	6000	4474	6.5	24	24	1296	33	437	389	0	0	77	0	260	100	0	0							10	0	0	0	100	0	0	3055
Crew Transport Vessel:	Crew	2	2,000	1491	50	37	23	24	50	977	15	197	568	0	0	35	0	117	45	0	0							16	0	0	0	100	0	0	4889
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	25	1003	25	321	337	0	0	56	0	191	73	0	0							26	0	0	0	100	0	0	7944
Helicopter:	Helicopter	1	3700	2759	0	0	165	24	5	329	12	158	0	0	0	28	0	94	36	0	0							92	0	0	0	100	0	0	28109
Feeder Barge: Monco 335	Barge	2	8,000	5966	1500	1119	4	24	33	2527	87	1135	170	0	0	200	0	675	260	0	0							16	0	0	0	100	0	0	4889
Bunkering vessel	Shuttle Tanker	1	8,000	5966	450	336	25	24	33	340	10	136	58	0	0	24	0	81	31	0	0							12	0	0	0	100	0	0	3666

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines***

Table 1e. - Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Monopile Installation (tons) - Sparrows Point, MD

Please provide manufacturer catalog cut sheets for each engine, as available

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Floating/Jack-up Crane Barge	Jackup	1	40,000	29828	4100	3057	10	24	33	946	9	181	575	0	0	8	0	0	79	48	51							4	0	0	0	0	100	0	1899
Towing Tug	Tug	2	15,000	11186	600	447	11	24	33	1638	32	659	288	0	0	30	0	0	275	168	186							16	0	0	0	0	100	0	7596
Material Barge	Barge	2	200	149	0	0	4	24	5	1418	33	679	26	0	0	31	0	0	283	173	192							6	0	0	0	0	100	0	2848
Anchor Handling Tug	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	2759	59	1235	229	0	0	56	0	0	515	315	349							30	0	0	0	0	100	0	14242
Rock Dumping Vessel	Dredging	1	20,000	14914	6000	4474	6.5	24	24	1816	33	697	389	0	0	32	0	0	291	178	197							10	0	0	0	0	100	0	4747
Crew Transport Vessel:	Crew	2	2,000	1491	50	37	23	24	50	1213	15	315	568	0	0	14	0	0	131	80	89							16	0	0	0	0	100	0	7596
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	25	1386	25	512	337	0	0	23	0	0	213	131	145							26	0	0	0	0	100	0	12343
Helicopter:	Helicopter	1	3700	2759	0	0	165	24	5	517	12	253	0	0	0	12	0	0	105	64	71							92	0	0	0	0	100	0	43674
Feeder Barge: Monco 335	Barge	2	8,000	5966	1500	1119	4	24	33	3880	87	1812	170	0	0	83	0	0	755	462	512							16	0	0	0	0	100	0	7596
Bunkering vessel	Shuttle Tanker	1	8,000	5966	450	336	25	24	33	503	10	217	58	0	0	10	0	0	91	55	61							12	0	0	0	0	100	0	5697

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines***

Table 1f. - Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Monopile Installation (tons) - Port of Forfold, VA

Please provide manufacturer catalog cut sheets for each engine, as available

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Floating/Jack-up Crane Barge	Jackup	1	40,000	29828	4100	3057	10	24	33	852	9	134	575	0	0	8	0	0	76	12	38							4	0	0	0	0	0	100	1427
Towing Tug	Tug	2	15,000	11186	600	447	11	24	33	1295	32	487	288	0	0	30	0	0	276	44	138							16	0	0	0	0	0	100	5709
Material Barge	Barge	2	200	149	0	0	4	24	5	1064	33	503	26	0	0	31	0	0	285	45	142							6	0	0	0	0	0	100	2141
Anchor Handling Tug	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	2116	59	914	229	0	0	56	0	0	518	82	258							30	0	0	0	0	0	100	10704
Rock Dumping Vessel	Dredging	1	20,000	14914	6000	4474	6.5	24	24	1453	33	516	389	0	0	31	0	0	292	46	145							10	0	0	0	0	0	100	3568
Crew Transport Vessel:	Crew	2	2,000	1491	50	37	23	24	50	1049	15	233	568	0	0	14	0	0	132	21	66							16	0	0	0	0	0	100	5709
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	25	1119	25	379	337	0	0	23	0	0	215	34	107							26	0	0	0	0	0	100	9277
Helicopter:	Helicopter	1	3700	2759	0	0	165	24	5	386	12	187	0	0	0	11	0	0	106	17	53							92	0	0	0	0	0	100	32826
Feeder Barge: Monco 335	Barge	2	8,000	5966	1500	1119	4	24	33	2937	87	1340	170	0	0	82	0	0	760	121	378							16	0	0	0	0	0	100	5709
Bunkering vessel	Shuttle Tanker	1	8,000	5966	450	336	25	24	33	390	10	161	58	0	0	10	0	0	91	14	45							12	0	0	0	0	0	100	4282

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines***

Table 1g. - Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Cable Installation - Supply vessels from Port of New Bedford, MA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use***	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site**	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to Prov Port	Percentage of Trips to New Bedford	Percentage of Trips to Quonset	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Transportation Barge:	Barge	1	200	149.14	0	0	4	24	5	72	0	0.0	72.0	0.0	0	0	0.0	0.0	0.0	0.0	0.0	18.2	20.8	33.1	0	0	60	0	0	100	0	0	0	0	0	0
Fuel Bunkering Vessel:	Shuttle Tanker	1	2020	1506.314	3500	2609.95	11	24	100	720	9	9.6	694.5	9.6	0	0	0.0	0.0	0.0	0.0	0.0	175.1	200.3	319.1	25	5	0	6	0	100	0	0	0	0	0	206
Towing Tug:	Tug	2	15,000	11185.5	600	447.42	11	24	33	158.4	12	12.7	124.4	12.7	0	0	0.0	0.0	0.0	0.0	0.0	31.4	35.9	57.2	20	0	0	8	0	100	0	0	0	0	0	274
Material Barge:	Barge	1	200	149.14	0	0	4	24	5	96	34	35.1	2.6	35.1	0	0	0.0	0.0	0.0	0.0	0.0	0.7	0.7	1.2	20	0	60	8	0	100	0	0	0	0	0	274
Anchor Handling Tug:	Anchor Handling Tugs	1	8,000	5965.6	450	335.565	11	24	33	158.4	12	12.7	124.4	12.7	0	0	0.0	0.0	0.0	0.0	0.0	31.4	35.9	57.2	20	0	0	8	0	100	0	0	0	0	0	274
Cable Laying Vessel:	Cable Laying	1	3100	2311.67	5200	3877.64	12.4	24	100	1680	8	8.5	1657.4	8.5	0	0	0.0	0.0	0.0	0.0	0.0	417.8	478.1	761.5	60	10	0	6	0	100	0	0	0	0	0	206
Work Vessel:	Supply Ship	1	15,000	11185.5	100	74.57	10	24	33	356.4	50	52.6	216.3	52.6	0	0	0.0	0.0	0.0	0.0	0.0	54.5	62.4	99.4	45	0	0	30	0	100	0	0	0	0	0	1029
Work Vessel Support Tug:	Tug	1	15,000	11185.5	600	447.42	11	24	33	356.4	46	47.8	229.0	47.8	0	0	0.0	0.0	0.0	0.0	0.0	57.7	66.1	105.2	45	0	0	30	0	100	0	0	0	0	0	1029
Crew Transport Vessel:	Crew	2	2,700	2013.39	50	37.285	23	24	50	1440	22	22.9	1379.1	22.9	0	0	0.0	0.0	0.0	0.0	0.0	347.7	397.8	633.6	60	0	60	30	0	100	0	0	0	0	0	1029
Support Vessel/Inflatable boats:	Crew	1	500	372.85	0	0	23	24	30	432	15	15.2	391.4	15.2	0	0	0.0	0.0	0.0	0.0	0.0	98.7	112.9	179.8	30	15	15	20	0	100	0	0	0	0	0	686
Helicopter:		1	3700	2759.09	0	0	165	24	5	24	9	9.8	0.0	9.8	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	0	10	92	0	100	0	0	0	0	0	3155

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines, **- Assuming the cable laying time in NY remain the same regardless the where the supply port is. ***-Total yearly hour use will be slightly different depending on the location of port used.***

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Table B2a - Information (for worst-case conformity emission estimates) on engines used for construction, maintenance and deconstruction vessels/vehicles - associated with Port locations

Cable Installation - Supply vessels from Port of Providence, RI

Please provide manufacturer catalog cut sheets for each engine, as available

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use***	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site**	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Transportation Barge:	Barge	1	200	149.14	0	0	4	24	5	72	0	0.0	72.0	0.0	0	0	0.0	0.0	0.0	0.0	0.0	18.2	20.8	33.1	0	0	60	0	0	0	100	0	0	0	0
Fuel Bunkering Vessel:	Shuttle Tanker	1	2020	1506.314	3500	2609.95	11	24	100	720	10	15.5	694.5	0.0	16	0	0.0	0.0	0.0	0.0	0.0	175.1	200.3	319.1	25	5	0	6	0	0	100	0	0	0	280
Towing Tug:	Tug	2	15,000	11185.5	600	447.42	11	24	33	158.4	13	20.7	124.4	0.0	21	0	0.0	0.0	0.0	0.0	0.0	31.4	35.9	57.2	20	0	0	8	0	0	100	0	0	0	374
Material Barge:	Barge	1	200	149.14	0	0	4	24	5	96	36	57.0	2.6	0.0	57	0	0.0	0.0	0.0	0.0	0.0	0.7	0.7	1.2	20	0	60	8	0	0	100	0	0	0	374
Anchor Handling Tug:	Anchor Handling Tugs	1	8,000	5965.6	450	335.565	11	24	33	158.4	13	20.7	124.4	0.0	21	0	0.0	0.0	0.0	0.0	0.0	31.4	35.9	57.2	20	0	0	8	0	0	100	0	0	0	374
Cable Laying Vessel:	Cable Laying	1	3100	2311.67	5200	3877.64	12.4	24	100	1680	9	13.8	1657.4	0.0	14	0	0.0	0.0	0.0	0.0	0.0	417.8	478.1	761.5	60	10	0	6	0	0	100	0	0	0	280
Work Vessel:	Supply Ship	1	15,000	11185.5	100	74.57	10	24	33	356.4	55	85.5	216.3	0.0	85	0	0.0	0.0	0.0	0.0	0.0	54.5	62.4	99.4	45	0	0	30	0	0	100	0	0	0	1401
Work Vessel Support Tug:	Tug	1	15,000	11185.5	600	447.42	11	24	33	356.4	50	77.7	229.0	0.0	78	0	0.0	0.0	0.0	0.0	0.0	57.7	66.1	105.2	45	0	0	30	0	0	100	0	0	0	1401
Crew Transport Vessel:	Crew	2	2,700	2013.39	50	37.285	23	24	50	1440	24	37.2	1379.1	0.0	37	0	0.0	0.0	0.0	0.0	0.0	347.7	397.8	633.6	60	0	60	30	0	0	100	0	0	0	1401
Support Vessel/Inflatable boats:	Crew	1	500	372.85	0	0	23	24	30	432	16	24.8	391.4	0.0	25	0	0.0	0.0	0.0	0.0	0.0	98.7	112.9	179.8	30	15	15	20	0	0	100	0	0	0	934
Helicopter:		1	3700	2759.09	0	0	165	24	5	24	10	15.9	0.0	0.0	16	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	0	10	92	0	0	100	0	0	0	4297

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

- Work Duration is for a build-out of 16 turbines, **- Assuming the cable laying time in NY remain the same regardless the where the supply port is. ***-Total yearly hour use will be slightly different depending on the location of port used.

Cable Installation - Supply vessels from Port of New London, CT

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use ***	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site**	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Transportation Barge:	Barge	1	200	149.14	0	0	4	24	5	72	0	0.0	72.0	0.0	0	0	0.0	0.0	0.0	0.0	0.0	18.2	20.8	33.1	0	0	60	0	100	0	0	0	0	0	0
Fuel Bunkering Vessel:	Shuttle Tanker	1	2020	1506.314	3500	2609.95	11	24	100	720	10	16.7	694.5	0.0	11	0	6.2	0.0	0.0	0.0	0.0	175.1	200.3	319.1	25	5	0	6	100	0	0	0	0	0	291
Towing Tug:	Tug	2	15,000	11185.5	600	447.42	11	24	33	158.4	13	22.3	124.4	0.0	14	0	8.2	0.0	0.0	0.0	0.0	31.4	35.9	57.2	20	0	0	8	100	0	0	0	0	0	388
Material Barge:	Barge	1	200	149.14	0	0	4	24	5	96	36	61.3	2.6	0.0	39	0	22.7	0.0	0.0	0.0	0.0	0.7	0.7	1.2	20	0	60	8	100	0	0	0	0	0	388
Anchor Handling Tug:	Anchor Handling Tugs	1	8,000	5965.6	450	335.565	11	24	33	158.4	13	22.3	124.4	0.0	14	0	8.2	0.0	0.0	0.0	0.0	31.4	35.9	57.2	20	0	0	8	100	0	0	0	0	0	388
Cable Laying Vessel:	Cable Laying	1	3100	2311.67	5200	3877.64	12.4	24	100	1680	9	14.8	1657.4	0.0	9	0	5.5	0.0	0.0	0.0	0.0	417.8	478.1	761.5	60	10	0	6	100	0	0	0	0	0	291
Work Vessel:	Supply Ship	1	15,000	11185.5	100	74.57	10	24	33	356.4	53	92.0	216.3	0.0	58	0	34.0	0.0	0.0	0.0	0.0	54.5	62.4	99.4	45	0	0	30	100	0	0	0	0	0	1454
Work Vessel Support Tug:	Tug	1	15,000	11185.5	600	447.42	11	24	33	356.4	49	83.6	229.0	0.0	53	0	30.9	0.0	0.0	0.0	0.0	57.7	66.1	105.2	45	0	0	30	100	0	0	0	0	0	1454
Crew Transport Vessel:	Crew	2	2,700	2013.39	50	37.285	23	24	50	1440	23	40.0	1379.1	0.0	25	0	14.8	0.0	0.0	0.0	0.0	347.7	397.8	633.6	60	0	60	30	100	0	0	0	0	0	1454
Support Vessel/Inflatable boats:	Crew	1	500	372.85	0	0	23	24	30	432	15	26.7	391.4	0.0	17	0	9.9	0.0	0.0	0.0	0.0	98.7	112.9	179.8	30	15	15	20	100	0	0	0	0	0	970
Helicopter:		1	3700	2759.09	0	0	165	24	5	24	10	17.1	0.0	0.0	11	0	6.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	0	10	92	100	0	0	0	0	0	4460

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

- Work Duration is for a build-out of 16 turbines, **- Assuming the cable laying time in NY remain the same regardless the where the supply port is. ***-Total yearly hour use will be slightly different depending on the location of port used.

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Cable Installation - Supply vessels from Paulsboro Marine Terminal, NJ

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use ***	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site**	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Transportation Barge:	Barge	1	200	149	0	0	4	24	5	72	0	0	72	0	0	0	0	0	0	0	0	18	21	33	0	0	60	0	0	0	100	0	0	0	0
Fuel Bunkering Vessel:	Shuttle Tanker	1	2020	1506	3500	2610	11	24	100	720	12	155	695	0	0	27	0	92	35	0	0	175	200	319	25	5	0	6	0	0	100	0	0	0	1833
Towing Tug:	Tug	2	15,000	11186	600	447	11	24	33	158.4	16	206	124	0	0	36	0	123	47	0	0	31	36	57	20	0	0	8	0	0	100	0	0	0	2444
Material Barge:	Barge	1	200	149	0	0	4	24	5	96	43	568	3	0	0	100	0	338	130	0	0	1	1	1	20	0	60	8	0	0	100	0	0	0	2444
Anchor Handling Tug:	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	158.4	16	206	124	0	0	36	0	123	47	0	0	31	36	57	20	0	0	8	0	0	100	0	0	0	2444
Cable Laying Vessel:	Cable Laying	1	3100	2312	5200	3878	12.4	24	100	1680	11	137	1657	0	0	24	0	82	31	0	0	418	478	761	60	10	0	6	0	0	100	0	0	0	1833
Work Vessel:	Supply Ship	1	15,000	11186	100	75	10	24	33	356.4	65	851	216	0	0	150	0	507	195	0	0	55	62	99	45	0	0	30	0	0	100	0	0	0	9166
Work Vessel Support Tug:	Tug	1	15,000	11186	600	447	11	24	33	356.4	59	774	229	0	0	136	0	460	177	0	0	58	66	105	45	0	0	30	0	0	100	0	0	0	9166
Crew Transport Vessel:	Crew	2	2,700	2013	50	37	23	24	50	1440	28	370	1379	0	0	65	0	220	85	0	0	348	398	634	60	0	60	30	0	0	100	0	0	0	9166
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	30	432	19	247	391	0	0	43	0	147	57	0	0	99	113	180	30	15	15	20	0	0	100	0	0	0	6111
Helicopter:		1	3700	2759	0	0	165	24	5	24	12	158	0	0	0	28	0	94	36	0	0	0	0	0	10	0	10	92	0	0	100	0	0	0	28109

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

- Work Duration is for a build-out of 16 turbines, **- Assuming the cable laying time in NY remain the same regardless the where the supply port is. ***-Total yearly hour use will be slightly different depending on the location of port used.

Cable Installation - Supply vessels from Sparrows Point, MD

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use ***	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site**	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to Prov Port	Percentage of Trips to New Bedford	Percentage of Trips to Quonset	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Transportation Barge:	Barge	1	200	149	0	0	4	24	5	72	0	0.0	72.0	0.0	0	0	0	0	0	0	0	18	21	33	0	0	60	0	0	0	0	0	0	100	0	0
Fuel Bunkering Vessel:	Shuttle Tanker	1	2020	1506	3500	2610	11	24	100	720	12	247.1	694.5	0.0	0	11	0	0	103	63	70	175	200	319	25	5	0	6	0	0	0	0	0	100	0	2848
Towing Tug:	Tug	2	15,000	11186	600	447	11	24	33	158.4	16	329.5	124.4	0.0	0	15	0	0	137	84	93	31	36	57	20	0	0	8	0	0	0	0	0	100	0	3798
Material Barge:	Barge	1	200	149	0	0	4	24	5	96	43	906.0	2.6	0.0	0	41	0	0	378	231	256	1	1	1	20	0	60	8	0	0	0	0	0	100	0	3798
Anchor Handling Tug:	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	158.4	16	329.5	124.4	0.0	0	15	0	0	137	84	93	31	36	57	20	0	0	8	0	0	0	0	0	100	0	3798
Cable Laying Vessel:	Cable Laying	1	3100	2312	5200	3878	12.4	24	100	1680	11	219.2	1657.4	0.0	0	10	0	0	91	56	62	418	478	761	60	10	0	6	0	0	0	0	0	100	0	2848
Work Vessel:	Supply Ship	1	15,000	11186	100	75	10	24	33	356.4	65	1359.0	216.3	0.0	0	62	0	0	566	347	384	55	62	99	45	0	0	30	0	0	0	0	0	100	0	14242
Work Vessel Support Tug:	Tug	1	15,000	11186	600	447	11	24	33	356.4	59	1235.4	229.0	0.0	0	56	0	0	515	315	349	58	66	105	45	0	0	30	0	0	0	0	0	100	0	14242
Crew Transport Vessel:	Crew	2	2,700	2013	50	37	23	24	50	1440	28	590.9	1379.1	0.0	0	27	0	0	246	151	167	348	398	634	60	0	60	30	0	0	0	0	0	100	0	14242
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	30	432	19	393.9	391.4	0.0	0	18	0	0	164	100	111	99	113	180	30	15	15	20	0	0	0	0	0	100	0	9494
Helicopter:		1	3700	2759	0	0	165	24	5	24	12	252.6	0.0	0.0	0	12	0	0	105	64	71	0	0	0	10	0	10	92	0	0	0	0	0	100	0	43674

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

- Work Duration is for a build-out of 16 turbines, **- Assuming the cable laying time in NY remain the same regardless the where the supply port is. ***-Total yearly hour use will be slightly different depending on the location of port used.

Table B2a - Information (for worst-case conformity emission estimates) on engines used for construction, maintenance and deconstruction vessels/vehicles - associated with Port locations

Cable Installation - Supply vessels from Port of Forfold, VA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use ***	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site**	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-array cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Transportation Barge:	Barge	1	200	149	0	0	4	24	5	72	0	0	72.0	0.0	0	0	0	0	0	0	0	18	21	33	0	0	60	0	0	0	100	0	0	0	400
Fuel Bunkering Vessel:	Shuttle Tanker	1	2020	1506	3500	2610	11	24	100	720	12	183	694.5	0.0	0	11	0	0	104	16	52	175	200	319	25	5	0	6	0	0	0	0	0	100	2141
Towing Tug:	Tug	2	15,000	11186	600	447	11	24	33	158.4	16	244	124.4	0.0	0	15	0	0	138	22	69	31	36	57	20	0	0	8	0	0	0	0	0	100	2854
Material Barge:	Barge	1	200	149	0	0	4	24	5	96	43	670	2.6	0.0	0	41	0	0	380	60	189	1	1	1	20	0	60	8	0	0	0	0	0	100	2854
Anchor Handling Tug:	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	158.4	16	244	124.4	0.0	0	15	0	0	138	22	69	31	36	57	20	0	0	8	0	0	0	0	0	100	2854
Cable Laying Vessel:	Cable Laying	1	3100	2312	5200	3878	12.4	24	100	1680	11	162	1657.4	0.0	0	10	0	0	92	15	46	418	478	761	60	10	0	6	0	0	0	0	0	100	2141
Work Vessel:	Supply Ship	1	15,000	11186	100	75	10	24	33	356.4	65	1005	216.3	0.0	0	61	0	0	570	90	284	55	62	99	45	0	0	30	0	0	0	0	0	100	10704
Work Vessel Support Tug:	Tug	1	15,000	11186	600	447	11	24	33	356.4	59	914	229.0	0.0	0	56	0	0	518	82	258	58	66	105	45	0	0	30	0	0	0	0	0	100	10704
Crew Transport Vessel:	Crew	2	2,700	2013	50	37	23	24	50	1440	28	437	1379.1	0.0	0	27	0	0	248	39	123	348	398	634	60	0	60	30	0	0	0	0	0	100	10704
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	30	432	19	291	391.4	0.0	0	18	0	0	165	26	82	99	113	180	30	15	15	20	0	0	0	0	0	100	7136
Helicopter:		1	3700	2759	0	0	165	24	5	24	12	187	0.0	0.0	0	11	0	0	106	17	53	0	0	0	10	0	10	92	0	0	0	0	0	100	32826

***NOTE:* * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.**

****- Work Duration is for a build-out of 16 turbines, **- Assuming the cable laying time in NY remain the same regardless the where the supply port is. ***-Total yearly hour use will be slightly different depending on the location of port used.***

PM insertion 5.15.18

Bunkering Vessel for all scopes - Has been included in emission calculations.

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-array cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Bunkering vessel	Shuttle Tanker	1	8,000	5965.6	450	335.565	11	24	33	80															9	1	0	8	0	0	100	0	0	0	400

On-shore Construction

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-array cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Onshore Substation Installation (138kV/69kV Substation with Power transformer and shunt reactors)																																		
Cranes:		1	1400	1043.98	200	149.14		12	50	720															0	120	0								
Excavator:		1	800	596.56	0	0		12	50	720															0	120	0								
Front-end Loader:		1	1000	745.7	0	0		12	50	720															0	120	0								
Trenchers:		1	100	74.57	0	0		12	75	1080															0	120	0								
Dump Trucks:		2	2500	1864.25	0	0		12	75	1080															0	120	0	NA							
Bucket Trucks		1	200	149.14	0	0	NA	12	50	720															0	120	0								
Lull Telescopic Forklift		1	150	111.855	0	0		12	50	720															0	120	0								
Heavy-duty Trucks:		1	200	149.14	0	0		6	25	180															0	120	0								
Catapiller D7 Bulldozer		1	250	186.425	0	0		12	50	540															0	120	0								
Pickup Trucks:		4	200	149.14	0	0		6	50	360															0	120	0								
Onshore Duct Bank (138kV Duct Bank ~5 miles)								0	0																									
Cranes:		1	1400	1043.98	200	149.14		12	50	360															0	60	0								
Excavator:		1	800	596.56	0	0		12	50	360															0	60	0								
Front-end Loader:		1	1000	745.7	0	0		12	50	360															0	60	0								
Trenchers:		1	100	74.57	0	0		12	75	540															0	60	0								
Dump Trucks:		2	2500	1864.25	0	0	NA	12	50	360															0	60	0	NA							
Heavy-duty Trucks:		1	200	149.14	0	0		12	25	180															0	60	0								
Catapiller D7 Bulldozer		1	250	186.425	0	0		12	50	540															0	60	0								
Pickup Trucks:		4	200	149.14	0	0		12	50	360															0	60	0								
HDD Boring Machine:		1	400	298.28	0	0		16	100	960															0	60	0								
Beach Lane HDD (3000 foot @138kV)								0	0																									
Cranes:		1	1400	1043.98	200	149.14		12	50	540															0	90	0								
Excavator:		1	800	596.56	0	0		12	50	540															0	90	0								
Front-end Loader:		1	1000	745.7	0	0		12	50	540															0	90	0								
Dump Trucks:		2	2500	1864.25	0	0		12	50	540															0	90	0	NA							
Heavy-duty Trucks:		1	200	149.14	0	0	NA	12	25	270															0	90	0								
Catapiller D7 Bulldozer		1	250	186.425	0	0		12	50	540															0	90	0								
Pickup Trucks:		4	200	149.14	0	0		12	50	540															0	90	0								
HDD Boring Machine:		1	400	298.28	0	0		16	100	1440															0	90	0								
Montauk Highway HDD (300 foot @ 138kV)								0	0																									
Cranes:		1	1400	1043.98	200	149.14		12	50	240															0	40	0								
Excavator:		1	800	596.56	0	0		12	50	240															0	40	0								
Front-end Loader:		1	1000	745.7	0	0		12	50	240															0	40	0								
Dump Trucks:		2	2500	1864.25	0	0	NA	12	50	240															0	40	0	NA							
Heavy-duty Trucks:		1	200	149.14	0	0		12	25	120															0	40	0								
Catapiller D7 Bulldozer		1	250	186.425	0	0		12	50	540															0	40	0								
Pickup Trucks:		4	200	149.14	0	0		12	50	240															0	40	0								
HDD Boring Machine:		1	400	298.28	0	0		16	100	640															0	40	0								

Table B2b - Information (for worst-case OCS emission estimates) on engines used for construction, maintenance and deconstruction vessels/vehicles - associated with Port locations

Nautical Mile (M)

1 km = 0.5399555 M

1 mile = 0.8689741 M

	Transit distance																				Cable Route			
	New London, CT			New Bedford, MA			ProvPort, RI			Shinnecock, NY			Paulsboro Marine Terminal, NJ			Sparrows Point, MD			Port of Norfolk, VA			substation in NY		
	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (M)	%	Trip Distances (mile)	Trip Distances (M)	%	Trip Distances (mile)	Trip Distances (M)	%	Trip Distances (mile)	Trip Distances (NM)	%	
Total distance to port	55.9	48.6		39.5	34.30		53.7	46.7		76.0	66.0		351.6	305.5		546.3	474.7		410.6	356.8		82.5	71.7		
																						20.7	18.0	25%	interarray cable lay within 25 mile of SFWF
Within 25-mile of SFWF	43.7	37.97	78%	25.0	21.72	63%	25.9	22.5	48%	76.0	66.0	100%	62.1	54.0	18%	47.5	41.3	9%	47.3	41.1	12%	61.8	53.7	75%	Within 25-mile of SFWF
Outside 25-mile of SFWF	12.2	10.60	22%	14.5	12.57	37%	27.8	24.2	52%	0.0	0.0	0%	289.5	251.6	82%	498.8	433.4	91%	363.3	315.7	88%	0.0	0.0	0%	Outside 25-mile of SFWF
outside 25 mile of SFWF and within 25mi of MA				14.5	12.57	37%																			outside 25 mile of SFWF and within 25 mile of MA
outside 25 mile of SFWF and within 25mi of RI							27.8	24.2	52%																outside 25 mile of SFWF and within 25-mile of RI
outside 25 mile of SFWF and within 25mi of NY										0.0	0.00	0%	20.4	17.7	6%	1.3	1.1	0%	1.2	1.0	0%				outside 25 mile of SFWF and within 25-mile of NY
outside 25 mile of SFWF and within 25mi of CT	12.2	10.60	22%																						outside 25 mile of SFWF and within 25-mile of CT
outside 25 mile of SFWF and within 25mi of NJ													194.3	168.8	55%	0.0	0.0	0%	0.0	0.0	0%				outside 25 mile of SFWF and within 25mi of NJ
outside 25 mile of SFWF in Other Water Offshore													74.8	65.0	21%	217.3	188.8	40%	218.6	190.0	53%				outside 25 mile of SFWF in Other Water Offshore
outside 25 mile of SFWF and within 25mi of MD																133.0	115.6	24%	34.7	30.2	8%				outside 25 mile of SFWF and within 25mi of MD
outside 25 mile of SFWF and within 25mi of VA																147.2	127.9	27%	108.8	94.5	26%				outside 25 mile of SFWF and within 25mi of VA

Table 1a. - Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Monopile Installation (tons) - Port of New Bedford, MA

Please provide manufacturer catalog cut sheets for each engine, as available

Trip Distances (NM)					
New London	New Bedford	ProvPort	Paulsboro Marine	Sparrows Point	Port of Norfolk
48.6	34.3	46.7	305.5	474.7	356.8

Crew vessels Crane work Parts delivery

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-array cable installation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Floating/Jack-up Crane Barge	Jackup	1	40,000	29828	4100	3057	10	24	33	594	9	5.0	575	5.0	0	0	0	0	0	0	0							4	0	100	0	0	0	0	0	137
Towing Tug	Tug	2	15,000	11186	600	447	11	24	33	357	32	18.3	289	18.3	0	0	0	0	0	0	0							16	0	100	0	0	0	0	0	549
Material Barge	Barge	2	200	149	0	0	4	24	5	96	33	18.9	26	18.9	0	0	0	0	0	0	0							6	0	100	0	0	0	0	0	206
Anchor Handling Tug	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	357	59	34.3	229	34.3	0	0	0	0	0	0	0							30	0	100	0	0	0	0	0	1029
Rock Dumping Vessel	Dredging	1	20,000	14914	6000	4474	6.5	24	24	461	33	19.3	389	19.3	0	0	0	0	0	0	0							10	0	100	0	0	0	0	0	343
Crew Transport Vessel:	Crew	2	2,000	1491	50	37	23	24	50	600	15	8.7	568	8.7	0	0	0	0	0	0	0							16	0	100	0	0	0	0	0	549
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	25	390	25	14.2	337	14.2	0	0	0	0	0	0	0							26	0	100	0	0	0	0	0	892
Helicopter:	Helicopter	1	3700	2759	0	0	165	24	5	26	12	7.0	0	7.0	0	0	0	0	0	0	0							92	0	100	0	0	0	0	0	3155
Feeder Barge: Monco 335	Barge	2	8,000	5966	1500	1119	4	24	33	357	87	50.3	170	50.3	0	0	0	0	0	0	0							16	0	100	0	0	0	0	0	549
Bunkering vessel	Shuttle Tanker	1	8,000	5966	450	336	25	24	33	80	10	6.0	58	6.0	0	0	0	0	0	0	0							12	0	100	0	0	0	0	0	412

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

- Work Duration is for a build-out of 16 turbines

Table 1b. - Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Monopile Installation (tons) - Port of Providence, RI

Please provide manufacturer catalog cut sheets for each engine, as available

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-array cable installation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Floating/Jack-up Crane Barge	Jackup	1	40,000	29828	4100	3057	10	24	33	594	9	10	575	0	10	0	0	0	0	0	0				75	0	0	4	0	0	100	0	0	0	187
Towing Tug	Tug	2	15,000	11186	600	447	11	24	33	356.4	33	35	289	0	35	0	0	0	0	0	0				45	0	0	16	0	0	100	0	0	0	747
Material Barge	Barge	2	200	149	0	0	4	24	5	96	34	36	26	0	36	0	0	0	0	0	0				30	0	50	6	0	0	100	0	0	0	280
Anchor Handling Tug	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	356.4	61	66	229	0	66	0	0	0	0	0	0				45	0	0	30	0	0	100	0	0	0	1400
Rock Dumping Vessel	Dredging	1	20,000	14914	6000	4474	6.5	24	24	460.8	35	37	389	0	37	0	0	0	0	0	0				30	0	50	10	0	0	100	0	0	0	467
Crew Transport Vessel:	Crew	2	2,000	1491	50	37	23	24	50	600	16	17	568	0	17	0	0	0	0	0	0				25	0	25	16	0	0	100	0	0	0	747
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	25	390	25	27	337	0	27	0	0	0	0	0	0				45	5	15	26	0	0	100	0	0	0	1213
Helicopter:	Helicopter	1	3700	2759	0	0	165	24	5	24	13	13	0	0	13	0	0	0	0	0	0				10	0	10	92	0	0	100	0	0	0	4293
Feeder Barge: Monco 335	Barge	2	8,000	5966	1500	1119	4	24	33	356.4	90	97	170	0	97	0	0	0	0	0	0				45	0	0	16	0	0	100	0	0	0	747
Bunkering vessel	Shuttle Tanker	1	8,000	5966	450	336	25	24	33	80	11	12	58	0	12	0	0	0	0	0	0				9	1	0	12	0	0	100	0	0	0	560

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

- Work Duration is for a build-out of 16 turbines

Table 1c. - Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Monopile Installation (tons) - Port of New London, CT

Please provide manufacturer catalog cut sheets for each engine, as available

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-array cable installation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Floating/Jack-up Crane Barge	Jackup	1	40,000	29828	4100	3057	10	24	33	599	15	4	575	0	0	0	4	0	0	0	0							4	100	0	0	0	0	0	194
Towing Tug	Tug	2	15,000	11186	600	447	11	24	33	375	55	15	289	0	0	0	15	0	0	0	0							16	100	0	0	0	0	0	777
Material Barge	Barge	2	200	149	0	0	4	24	5	115	57	16	26	0	0	0	16	0	0	0	0							6	100	0	0	0	0	0	291
Anchor Handling Tug	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	391	104	29	229	0	0	0	29	0	0	0	0							30	100	0	0	0	0	0	1457
Rock Dumping Vessel	Dredging	1	20,000	14914	6000	4474	6.5	24	24	480	58	16	389	0	0	0	16	0	0	0	0							10	100	0	0	0	0	0	486
Crew Transport Vessel:	Crew	2	2,000	1491	50	37	23	24	50	609	26	7	568	0	0	0	7	0	0	0	0							16	100	0	0	0	0	0	777
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	25	404	43	12	337	0	0	0	12	0	0	0	0							26	100	0	0	0	0	0	1263
Helicopter:	Helicopter	1	3700	2759	0	0	165	24	5	33	21	6	0	0	0	0	6	0	0	0	0							92	100	0	0	0	0	0	4469
Feeder Barge: Monco 335	Barge	2	8,000	5966	1500	1119	4	24	33	406	152	42	170	0	0	0	42	0	0	0	0							16	100	0	0	0	0	0	777
Bunkering vessel	Shuttle Tanker	1	8,000	5966	450	336	25	24	33	86	18	5	58	0	0	0	5	0	0	0	0							12	100	0	0	0	0	0	583

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

- Work Duration is for a build-out of 16 turbines

Table B2b - Information (for worst-case OCS emission estimates) on engines used for construction, maintenance and deconstruction vessels/vehicles - associated with Port locations

Table 1d. - Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Monopile Installation (tons) - Paulsboro Marine Terminal, NJ

Please provide manufacturer catalog cut sheets for each engine, as available

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Floating/Jack-up Crane Barge	Jackup	1	40,000	29828	4100	3057	10	24	33	798	22	101	575	0	0	7	0	68	26	0	0							4	0	0	0	100	0	0	1222
Towing Tug	Tug	2	15,000	11186	600	447	11	24	33	1099	78	366	289	0	0	26	0	246	95	0	0							16	0	0	0	100	0	0	4889
Material Barge	Barge	2	200	149	0	0	4	24	5	862	81	377	26	0	0	27	0	253	97	0	0							6	0	0	0	100	0	0	1833
Anchor Handling Tug	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	1748	147	686	229	0	0	48	0	460	177	0	0							30	0	0	0	100	0	0	9166
Rock Dumping Vessel	Dredging	1	20,000	14914	6000	4474	6.5	24	24	1246	83	387	389	0	0	27	0	260	100	0	0							10	0	0	0	100	0	0	3055
Crew Transport Vessel:	Crew	2	2,000	1491	50	37	23	24	50	955	38	175	568	0	0	12	0	117	45	0	0							16	0	0	0	100	0	0	4889
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	25	967	61	284	337	0	0	20	0	191	73	0	0							26	0	0	0	100	0	0	7944
Helicopter:	Helicopter	1	3700	2759	0	0	165	24	5	311	30	140	0	0	0	10	0	94	36	0	0							92	0	0	0	100	0	0	28109
Feeder Barge: Monco 335	Barge	2	8,000	5966	1500	1119	4	24	33	2398	216	1006	170	0	0	71	0	675	260	0	0							16	0	0	0	100	0	0	4889
Bunkering vessel	Shuttle Tanker	1	8,000	5966	450	336	25	24	33	325	26	121	58	0	0	9	0	81	31	0	0							12	0	0	0	100	0	0	3666

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines***

Table 1e. - Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Monopile Installation (tons) - Sparrows Point, MD

Please provide manufacturer catalog cut sheets for each engine, as available

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Floating/Jack-up Crane Barge	Jackup	1	40,000	29828	4100	3057	10	24	33	939	17	173	575	0	0	0	0	0	79	48	51							4	0	0	0	0	100	0	1899
Towing Tug	Tug	2	15,000	11186	600	447	11	24	33	1609	60	630	289	0	0	2	0	0	275	168	186							16	0	0	0	0	100	0	7596
Material Barge	Barge	2	200	149	0	0	4	24	5	1388	62	650	26	0	0	2	0	0	283	173	192							6	0	0	0	0	100	0	2848
Anchor Handling Tug	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	2706	113	1182	229	0	0	3	0	0	515	315	349							30	0	0	0	0	100	0	14242
Rock Dumping Vessel	Dredging	1	20,000	14914	6000	4474	6.5	24	24	1786	64	667	389	0	0	2	0	0	291	178	197							10	0	0	0	0	100	0	4747
Crew Transport Vessel:	Crew	2	2,000	1491	50	37	23	24	50	1199	29	302	568	0	0	1	0	0	131	80	89							16	0	0	0	0	100	0	7596
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	25	1364	47	490	337	0	0	1	0	0	213	131	145							26	0	0	0	0	100	0	12343
Helicopter:	Helicopter	1	3700	2759	0	0	165	24	5	506	23	242	0	0	0	1	0	0	105	64	71							92	0	0	0	0	100	0	43674
Feeder Barge: Monco 335	Barge	2	8,000	5966	1500	1119	4	24	33	3802	165	1734	170	0	0	5	0	0	755	462	512							16	0	0	0	0	100	0	7596
Bunkering vessel	Shuttle Tanker	1	8,000	5966	450	336	25	24	33	494	20	208	58	0	0	1	0	0	91	55	61							12	0	0	0	0	100	0	5697

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines***

Table 1f. - Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Monopile Installation (tons) - Port of Forfold, VA

Please provide manufacturer catalog cut sheets for each engine, as available

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Floating/Jack-up Crane Barge	Jackup	1	40,000	29828	4100	3057	10	24	33	844	16	126	575	0	0	0	0	0	76	12	38							4	0	0	0	0	0	100	1427
Towing Tug	Tug	2	15,000	11186	600	447	11	24	33	1267	60	459	289	0	0	2	0	0	276	44	138							16	0	0	0	0	0	100	5709
Material Barge	Barge	2	200	149	0	0	4	24	5	1035	62	474	26	0	0	2	0	0	285	45	142							6	0	0	0	0	0	100	2141
Anchor Handling Tug	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	2063	112	861	229	0	0	3	0	0	518	82	258							30	0	0	0	0	0	100	10704
Rock Dumping Vessel	Dredging	1	20,000	14914	6000	4474	6.5	24	24	1424	63	486	389	0	0	2	0	0	292	46	145							10	0	0	0	0	0	100	3568
Crew Transport Vessel:	Crew	2	2,000	1491	50	37	23	24	50	1035	29	220	568	0	0	1	0	0	132	21	66							16	0	0	0	0	0	100	5709
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	25	1097	46	357	337	0	0	1	0	0	215	34	107							26	0	0	0	0	0	100	9277
Helicopter:	Helicopter	1	3700	2759	0	0	165	24	5	375	23	176	0	0	0	1	0	0	106	17	53							92	0	0	0	0	0	100	32826
Feeder Barge: Monco 335	Barge	2	8,000	5966	1500	1119	4	24	33	2860	164	1263	170	0	0	4	0	0	760	121	378							16	0	0	0	0	0	100	5709
Bunkering vessel	Shuttle Tanker	1	8,000	5966	450	336	25	24	33	380	20	152	58	0	0	1	0	0	91	14	45							12	0	0	0	0	0	100	4282

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines***

Table 1g. - Information on engines used for construction, maintenance and deconstruction vessels/vehicles

Cable Installation - Supply vessels from Port of New Bedford, MA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use***	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site**	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to Prov Port	Percentage of Trips to New Bedford	Percentage of Trips to Quonset	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Transportation Barge:	Barge	1	200	149.14	0	0	4	24	5	72	0	0.0	72.0	0.0	0	0	0.0	0.0	0.0	0.0	0.0	18.1	53.9	0.0	0	0	60	0	0	100	0	0	0	0	0	0
Fuel Bunkering Vessel:	Shuttle Tanker	1	2020	1506.314	3500	2609.95	11	24	100	720	12	6.9	694.5	6.9	0	0	0.0	0.0	0.0	0.0	0.0	174.4	520.2	0.0	25	5	0	6	0	100	0	0	0	0	0	206
Towing Tug:	Tug	2	15,000	11185.5	600	447.42	11	24	33	158.4	16	9.1	124.5	9.1	0	0	0.0	0.0	0.0	0.0	0.0	31.2	93.2	0.0	20	0	0	8	0	100	0	0	0	0	0	274
Material Barge:	Barge	1	200	149.14	0	0	4	24	5	96	43	25.1	2.7	25.1	0	0	0.0	0.0	0.0	0.0	0.0	0.7	2.0	0.0	20	0	60	8	0	100	0	0	0	0	0	274
Anchor Handling Tug:	Anchor Handling Tugs	1	8,000	5965.6	450	335.565	11	24	33	158.4	16	9.1	124.5	9.1	0	0	0.0	0.0	0.0	0.0	0.0	31.2	93.2	0.0	20	0	0	8	0	100	0	0	0	0	0	274
Cable Laying Vessel:	Cable Laying	1	3100	2311.67	5200	3877.64	12.4	24	100	1680	11	6.1	1657.4	6.1	0	0	0.0	0.0	0.0	0.0	0.0	416.1	1241.3	0.0	60	10	0	6	0	100	0	0	0	0	0	206
Work Vessel:	Supply Ship	1	15,000	11185.5	100	74.57	10	24	33	356.4	65	37.7	216.4	37.7	0	0	0.0	0.0	0.0	0.0	0.0	54.3	162.1	0.0	45	0	0	30	0	100	0	0	0	0	0	1029
Work Vessel Support Tug:	Tug	1	15,000	11185.5	600	447.42	11	24	33	356.4	59	34.3	229.1	34.3	0	0	0.0	0.0	0.0	0.0	0.0	57.5	171.6	0.0	45	0	0	30	0	100	0	0	0	0	0	1029
Crew Transport Vessel:	Crew	2	2,700	2013.39	50	37.285	23	24	50	1440	28	16.4	1379.1	16.4	0	0	0.0	0.0	0.0	0.0	0.0	346.2	1032.9	0.0	60	0	60	30	0	100	0	0	0	0	0	1029
Support Vessel/Inflatable boats:	Crew	1	500	372.85	0	0	23	24	30	432	19	10.9	391.4	10.9	0	0	0.0	0.0	0.0	0.0	0.0	98.3	293.2	0.0	30	15	15	20	0	100	0	0	0	0	0	686
Helicopter:		1	3700	2759.09	0	0	165	24	5	24	12	7.0	0.0	7.0	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	0	10	92	0	100	0	0	0	0	0	3155

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines, **- Assuming the cable laying time in NY remain the same regardless the where the supply port is. ***-Total yearly hour use will be slightly different depending on the location of port used.***

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Table B2b - Information (for worst-case OCS emission estimates) on engines used for construction, maintenance and deconstruction vessels/vehicles - associated with Port locations

Cable Installation - Supply vessels from Port of Providence, RI

Please provide manufacturer catalog cut sheets for each engine, as available

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use***	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site**	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Transportation Barge:	Barge	1	200	149.14	0	0	4	24	5	72	0	0.0	72.0	0.0	0	0	0.0	0.0	0.0	0.0	0.0	18.1	53.9	0.0	0	0	60	0	0	0	100	0	0	0	0
Fuel Bunkering Vessel:	Shuttle Tanker	1	2020	1506.314	3500	2609.95	11	24	100	720	12	13.2	694.5	0.0	13	0	0.0	0.0	0.0	0.0	0.0	174.4	520.2	0.0	25	5	0	6	0	0	100	0	0	0	280
Towing Tug:	Tug	2	15,000	11185.5	600	447.42	11	24	33	158.4	16	17.6	124.5	0.0	18	0	0.0	0.0	0.0	0.0	0.0	31.2	93.2	0.0	20	0	0	8	0	0	100	0	0	0	373
Material Barge:	Barge	1	200	149.14	0	0	4	24	5	96	45	48.3	2.7	0.0	48	0	0.0	0.0	0.0	0.0	0.0	0.7	2.0	0.0	20	0	60	8	0	0	100	0	0	0	373
Anchor Handling Tug:	Anchor Handling Tugs	1	8,000	5965.6	450	335.565	11	24	33	158.4	16	17.6	124.5	0.0	18	0	0.0	0.0	0.0	0.0	0.0	31.2	93.2	0.0	20	0	0	8	0	0	100	0	0	0	373
Cable Laying Vessel:	Cable Laying	1	3100	2311.67	5200	3877.64	12.4	24	100	1680	11	11.7	1657.4	0.0	12	0	0.0	0.0	0.0	0.0	0.0	416.1	1241.3	0.0	60	10	0	6	0	0	100	0	0	0	280
Work Vessel:	Supply Ship	1	15,000	11185.5	100	74.57	10	24	33	356.4	68	72.5	216.4	0.0	72	0	0.0	0.0	0.0	0.0	0.0	54.3	162.1	0.0	45	0	0	30	0	0	100	0	0	0	1400
Work Vessel Support Tug:	Tug	1	15,000	11185.5	600	447.42	11	24	33	356.4	61	65.9	229.1	0.0	66	0	0.0	0.0	0.0	0.0	0.0	57.5	171.6	0.0	45	0	0	30	0	0	100	0	0	0	1400
Crew Transport Vessel:	Crew	2	2,700	2013.39	50	37.285	23	24	50	1440	29	31.5	1379.1	0.0	32	0	0.0	0.0	0.0	0.0	0.0	346.2	1032.9	0.0	60	0	60	30	0	0	100	0	0	0	1400
Support Vessel/Inflatable boats:	Crew	1	500	372.85	0	0	23	24	30	432	20	21.0	391.4	0.0	21	0	0.0	0.0	0.0	0.0	0.0	98.3	293.2	0.0	30	15	15	20	0	0	100	0	0	0	933
Helicopter:		1	3700	2759.09	0	0	165	24	5	24	13	13.5	0.0	0.0	13	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	0	10	92	0	0	100	0	0	0	4293

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines, **- Assuming the cable laying time in NY remain the same regardless the where the supply port is. ***-Total yearly hour use will be slightly different depending on the location of port used.***

Cable Installation - Supply vessels from Port of New London, CT

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use ***	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site**	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Transportation Barge:	Barge	1	200	149.14	0	0	4	24	5	72	0	0.0	72.0	0.0	0	0	0.0	0.0	0.0	0.0	0.0	18.1	53.9	0.0	0	0	60	0	100	0	0	0	0	0	0
Fuel Bunkering Vessel:	Shuttle Tanker	1	2020	1506.314	3500	2609.95	11	24	100	720	21	5.8	694.5	0.0	0	0	5.8	0.0	0.0	0.0	0.0	174.4	520.2	0.0	25	5	0	6	100	0	0	0	0	0	291
Towing Tug:	Tug	2	15,000	11185.5	600	447.42	11	24	33	158.4	28	7.7	124.5	0.0	0	0	7.7	0.0	0.0	0.0	0.0	31.2	93.2	0.0	20	0	0	8	100	0	0	0	0	0	389
Material Barge:	Barge	1	200	149.14	0	0	4	24	5	96	76	21.2	2.7	0.0	0	0	21.2	0.0	0.0	0.0	0.0	0.7	2.0	0.0	20	0	60	8	100	0	0	0	0	0	389
Anchor Handling Tug:	Anchor Handling Tugs	1	8,000	5965.6	450	335.565	11	24	33	158.4	28	7.7	124.5	0.0	0	0	7.7	0.0	0.0	0.0	0.0	31.2	93.2	0.0	20	0	0	8	100	0	0	0	0	0	389
Cable Laying Vessel:	Cable Laying	1	3100	2311.67	5200	3877.64	12.4	24	100	1680	18	5.1	1657.4	0.0	0	0	5.1	0.0	0.0	0.0	0.0	416.1	1241.3	0.0	60	10	0	6	100	0	0	0	0	0	291
Work Vessel:	Supply Ship	1	15,000	11185.5	100	74.57	10	24	33	356.4	114	31.8	216.4	0.0	0	0	31.8	0.0	0.0	0.0	0.0	54.3	162.1	0.0	45	0	0	30	100	0	0	0	0	0	1457
Work Vessel Support Tug:	Tug	1	15,000	11185.5	600	447.42	11	24	33	356.4	104	28.9	229.1	0.0	0	0	28.9	0.0	0.0	0.0	0.0	57.5	171.6	0.0	45	0	0	30	100	0	0	0	0	0	1457
Crew Transport Vessel:	Crew	2	2,700	2013.39	50	37.285	23	24	50	1440	50	13.8	1379.1	0.0	0	0	13.8	0.0	0.0	0.0	0.0	346.2	1032.9	0.0	60	0	60	30	100	0	0	0	0	0	1457
Support Vessel/Inflatable boats:	Crew	1	500	372.85	0	0	23	24	30	432	33	9.2	391.4	0.0	0	0	9.2	0.0	0.0	0.0	0.0	98.3	293.2	0.0	30	15	15	20	100	0	0	0	0	0	972
Helicopter:		1	3700	2759.09	0	0	165	24	5	24	21	5.9	0.0	0.0	0	0	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10	0	10	92	100	0	0	0	0	0	4469

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines, **- Assuming the cable laying time in NY remain the same regardless the where the supply port is. ***-Total yearly hour use will be slightly different depending on the location of port used.***

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Cable Installation - Supply vessels from Paulsboro Marine Terminal, NJ

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use ***	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site**	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to Prov Port	Percentage of Trips to New Bedford	Percentage of Trips to Quonset	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Transportation Barge:	Barge	1	200	149	0	0	4	24	5	72	0	0	72	0	0	0	0	0	0	0	0	18	54	0	0	0	60	0	0	0	0	0	100	0	0
Fuel Bunkering Vessel:	Shuttle Tanker	1	2020	1506	3500	2610	11	24	100	720	29	137	695	0	0	10	0	92	35	0	0	174	520	0	25	5	0	6	0	0	100	0	0	0	1833
Towing Tug:	Tug	2	15,000	11186	600	447	11	24	33	158.4	39	183	124	0	0	13	0	123	47	0	0	31	93	0	20	0	0	8	0	0	100	0	0	0	2444
Material Barge:	Barge	1	200	149	0	0	4	24	5	96	108	503	3	0	0	35	0	338	130	0	0	1	2	0	20	0	60	8	0	0	100	0	0	0	2444
Anchor Handling Tug:	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	158.4	39	183	124	0	0	13	0	123	47	0	0	31	93	0	20	0	0	8	0	0	100	0	0	0	2444
Cable Laying Vessel:	Cable Laying	1	3100	2312	5200	3878	12.4	24	100	1680	26	122	1657	0	0	9	0	82	31	0	0	416	1241	0	60	10	0	6	0	0	100	0	0	0	1833
Work Vessel:	Supply Ship	1	15,000	11186	100	75	10	24	33	356.4	162	755	216	0	0	53	0	507	195	0	0	54	162	0	45	0	0	30	0	0	100	0	0	0	9166
Work Vessel Support Tug:	Tug	1	15,000	11186	600	447	11	24	33	356.4	147	686	229	0	0	48	0	460	177	0	0	58	172	0	45	0	0	30	0	0	100	0	0	0	9166
Crew Transport Vessel:	Crew	2	2,700	2013	50	37	23	24	50	1440	70	328	1379	0	0	23	0	220	85	0	0	346	1033	0	60	0	60	30	0	0	100	0	0	0	9166
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	30	432	47	219	391	0	0	15	0	147	57	0	0	98	293	0	30	15	15	20	0	0	100	0	0	0	6111
Helicopter:		1	3700	2759	0	0	165	24	5	24	30	140	0	0	0	10	0	94	36	0	0	0	0	0	10	0	10	92	0	0	100	0	0	0	28109

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines, **- Assuming the cable laying time in NY remain the same regardless the where the supply port is. ***-Total yearly hour use will be slightly different depending on the location of port used.***

Cable Installation - Supply vessels from Sparrows Point, MD

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use ***	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site**	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -inter-arrary cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to Prov Port	Percentage of Trips to New Bedford	Percentage of Trips to Quonset	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Transportation Barge:	Barge	1	200	149	0	0	4	24	5	72	0	0.0	72.0	0.0	0	0	0	0	0	0	0	18	54	0	0	0	60	0	0	0	0	0	100	0	0
Fuel Bunkering Vessel:	Shuttle Tanker	1	2020	1506	3500	2610	11	24	100	720	23	236.4	694.5	0.0	0	1	0	0	103	63	70	174	520	0	25	5	0	6	0	0	0	0	100	0	2848
Towing Tug:	Tug	2	15,000	11186	600	447	11	24	33	158.4	30	315.2	124.5	0.0	0	1	0	0	137	84	93	31	93	0	20	0	0	8	0	0	0	0	100	0	3798
Material Barge:	Barge	1	200	149	0	0	4	24	5	96	83	866.9	2.7	0.0	0	2	0	0	378	231	256	1	2	0	20	0	60	8	0	0	0	0	100	0	3798
Anchor Handling Tug:	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	158.4	30	315.2	124.5	0.0	0	1	0	0	137	84	93	31	93	0	20	0	0	8	0	0	0	0	100	0	3798
Cable Laying Vessel:	Cable Laying	1	3100	2312	5200	3878	12.4	24	100	1680	20	209.7	1657.4	0.0	0	1	0	0	91	56	62	416	1241	0	60	10	0	6	0	0	0	0	100	0	2848
Work Vessel:	Supply Ship	1	15,000	11186	100	75	10	24	33	356.4	124	1300.3	216.4	0.0	0	3	0	0	566	347	384	54	162	0	45	0	0	30	0	0	0	0	100	0	14242
Work Vessel Support Tug:	Tug	1	15,000	11186	600	447	11	24	33	356.4	113	1182.1	229.1	0.0	0	3	0	0	515	315	349	58	172	0	45	0	0	30	0	0	0	0	100	0	14242
Crew Transport Vessel:	Crew	2	2,700	2013	50	37	23	24	50	1440	54	565.4	1379.1	0.0	0	1	0	0	246	151	167	346	1033	0	60	0	60	30	0	0	0	0	100	0	14242
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	30	432	36	376.9	391.4	0.0	0	1	0	0	164	100	111	98	293	0	30	15	15	20	0	0	0	0	100	0	9494
Helicopter:		1	3700	2759	0	0	165	24	5	24	23	241.7	0.0	0.0	0	1	0	0	105	64	71	0	0	0	10	0	10	92	0	0	0	0	100	0	43674

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines, **- Assuming the cable laying time in NY remain the same regardless the where the supply port is. ***-Total yearly hour use will be slightly different depending on the location of port used.***

Table B2b - Information (for worst-case OCS emission estimates) on engines used for construction, maintenance and deconstruction vessels/vehicles - associated with Port locations

Cable Installation - Supply vessels from Port of Forfold, VA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use ***	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site**	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -Inter-array cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Land/Waters (days) NYC	Other State Land/Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Transportation Barge:	Barge	1	200	149	0	0	4	24	5	72	0	0	72.0	0.0	0	0	0	0	0	0	0	18	54	0	0	0	60	0	0	0	0	100	0	0	0	400
Fuel Bunkering Vessel:	Shuttle Tanker	1	2020	1506	3500	2610	11	24	100	720	22	172	694.5	0.0	0	1	0	0	104	16	52	174	520	0	25	5	0	6	0	0	0	0	0	100	2141
Towing Tug:	Tug	2	15,000	11186	600	447	11	24	33	158.4	30	230	124.5	0.0	0	1	0	0	138	22	69	31	93	0	20	0	0	8	0	0	0	0	0	100	2854
Material Barge:	Barge	1	200	149	0	0	4	24	5	96	82	631	2.7	0.0	0	2	0	0	380	60	189	1	2	0	20	0	60	8	0	0	0	0	0	100	2854
Anchor Handling Tug:	Anchor Handling Tugs	1	8,000	5966	450	336	11	24	33	158.4	30	230	124.5	0.0	0	1	0	0	138	22	69	31	93	0	20	0	0	8	0	0	0	0	0	100	2854
Cable Laying Vessel:	Cable Laying	1	3100	2312	5200	3878	12.4	24	100	1680	20	153	1657.4	0.0	0	1	0	0	92	15	46	416	1241	0	60	10	0	6	0	0	0	0	0	100	2141
Work Vessel:	Supply Ship	1	15,000	11186	100	75	10	24	33	356.4	123	947	216.4	0.0	0	3	0	0	570	90	284	54	162	0	45	0	0	30	0	0	0	0	0	100	10704
Work Vessel Support Tug:	Tug	1	15,000	11186	600	447	11	24	33	356.4	112	861	229.1	0.0	0	3	0	0	518	82	258	58	172	0	45	0	0	30	0	0	0	0	0	100	10704
Crew Transport Vessel:	Crew	2	2,700	2013	50	37	23	24	50	1440	54	412	1379.1	0.0	0	1	0	0	248	39	123	346	1033	0	60	0	60	30	0	0	0	0	0	100	10704
Support Vessel/Inflatable boats:	Crew	1	500	373	0	0	23	24	30	432	36	275	391.4	0.0	0	1	0	0	165	26	82	98	293	0	30	15	15	20	0	0	0	0	0	100	7136
Helicopter:		1	3700	2759	0	0	165	24	5	24	23	176	0.0	0.0	0	1	0	0	106	17	53	0	0	0	10	0	10	92	0	0	0	0	0	100	32826

NOTE:* * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

****- Work Duration is for a build-out of 16 turbines, **- Assuming the cable laying time in NY remain the same regardless the where the supply port is. ***-Total yearly hour use will be slightly different depending on the location of port used.***

PM insertion 5.15.18

Bunkering Vessel for all scopes - Has been included in emission calculations.

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -Inter-array cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Bunkering vessel	Shuttle Tanker	1	8,000	5965.6	450	335.565	11	24	33	80															9	1	0	8	0	0	100	0	0	0	400

On-shore Construction

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (KW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - manuvering on-site	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Hours -Inter-array cable iinstallation within SFWF	Hours - cable laying within 25 mile of SFWF	Hours -cable laying outside 25-mile of SFWF and within 25-mile boundary of NY	Realistic Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Other State Land/Waters	Number of Supply Trips During Construction (One-Way)	Percentage of Trips to New London (%)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to Paulsboro Marine (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfolk (%)	Total Number of Miles Traveled
Onshore Substation Installation (138kV/69kV Substation with Power transformer and shunt reactors)																																			
Cranes:		1	1400	1043.98	200	149.14		12	50	720															0	120	0								
Excavator:		1	800	596.56	0	0		12	50	720															0	120	0								
Front-end Loader:		1	1000	745.7	0	0		12	50	720															0	120	0								
Trenchers:		1	100	74.57	0	0		12	75	1080															0	120	0								
Dump Trucks:		2	2500	1864.25	0	0		12	75	1080															0	120	0								
Bucket Trucks		1	200	149.14	0	0	NA	12	50	720															0	120	0								
Lull Telescopic Forklift		1	150	111.855	0	0		12	50	720															0	120	0								
Heavy-duty Trucks:		1	200	149.14	0	0		6	25	180															0	120	0								
Catapiller D7 Bulldozer		1	250	186.425	0	0		12	50	540															0	120	0								
Pickup Trucks:		4	200	149.14	0	0		6	50	360															0	120	0								
Onshore Duct Bank (138kV Duct Bank ~5 miles)								0	0																										
Cranes:		1	1400	1043.98	200	149.14		12	50	360															0	60	0								
Excavator:		1	800	596.56	0	0		12	50	360															0	60	0								
Front-end Loader:		1	1000	745.7	0	0		12	50	360															0	60	0								
Trenchers:		1	100	74.57	0	0		12	75	540															0	60	0								
Dump Trucks:		2	2500	1864.25	0	0	NA	12	50	360															0	60	0								
Heavy-duty Trucks:		1	200	149.14	0	0		12	25	180															0	60	0								
Catapiller D7 Bulldozer		1	250	186.425	0	0		12	50	540															0	60	0								
Pickup Trucks:		4	200	149.14	0	0		12	50	360															0	60	0								
HDD Boring Machine:		1	400	298.28	0	0		16	100	960															0	60	0								
Beach Lane HDD (3000 foot @138kV)								0	0																										
Cranes:		1	1400	1043.98	200	149.14		12	50	540															0	90	0								
Excavator:		1	800	596.56	0	0		12	50	540															0	90	0								
Front-end Loader:		1	1000	745.7	0	0		12	50	540															0	90	0								
Dump Trucks:		2	2500	1864.25	0	0		12	50	540															0	90	0								
Heavy-duty Trucks:		1	200	149.14	0	0	NA	12	25	270															0	90	0								
Catapiller D7 Bulldozer		1	250	186.425	0	0		12	50	540															0	90	0								
Pickup Trucks:		4	200	149.14	0	0		12	50	540															0	90	0								
HDD Boring Machine:		1	400	298.28	0	0		16	100	1440															0	90	0								
Montauk Highway HDD (300 foot @ 138kV)								0	0																										
Cranes:		1	1400	1043.98	200	149.14		12	50	240															0	40	0								
Excavator:		1	800	596.56	0	0		12	50	240															0	40	0								
Front-end Loader:		1	1000	745.7	0	0		12	50	240															0	40	0								
Dump Trucks:		2	2500	1864.25	0	0	NA	12	50	240															0	40	0								
Heavy-duty Trucks:		1	200	149.14	0	0		12	25	120															0	40	0								
Catapiller D7 Bulldozer		1	250	186.425	0	0		12	50	540															0	40	0								
Pickup Trucks:		4	200	149.14	0	0		12	50	240															0	40	0								
HDD Boring Machine:		1	400	298.28	0	0		16	100	640															0	40	0								

Table B3 - Construction Emissions - Transit outside 25-mile of SFWF

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Vessel Emissions (ton) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Helicopter Emissions (ton) = Activity Hours (hours) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B3 - Construction Emissions - Transit outside 25-mile of SFWF

Monopile Installation (tons) - Port of New Bedford, MA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours for transit outside 25-mile of SFWF.	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	7.0	138	0.0	0.0	0.0	0.4	2.2	0.1	0.1	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	25.5	348	0.0	0.0	0.1	1.2	5.2	0.2	0.2	0.0	0.0	0.1
Material Barge	Barge	2	149	0	26.3	4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	47.8	175	0.0	0.0	0.1	0.6	2.6	0.1	0.1	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	27.0	315	0.0	0.0	0.1	0.8	4.8	0.2	0.2	0.0	0.0	0.1
Crew Transport Vessel:	Crew	2	1491	37	12.2	22	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	19.8	4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	9.8	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	70.1	557	0.0	0.0	0.3	1.1	12.5	0.4	0.4	0.3	0.0	0.5
Bunkering vessel	Shuttle Tanker	1	5966	336	8.4	29	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1598**	**0.0**	**0.1**	**0.7**	**4.2**	**28.1**	**0.9**	**0.9**	**0.4**	**0.0**	**0.9**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Providence, RI

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours for transit outside 25-mile of SFWF.	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	11.4	224	0.0	0.0	0.1	0.7	3.5	0.1	0.1	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	41.4	566	0.0	0.0	0.2	1.9	8.4	0.3	0.3	0.0	0.0	0.2
Material Barge	Barge	2	149	0	42.7	7	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	77.7	285	0.0	0.0	0.1	0.9	4.2	0.2	0.1	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	43.8	513	0.0	0.0	0.2	1.3	7.8	0.3	0.3	0.1	0.0	0.2
Crew Transport Vessel:	Crew	2	1491	37	19.8	36	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	32.2	7	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	15.9	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	114.0	906	0.0	0.0	0.5	1.7	20.3	0.6	0.6	0.4	0.0	0.8
Bunkering vessel	Shuttle Tanker	1	5966	336	13.7	47	0.0	0.0	0.0	0.1	0.7	0.0	0.0	0.0	0.0	0.0
					Total emissions	**2598**	**0.0**	**0.1**	**1.1**	**6.8**	**45.6**	**1.5**	**1.5**	**0.6**	**0.0**	**1.4**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B3 - Construction Emissions - Transit outside 25-mile of SFWF

Monopile Installation (tons) - Port of New London, CT

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours for transit outside 25-mile of SFWF.	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	12.3	241	0.0	0.0	0.1	0.8	3.8	0.1	0.1	0.0	0.0	0.1
Towing Tug	Tug	2	11186	447	44.6	609	0.0	0.0	0.2	2.1	9.0	0.3	0.3	0.0	0.0	0.2
Material Barge	Barge	2	149	0	46.0	7	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	83.6	307	0.0	0.0	0.1	1.0	4.5	0.2	0.2	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	47.2	552	0.0	0.0	0.2	1.4	8.4	0.3	0.3	0.1	0.0	0.2
Description: For crew transfer	Crew	2	1491	37	21.3	38	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	34.7	8	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	17.1	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	122.7	975	0.0	0.1	0.5	1.9	21.8	0.7	0.6	0.5	0.0	0.9
Bunkering vessel	Shuttle Tanker	1	5966	336	14.7	50	0.0	0.0	0.0	0.1	0.8	0.0	0.0	0.0	0.0	0.1
					Total emissions	**2795.6**	**0.0**	**0.1**	**1.2**	**7.3**	**49.1**	**1.6**	**1.6**	**0.7**	**0.0**	**1.5**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Paulsboro Marine Terminal, NJ

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours for transit outside 25-mile of SFWF.	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	113.5	2229	0.0	0.1	0.8	7.0	35.1	1.1	1.0	0.0	0.0	0.5
Towing Tug	Tug	2	11186	447	412.8	5637	0.0	0.3	2.1	19.1	83.6	2.9	2.8	0.3	0.0	1.5
Material Barge	Barge	2	149	0	425.7	68	0.0	0.0	0.0	0.2	1.6	0.1	0.0	0.0	0.0	0.1
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	774.0	2840	0.0	0.1	1.1	9.0	41.5	1.5	1.5	0.3	0.0	1.0
Rock Dumping Vessel	Dredging	1	14914	4474	436.6	5108	0.0	0.2	2.1	12.5	77.7	2.8	2.7	0.7	0.0	2.0
Description: For crew transfer	Crew	2	1491	37	197.4	356	0.0	0.0	0.1	1.2	5.0	0.2	0.2	0.0	0.0	0.1
Description: For transport of	Crew	1	373	0	320.8	70	0.0	0.0	0.0	0.2	1.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	158.2	76	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.1
Feeder Barge: Monco 335	Barge	2	5966	1119	1135.2	9025	0.1	0.5	4.6	17.1	201.8	6.4	6.0	4.4	0.0	8.1
Bunkering vessel	Shuttle Tanker	1	5966	336	136.2	465	0.0	0.0	0.2	1.0	7.1	0.3	0.3	0.3	0.0	0.5
					Total emissions	**25872.3**	**0.2**	**1.3**	**11.2**	**67.6**	**454.6**	**15.3**	**14.5**	**6.1**	**0.0**	**13.9**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B3 - Construction Emissions - Transit outside 25-mile of SFWF

Monopile Installation (tons) - Sparrows Point, MD

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours for transit outside 25-mile of SFWF.	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	181.2	3557	0.0	0.2	1.3	11.2	56.0	1.7	1.6	0.1	0.0	0.8
Towing Tug	Tug	2	11186	447	658.9	8997	0.1	0.4	3.4	30.5	133.4	4.6	4.4	0.4	0.0	2.4
Material Barge	Barge	2	149	0	679.5	108	0.0	0.0	0.1	0.3	2.5	0.1	0.1	0.1	0.0	0.1
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	1235.4	4534	0.0	0.2	1.8	14.4	66.2	2.4	2.3	0.5	0.0	1.7
Rock Dumping Vessel	Dredging	1	14914	4474	696.9	8153	0.1	0.4	3.3	20.0	124.1	4.5	4.3	1.1	0.0	3.2
Description: For crew transfer	Crew	2	1491	37	315.1	567	0.0	0.0	0.2	2.0	8.0	0.3	0.3	0.0	0.0	0.1
Description: For transport of	Crew	1	373	0	512.1	112	0.0	0.0	0.0	0.4	1.6	0.1	0.1	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	252.6	121	0.0	0.0	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.2
Feeder Barge: Monco 335	Barge	2	5966	1119	1812.0	14404	0.1	0.7	7.4	27.4	322.1	10.2	9.6	7.1	0.0	12.9
Bunkering vessel	Shuttle Tanker	1	5966	336	217.4	743	0.0	0.0	0.4	1.6	11.4	0.6	0.5	0.4	0.0	0.7
					Total emissions	**41295.9**	**0.3**	**2.0**	**17.8**	**107.9**	**725.7**	**24.4**	**23.2**	**9.7**	**0.0**	**22.2**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Norfolk, VA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours for transit outside 25-mile of SFWF.	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	134.0	2631	0.0	0.1	0.9	8.3	41.4	1.3	1.2	0.0	0.0	0.6
Towing Tug	Tug	2	11186	447	487.4	6655	0.0	0.3	2.5	22.6	98.7	3.4	3.3	0.3	0.0	1.8
Material Barge	Barge	2	149	0	502.6	80	0.0	0.0	0.0	0.2	1.8	0.1	0.1	0.0	0.0	0.1
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	913.8	3354	0.0	0.2	1.3	10.6	49.0	1.8	1.7	0.4	0.0	1.2
Rock Dumping Vessel	Dredging	1	14914	4474	515.5	6030	0.0	0.3	2.4	14.8	91.8	3.3	3.2	0.8	0.0	2.3
Description: For crew transfer	Crew	2	1491	37	233.1	420	0.0	0.0	0.1	1.4	5.9	0.2	0.2	0.0	0.0	0.1
Description: For transport of	Crew	1	373	0	378.8	83	0.0	0.0	0.0	0.3	1.2	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	186.8	89	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.2
Feeder Barge: Monco 335	Barge	2	5966	1119	1340.3	10655	0.1	0.6	5.5	20.2	238.3	7.6	7.1	5.3	0.0	9.6
Bunkering vessel	Shuttle Tanker	1	5966	336	160.8	549	0.0	0.0	0.3	1.2	8.4	0.4	0.4	0.3	0.0	0.6
					Total emissions	**30546.1**	**0.2**	**1.5**	**13.2**	**79.8**	**536.8**	**18.0**	**17.1**	**7.2**	**0.0**	**16.4**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B3 - Construction Emissions - Transit outside 25-mile of SFWF

Cable Installation (tons) - Port of New Bedford, MA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours for transit outside 25-mile of SFWF.	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	9.6	25	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	12.7	174	0.0	0.0	0.1	0.6	2.6	0.1	0.1	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	35.1	3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	12.7	47	0.0	0.0	0.0	0.1	0.7	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	8.5	35	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	52.6	345	0.0	0.0	0.1	1.2	5.1	0.2	0.2	0.0	0.0	0.1
Work Vessel Support Tug:	Tug	1	11186	447	47.8	326	0.0	0.0	0.1	1.1	4.8	0.2	0.2	0.0	0.0	0.1
Crew Transport Vessel:	Crew	2	2013	37	22.9	55	0.0	0.0	0.0	0.2	0.8	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	15.2	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	9.8	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1019**	**0.0**	**0.0**	**0.4**	**3.3**	**15.0**	**0.5**	**0.5**	**0.1**	**0.0**	**0.3**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**679**	**0.0**	**0.0**	**0.3**	**2.2**	**10.0**	**0.3**	**0.3**	**0.0**	**0.0**	**0.2**
					SFEC	**340**	**0.0**	**0.0**	**0.1**	**1.1**	**5.0**	**0.2**	**0.2**	**0.0**	**0.0**	**0.1**

Cable Installation (tons) - Port of Providence, RI based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours for transit outside 25-mile of SFWF.	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	15.5	41	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	20.7	283	0.0	0.0	0.1	1.0	4.2	0.1	0.1	0.0	0.0	0.1
Material Barge:	Barge	1	149	0	57.0	5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	20.7	76	0.0	0.0	0.0	0.2	1.1	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	13.8	56	0.0	0.0	0.0	0.1	0.9	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	85.5	562	0.0	0.0	0.2	2.0	8.2	0.3	0.3	0.0	0.0	0.1
Work Vessel Support Tug:	Tug	1	11186	447	77.7	531	0.0	0.0	0.2	1.8	7.9	0.3	0.3	0.0	0.0	0.1
Crew Transport Vessel:	Crew	2	2013	37	37.2	90	0.0	0.0	0.0	0.3	1.3	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	24.8	5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	15.9	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1656**	**0.0**	**0.1**	**0.6**	**5.4**	**24.4**	**0.8**	**0.8**	**0.1**	**0.0**	**0.5**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**1104**	**0.0**	**0.1**	**0.4**	**3.6**	**16.2**	**0.6**	**0.5**	**0.1**	**0.0**	**0.3**
					SFEC	**552**	**0.0**	**0.0**	**0.2**	**1.8**	**8.1**	**0.3**	**0.3**	**0.0**	**0.0**	**0.2**

Table B3 - Construction Emissions - Transit outside 25-mile of SFWF

Cable Installation (tons) - Port of New London, CT based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours for transit outside 25-mile of SFWF.	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	16.7	45	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	22.3	305	0.0	0.0	0.1	1.0	4.5	0.2	0.1	0.0	0.0	0.1
Material Barge:	Barge	1	149	0	61.3	5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	22.3	82	0.0	0.0	0.0	0.3	1.2	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	14.8	61	0.0	0.0	0.0	0.1	0.9	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	92.0	604	0.0	0.0	0.2	2.1	8.9	0.3	0.3	0.0	0.0	0.2
Work Vessel Support Tug:	Tug	1	11186	447	83.6	571	0.0	0.0	0.2	1.9	8.5	0.3	0.3	0.0	0.0	0.2
Crew Transport Vessel:	Crew	2	2013	37	40.0	96	0.0	0.0	0.0	0.3	1.4	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	26.7	6	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	17.1	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1783**	**0.0**	**0.1**	**0.7**	**5.8**	**26.2**	**0.9**	**0.9**	**0.1**	**0.0**	**0.5**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**1188**	**0.0**	**0.1**	**0.4**	**3.9**	**17.5**	**0.6**	**0.6**	**0.1**	**0.0**	**0.3**
					SFEC	**594**	**0.0**	**0.0**	**0.2**	**1.9**	**8.7**	**0.3**	**0.3**	**0.0**	**0.0**	**0.2**

Cable Installation (tons) - Paulsboro Marine Terminal, NJ based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours for transit outside 25-mile of SFWF.	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	154.8	413	0.0	0.0	0.2	0.3	6.3	0.2	0.2	0.1	0.0	0.2
Towing Tug:	Tug	2	11186	447	206.4	2818	0.0	0.1	1.1	9.6	41.8	1.4	1.4	0.1	0.0	0.8
Material Barge:	Barge	1	149	0	567.6	45	0.0	0.0	0.0	0.1	1.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	206.4	757	0.0	0.0	0.3	2.4	11.1	0.4	0.4	0.1	0.0	0.3
Cable Laying Vessel:	Cable Laying	1	2312	3878	137.3	563	0.0	0.0	0.2	0.6	8.5	0.3	0.3	0.0	0.0	0.2
Work Vessel:	Supply Ship	1	11186	75	851.4	5594	0.0	0.3	2.1	19.7	82.0	2.8	2.7	0.2	0.0	1.4
Work Vessel Support Tug:	Tug	1	11186	447	774.0	5285	0.0	0.3	2.0	17.9	78.4	2.7	2.6	0.3	0.0	1.4
Crew Transport Vessel:	Crew	2	2013	37	370.2	893	0.0	0.0	0.3	3.1	12.6	0.4	0.4	0.0	0.0	0.2
Support Vessel/Inflatable boats:	Crew	1	373	0	246.8	54	0.0	0.0	0.0	0.2	0.8	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	158.2	76	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.1
					Total emissions	**16498**	**0.1**	**0.8**	**6.2**	**54.0**	**242.7**	**8.3**	**8.0**	**0.9**	**0.0**	**4.7**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**10999**	**0.1**	**0.5**	**4.1**	**36.0**	**161.8**	**5.5**	**5.3**	**0.6**	**0.0**	**3.1**
					SFEC	**5499**	**0.0**	**0.3**	**2.1**	**18.0**	**80.9**	**2.8**	**2.7**	**0.3**	**0.0**	**1.6**

Table B3 - Construction Emissions - Transit outside 25-mile of SFWF

Cable Installation (tons) - Sparrows Point, MD based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours for transit outside 25-mile of SFWF.	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	247.1	659	0.0	0.0	0.3	0.5	10.0	0.4	0.4	0.1	0.0	0.3
Towing Tug:	Tug	2	11186	447	329.5	4499	0.0	0.2	1.7	15.2	66.7	2.3	2.2	0.2	0.0	1.2
Material Barge:	Barge	1	149	0	906.0	72	0.0	0.0	0.0	0.2	1.7	0.1	0.1	0.0	0.0	0.1
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	329.5	1209	0.0	0.1	0.5	3.8	17.7	0.7	0.6	0.1	0.0	0.4
Cable Laying Vessel:	Cable Laying	1	2312	3878	219.2	898	0.0	0.0	0.3	1.0	13.6	0.5	0.4	0.0	0.0	0.2
Work Vessel:	Supply Ship	1	11186	75	1359.0	8929	0.1	0.4	3.3	31.4	130.9	4.4	4.3	0.4	0.0	2.3
Work Vessel Support Tug:	Tug	1	11186	447	1235.4	8435	0.1	0.4	3.2	28.6	125.1	4.3	4.1	0.4	0.0	2.3
Crew Transport Vessel:	Crew	2	2013	37	590.9	1425	0.0	0.1	0.5	4.9	20.2	0.7	0.7	0.0	0.0	0.3
Support Vessel/Inflatable boats:	Crew	1	373	0	393.9	86	0.0	0.0	0.0	0.3	1.2	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	252.6	121	0.0	0.0	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.2
					Total emissions	**26333**	**0.2**	**1.3**	**9.9**	**86.3**	**387.4**	**13.3**	**12.8**	**1.4**	**0.0**	**7.4**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**17555**	**0.1**	**0.8**	**6.6**	**57.5**	**258.2**	**8.8**	**8.5**	**1.0**	**0.0**	**5.0**
					SFEC	**8778**	**0.1**	**0.4**	**3.3**	**28.8**	**129.1**	**4.4**	**4.3**	**0.5**	**0.0**	**2.5**

Cable Installation (tons) - Port of Norfolk, VA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours for transit outside 25-mile of SFWF.	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	182.8	487	0.0	0.0	0.2	0.3	7.4	0.3	0.3	0.1	0.0	0.2
Towing Tug:	Tug	2	11186	447	243.7	3328	0.0	0.2	1.3	11.3	49.3	1.7	1.6	0.2	0.0	0.9
Material Barge:	Barge	1	149	0	670.2	53	0.0	0.0	0.0	0.1	1.2	0.0	0.0	0.0	0.0	0.1
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	243.7	894	0.0	0.0	0.4	2.8	13.1	0.5	0.5	0.1	0.0	0.3
Cable Laying Vessel:	Cable Laying	1	2312	3878	162.1	664	0.0	0.0	0.3	0.7	10.1	0.3	0.3	0.0	0.0	0.2
Work Vessel:	Supply Ship	1	11186	75	1005.2	6605	0.0	0.3	2.4	23.3	96.8	3.3	3.2	0.3	0.0	1.7
Work Vessel Support Tug:	Tug	1	11186	447	913.8	6239	0.0	0.3	2.4	21.1	92.5	3.2	3.1	0.3	0.0	1.7
Crew Transport Vessel:	Crew	2	2013	37	437.1	1054	0.0	0.1	0.4	3.7	14.9	0.5	0.5	0.0	0.0	0.2
Support Vessel/Inflatable boats:	Crew	1	373	0	291.4	64	0.0	0.0	0.0	0.2	0.9	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	186.8	89	0.0	0.0	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.2
					Total emissions	**19478**	**0.1**	**0.9**	**7.3**	**63.8**	**286.5**	**9.8**	**9.5**	**1.1**	**0.0**	**5.5**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**12985**	**0.1**	**0.6**	**4.9**	**42.5**	**191.0**	**6.5**	**6.3**	**0.7**	**0.0**	**3.7**
					SFEC	**6493**	**0.0**	**0.3**	**2.4**	**21.3**	**95.5**	**3.3**	**3.2**	**0.4**	**0.0**	**1.8**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B4 - Construction Emissions - Transit within 25-mile of SFWF

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Vessel Emissions (ton) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Helicopter Emissions (ton) = Activity Hours (hours) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B4 - Construction Emissions - Transit within 25-mile of SFWF

Monopile Installation (tons) - Port of New Bedford, MA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours for transit within 25-mile of SFWF	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	8.7	171	0.0	0.0	0.1	0.5	2.7	0.1	0.1	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	31.6	431	0.0	0.0	0.2	1.5	6.4	0.2	0.2	0.0	0.0	0.1
Material Barge	Barge	2	149	0	32.6	5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	59.2	217	0.0	0.0	0.1	0.7	3.2	0.1	0.1	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	33.4	391	0.0	0.0	0.2	1.0	5.9	0.2	0.2	0.1	0.0	0.2
Crew Transport Vessel:	Crew	2	1491	37	15.1	27	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	24.6	5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	12.1	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	86.9	691	0.0	0.0	0.4	1.3	15.4	0.5	0.5	0.3	0.0	0.6
Bunkering vessel	Shuttle Tanker	1	5966	336	10.4	36	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1980**	**0.0**	**0.1**	**0.9**	**5.2**	**34.8**	**1.2**	**1.1**	**0.5**	**0.0**	**1.1**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Providence, RI

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours for transit within 25-mile of SFWF	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	9.0	177	0.0	0.0	0.1	0.6	2.8	0.1	0.1	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	32.7	447	0.0	0.0	0.2	1.5	6.6	0.2	0.2	0.0	0.0	0.1
Material Barge	Barge	2	149	0	33.8	5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	61.4	225	0.0	0.0	0.1	0.7	3.3	0.1	0.1	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	34.6	405	0.0	0.0	0.2	1.0	6.2	0.2	0.2	0.1	0.0	0.2
Crew Transport Vessel:	Crew	2	1491	37	15.7	28	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	25.4	6	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	12.5	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	90.0	716	0.0	0.0	0.4	1.4	16.0	0.5	0.5	0.4	0.0	0.6
Bunkering vessel	Shuttle Tanker	1	5966	336	10.8	37	0.0	0.0	0.0	0.1	0.6	0.0	0.0	0.0	0.0	0.0
					Total emissions	**2052**	**0.0**	**0.1**	**0.9**	**5.4**	**36.1**	**1.2**	**1.2**	**0.5**	**0.0**	**1.1**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B4 - Construction Emissions - Transit within 25-mile of SFWF

Monopile Installation (tons) - Port of New London, CT

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours for transit within 25-mile of SFWF	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	15.2	298	0.0	0.0	0.1	0.9	4.7	0.1	0.1	0.0	0.0	0.1
Towing Tug	Tug	2	11186	447	55.2	754	0.0	0.0	0.3	2.6	11.2	0.4	0.4	0.0	0.0	0.2
Material Barge	Barge	2	149	0	57.0	9	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	103.6	380	0.0	0.0	0.2	1.2	5.6	0.2	0.2	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	58.4	683	0.0	0.0	0.3	1.7	10.4	0.4	0.4	0.1	0.0	0.3
Description: For crew transfer	Crew	2	1491	37	26.4	48	0.0	0.0	0.0	0.2	0.7	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	42.9	9	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	21.2	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	151.9	1208	0.0	0.1	0.6	2.3	27.0	0.9	0.8	0.6	0.0	1.1
Bunkering vessel	Shuttle Tanker	1	5966	336	18.2	62	0.0	0.0	0.0	0.1	1.0	0.0	0.0	0.0	0.0	0.1
					Total emissions	**3461.8**	**0.0**	**0.2**	**1.5**	**9.0**	**60.8**	**2.0**	**1.9**	**0.8**	**0.0**	**1.9**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Paulsboro Marine Terminal, NJ

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours for transit within 25-mile of SFWF	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	21.6	424	0.0	0.0	0.2	1.3	6.7	0.2	0.2	0.0	0.0	0.1
Towing Tug	Tug	2	11186	447	78.5	1072	0.0	0.1	0.4	3.6	15.9	0.5	0.5	0.1	0.0	0.3
Material Barge	Barge	2	149	0	80.9	13	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	147.2	540	0.0	0.0	0.2	1.7	7.9	0.3	0.3	0.1	0.0	0.2
Rock Dumping Vessel	Dredging	1	14914	4474	83.0	971	0.0	0.0	0.4	2.4	14.8	0.5	0.5	0.1	0.0	0.4
Description: For crew transfer	Crew	2	1491	37	37.5	68	0.0	0.0	0.0	0.2	1.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	61.0	13	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	30.1	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	215.9	1716	0.0	0.1	0.9	3.3	38.4	1.2	1.1	0.8	0.0	1.5
Bunkering vessel	Shuttle Tanker	1	5966	336	25.9	88	0.0	0.0	0.0	0.2	1.4	0.1	0.1	0.1	0.0	0.1
					Total emissions	**4919.4**	**0.0**	**0.2**	**2.1**	**12.9**	**86.4**	**2.9**	**2.8**	**1.2**	**0.0**	**2.6**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B4 - Construction Emissions - Transit within 25-mile of SFWF

Monopile Installation (tons) - Sparrows Point, MD

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours for transit within 25-mile of SFWF	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	16.5	324	0.0	0.0	0.1	1.0	5.1	0.2	0.1	0.0	0.0	0.1
Towing Tug	Tug	2	11186	447	60.0	820	0.0	0.0	0.3	2.8	12.2	0.4	0.4	0.0	0.0	0.2
Material Barge	Barge	2	149	0	61.9	10	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	112.6	413	0.0	0.0	0.2	1.3	6.0	0.2	0.2	0.0	0.0	0.2
Rock Dumping Vessel	Dredging	1	14914	4474	63.5	743	0.0	0.0	0.3	1.8	11.3	0.4	0.4	0.1	0.0	0.3
Description: For crew transfer	Crew	2	1491	37	28.7	52	0.0	0.0	0.0	0.2	0.7	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	46.7	10	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	23.0	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	165.1	1313	0.0	0.1	0.7	2.5	29.4	0.9	0.9	0.6	0.0	1.2
Bunkering vessel	Shuttle Tanker	1	5966	336	19.8	68	0.0	0.0	0.0	0.1	1.0	0.1	0.0	0.0	0.0	0.1
					Total emissions	**3762.8**	**0.0**	**0.2**	**1.6**	**9.8**	**66.1**	**2.2**	**2.1**	**0.9**	**0.0**	**2.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Norfolk, VA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours for transit within 25-mile of SFWF	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	16.4	323	0.0	0.0	0.1	1.0	5.1	0.2	0.1	0.0	0.0	0.1
Towing Tug	Tug	2	11186	447	59.8	816	0.0	0.0	0.3	2.8	12.1	0.4	0.4	0.0	0.0	0.2
Material Barge	Barge	2	149	0	61.7	10	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	112.1	411	0.0	0.0	0.2	1.3	6.0	0.2	0.2	0.0	0.0	0.2
Rock Dumping Vessel	Dredging	1	14914	4474	63.2	740	0.0	0.0	0.3	1.8	11.3	0.4	0.4	0.1	0.0	0.3
Description: For crew transfer	Crew	2	1491	37	28.6	51	0.0	0.0	0.0	0.2	0.7	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	46.5	10	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	22.9	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	164.4	1307	0.0	0.1	0.7	2.5	29.2	0.9	0.9	0.6	0.0	1.2
Bunkering vessel	Shuttle Tanker	1	5966	336	19.7	67	0.0	0.0	0.0	0.1	1.0	0.1	0.0	0.0	0.0	0.1
					Total emissions	**3747.0**	**0.0**	**0.2**	**1.6**	**9.8**	**65.8**	**2.2**	**2.1**	**0.9**	**0.0**	**2.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B4 - Construction Emissions - Transit within 25-mile of SFWF

Cable Installation (tons) - Port of New Bedford, MA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours for transit within 25-mile of SFWF	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	11.8	32	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	15.8	216	0.0	0.0	0.1	0.7	3.2	0.1	0.1	0.0	0.0	0.1
Material Barge:	Barge	1	149	0	43.4	3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	15.8	58	0.0	0.0	0.0	0.2	0.8	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	10.5	43	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	65.2	428	0.0	0.0	0.2	1.5	6.3	0.2	0.2	0.0	0.0	0.1
Work Vessel Support Tug:	Tug	1	11186	447	59.2	405	0.0	0.0	0.2	1.4	6.0	0.2	0.2	0.0	0.0	0.1
Crew Transport Vessel:	Crew	2	2013	37	28.3	68	0.0	0.0	0.0	0.2	1.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	18.9	4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	12.1	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1263**	**0.0**	**0.1**	**0.5**	**4.1**	**18.6**	**0.6**	**0.6**	**0.1**	**0.0**	**0.4**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**842**	**0.0**	**0.0**	**0.3**	**2.8**	**12.4**	**0.4**	**0.4**	**0.0**	**0.0**	**0.2**
					SFEC	**421**	**0.0**	**0.0**	**0.2**	**1.4**	**6.2**	**0.2**	**0.2**	**0.0**	**0.0**	**0.1**

Cable Installation (tons) - Port of Providence, RI based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours for transit within 25-mile of SFWF	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	12.3	33	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	16.4	224	0.0	0.0	0.1	0.8	3.3	0.1	0.1	0.0	0.0	0.1
Material Barge:	Barge	1	149	0	45.0	4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	16.4	60	0.0	0.0	0.0	0.2	0.9	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	10.9	45	0.0	0.0	0.0	0.1	0.7	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	67.5	444	0.0	0.0	0.2	1.6	6.5	0.2	0.2	0.0	0.0	0.1
Work Vessel Support Tug:	Tug	1	11186	447	61.4	419	0.0	0.0	0.2	1.4	6.2	0.2	0.2	0.0	0.0	0.1
Crew Transport Vessel:	Crew	2	2013	37	29.4	71	0.0	0.0	0.0	0.2	1.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	19.6	4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	12.5	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1308**	**0.0**	**0.1**	**0.5**	**4.3**	**19.2**	**0.7**	**0.6**	**0.1**	**0.0**	**0.4**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**872**	**0.0**	**0.0**	**0.3**	**2.9**	**12.8**	**0.4**	**0.4**	**0.0**	**0.0**	**0.2**
					SFEC	**436**	**0.0**	**0.0**	**0.2**	**1.4**	**6.4**	**0.2**	**0.2**	**0.0**	**0.0**	**0.1**

Table B4 - Construction Emissions - Transit within 25-mile of SFWF

Cable Installation (tons) - Port of New London, CT based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours for transit within 25-mile of SFWF	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	20.7	55	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	27.6	377	0.0	0.0	0.1	1.3	5.6	0.2	0.2	0.0	0.0	0.1
Material Barge:	Barge	1	149	0	75.9	6	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	27.6	101	0.0	0.0	0.0	0.3	1.5	0.1	0.1	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	18.4	75	0.0	0.0	0.0	0.1	1.1	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	113.9	749	0.0	0.0	0.3	2.6	11.0	0.4	0.4	0.0	0.0	0.2
Work Vessel Support Tug:	Tug	1	11186	447	103.6	707	0.0	0.0	0.3	2.4	10.5	0.4	0.3	0.0	0.0	0.2
Crew Transport Vessel:	Crew	2	2013	37	49.5	119	0.0	0.0	0.0	0.4	1.7	0.1	0.1	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	33.0	7	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	21.2	10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**2207**	**0.0**	**0.1**	**0.8**	**7.2**	**32.5**	**1.1**	**1.1**	**0.1**	**0.0**	**0.6**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**1472**	**0.0**	**0.1**	**0.6**	**4.8**	**21.6**	**0.7**	**0.7**	**0.1**	**0.0**	**0.4**
					SFEC	**736**	**0.0**	**0.0**	**0.3**	**2.4**	**10.8**	**0.4**	**0.4**	**0.0**	**0.0**	**0.2**

Cable Installation (tons) - Paulsboro Marine Terminal, NJ based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours for transit within 25-mile of SFWF	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	29.4	78	0.0	0.0	0.0	0.1	1.2	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	39.2	536	0.0	0.0	0.2	1.8	7.9	0.3	0.3	0.0	0.0	0.1
Material Barge:	Barge	1	149	0	107.9	9	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	39.2	144	0.0	0.0	0.1	0.5	2.1	0.1	0.1	0.0	0.0	0.1
Cable Laying Vessel:	Cable Laying	1	2312	3878	26.1	107	0.0	0.0	0.0	0.1	1.6	0.1	0.1	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	161.9	1064	0.0	0.1	0.4	3.7	15.6	0.5	0.5	0.0	0.0	0.3
Work Vessel Support Tug:	Tug	1	11186	447	147.2	1005	0.0	0.0	0.4	3.4	14.9	0.5	0.5	0.0	0.0	0.3
Crew Transport Vessel:	Crew	2	2013	37	70.4	170	0.0	0.0	0.1	0.6	2.4	0.1	0.1	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	46.9	10	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	30.1	14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**3137**	**0.0**	**0.2**	**1.2**	**10.3**	**46.1**	**1.6**	**1.5**	**0.2**	**0.0**	**0.9**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**2091**	**0.0**	**0.1**	**0.8**	**6.9**	**30.8**	**1.1**	**1.0**	**0.1**	**0.0**	**0.6**
					SFEC	**1046**	**0.0**	**0.1**	**0.4**	**3.4**	**15.4**	**0.5**	**0.5**	**0.1**	**0.0**	**0.3**

Table B4 - Construction Emissions - Transit within 25-mile of SFWF

Cable Installation (tons) - Sparrows Point, MD based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours for transit within 25-mile of SFWF	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	22.5	60	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	30.0	410	0.0	0.0	0.2	1.4	6.1	0.2	0.2	0.0	0.0	0.1
Material Barge:	Barge	1	149	0	82.6	7	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	30.0	110	0.0	0.0	0.0	0.3	1.6	0.1	0.1	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	20.0	82	0.0	0.0	0.0	0.1	1.2	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	123.8	814	0.0	0.0	0.3	2.9	11.9	0.4	0.4	0.0	0.0	0.2
Work Vessel Support Tug:	Tug	1	11186	447	112.6	769	0.0	0.0	0.3	2.6	11.4	0.4	0.4	0.0	0.0	0.2
Crew Transport Vessel:	Crew	2	2013	37	53.8	130	0.0	0.0	0.0	0.5	1.8	0.1	0.1	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	35.9	8	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	23.0	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**2399**	**0.0**	**0.1**	**0.9**	**7.9**	**35.3**	**1.2**	**1.2**	**0.1**	**0.0**	**0.7**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**1600**	**0.0**	**0.1**	**0.6**	**5.2**	**23.5**	**0.8**	**0.8**	**0.1**	**0.0**	**0.5**
					SFEC	**800**	**0.0**	**0.0**	**0.3**	**2.6**	**11.8**	**0.4**	**0.4**	**0.0**	**0.0**	**0.2**

Cable Installation (tons) - Port of Norfolk, VA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours for transit within 25-mile of SFWF	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	22.4	60	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	29.9	408	0.0	0.0	0.2	1.4	6.1	0.2	0.2	0.0	0.0	0.1
Material Barge:	Barge	1	149	0	82.2	7	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	29.9	110	0.0	0.0	0.0	0.3	1.6	0.1	0.1	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	19.9	81	0.0	0.0	0.0	0.1	1.2	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	123.3	810	0.0	0.0	0.3	2.9	11.9	0.4	0.4	0.0	0.0	0.2
Work Vessel Support Tug:	Tug	1	11186	447	112.1	765	0.0	0.0	0.3	2.6	11.3	0.4	0.4	0.0	0.0	0.2
Crew Transport Vessel:	Crew	2	2013	37	53.6	129	0.0	0.0	0.0	0.4	1.8	0.1	0.1	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	35.7	8	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	22.9	11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**2389**	**0.0**	**0.1**	**0.9**	**7.8**	**35.1**	**1.2**	**1.2**	**0.1**	**0.0**	**0.7**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**1593**	**0.0**	**0.1**	**0.6**	**5.2**	**23.4**	**0.8**	**0.8**	**0.1**	**0.0**	**0.4**
					SFEC	**796**	**0.0**	**0.0**	**0.3**	**2.6**	**11.7**	**0.4**	**0.4**	**0.0**	**0.0**	**0.2**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B5 - South Fork Wind Farm Project, On-vessel Equipment Emissions

1 Emission Factors - Non-road CI Engine (g/kW-hr)

Emission Factor ID	Engine Rated Power (kW)	CO2*	CO	NOX	PM10 (as PM)	PM2.5 (as PM)	SO2*	VOC*	HAPs*	Data Source
Nonroad 1	130 ≤ kW < 560 (Tier 3)	699.5	3.5	4	0.2	0.2	1.25	1.50	2.71E-02	(a)
Nonroad 2	kW > 900 (Tier 2)	699.5	3.5	6.4	0.2	0.2	1.25	1.50	2.71E-02	

Note:

(a) EPA Federal Nonroad Compression-Ignition Engines: Exhaust Emission Standards (EPA-420-B-16-022, March 2016)

* Emission factor are from AP-42 section 3.3

AP-42	CO2		SO2		VOC		HAPs		
	(lb/hp-hr)	(g/kW-hr)	(lb/hp-hr)	(g/kW-hr)	(lb/hp-hr)	(g/kW-hr)	(lb/MMBTU)	(lb/hp-hr)	(g/kW-hr)
Section 3.3	1.15	700	2.05E-03	1	2.47E-03	2	6.37E-03	4.46E-05	2.71E-02

HAP is the sum of avaiable emissions factors for HAPs listed in Clean Air Act

Emissions (ton) = Engine Power Rating (kW) x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Monopile Installation (tons) - Port of New Bedford, MA

Type of Equipment/Emission Source Description (list others as needed)	No. of Each Type of Equipment	Engine Size on Equipment (specify units)	Equipment Size HP	Equipment Size kW	Fuel Type	Emission Factor used	Engine Use	Vent/Stack Height (feet)	Vent/Stack Diameter (inches)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Work Task	Load Factor	Auxillary Engine Power Adjustment	Emission (tons) CO2	CO	NOx	PM10	PM2.5	SO2	VOC	HAP
Floating/Jack-up Crane	1	Main Engines 40,000 hp	40000	29,828	Diesel	OGV	Propulsion/DP/ General Power	20-200	10-100	24	33	594	Monopile Installation										
	1	Hammer Power Pack	1500	1,119	Diesel	Nonroad 2						168		1		144.9	0.7	1.3	0.0	0.0	0.3	0.3	0.0
	1	Noise Mitigation Power Pack	2000	1,491	Diesel	Nonroad 2						168		1		193.2	1.0	1.8	0.1	0.1	0.3	0.4	0.0
	1	Crawler crane 500 hp	500	373	Diesel	Nonroad 1						168		1		48.3	0.2	0.3	0.0	0.0	0.1	0.1	0.0
																386.4	1.9	3.4	0.1	0.1	0.7	0.8	0.0

Monopile Installation (tons) - Port of Providence, RI

Type of Equipment/Emission Source Description (list others as needed)	No. of Each Type of Equipment	Engine Size on Equipment (specify units)	Equipment Size HP	Equipment Size kW	Fuel Type	Emission Factor used	Engine Use	Vent/Stack Height (feet)	Vent/Stack Diameter (inches)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Work Task	Load Factor	Auxillary Engine Power Adjustment	Emission (tons) CO2	CO	NOx	PM10	PM2.5	SO2	VOC	HAP
Floating/Jack-up Crane	1	Main Engines 40,000 hp	40000	29,828	Diesel		Propulsion/DP/ General Power	20-200	10-100	24	33	594	Monopile Installation										
	1	Hammer Power Pack	1500	1,119	Diesel	Nonroad 2						168		1		144.9	0.7	1.3	0.0	0.0	0.3	0.3	0.0
	1	Noise Mitigation Power Pack	2000	1,491	Diesel	Nonroad 2						168		1		193.2	1.0	1.8	0.1	0.1	0.3	0.4	0.0
	1	Crawler crane 500 hp	500	373	Diesel	Nonroad 1						168		1		48.3	0.2	0.3	0.0	0.0	0.1	0.1	0.0
																386.4	1.9	3.4	0.1	0.1	0.7	0.8	0.0

Monopile Installation (tons) - Port of New London, CT

Type of Equipment/Emission Source Description (list others as needed)	No. of Each Type of Equipment	Engine Size on Equipment (specify units)	Equipment Size HP	Equipment Size kW	Fuel Type	Emission Factor used	Engine Use	Vent/Stack Height (feet)	Vent/Stack Diameter (inches)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Work Task	Load Factor	Auxillary Engine Power Adjustment	Emission (tons) CO2	CO	NOx	PM10	PM2.5	SO2	VOC	HAP
Floating/Jack-up Crane	1	Main Engines 40,000 hp	40000	29828	Diesel		Propulsion/DP/ General Power	20-200	10-100	24	33	594	Monopile Installation										
	1	Hammer Power Pack	1500	1119	Diesel	Nonroad 2						168		1		144.9	0.7	1.3	0.0	0.0	0.3	0.3	0.0
	1	Noise Mitigation Power	2000	1491	Diesel	Nonroad 2						168		1		193.2	1.0	1.8	0.1	0.1	0.3	0.4	0.0
	1	Crawler crane 500 hp	500	373	Diesel	Nonroad 1						168		1		48.3	0.2	0.3	0.0	0.0	0.1	0.1	0.0
																386.4	1.9	3.4	0.1	0.1	0.7	0.8	0.0

Table B5 - South Fork Wind Farm Project, On-vessel Equipment Emissions

Monopile Installation (tons) - Paulsboro Marine Terminal, NJ

Type of Equipment/Emission Source Description (list others as needed)	No. of Each Type of Equipment	Engine Size on Equipment (specify units)	Equipment Size HP	Equipment Size kW	Fuel Type	Emission Factor used	Engine Use	Vent/Stack Height (feet)	Vent/Stack Diameter (inches)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Work Task	Load Factor	Auxillary Engine Power Adjustment	Emission (tons) CO2	CO	NOx	PM10	PM2.5	SO2	VOC	HAP
Floating/Jack-up Crane	1	Main Engines 40,000 hp	40000	29827.996	Diesel	OGV	Propulsion/DP/ General Power	20-200	10-100	24	33	594	Monopile Installation										
	1	Hammer Power Pack	1500	1118.54985	Diesel	Nonroad 2						168		1		144.9	0.7	1.3	0.0	0.0	0.3	0.3	0.0
	1	Noise Mitigation Power Pack	2000	1491.3998	Diesel	Nonroad 2						168		1		193.2	1.0	1.8	0.1	0.1	0.3	0.4	0.0
	1	Crawler crane 500 hp	500	372.84995	Diesel	Nonroad 1						168		1		48.3	0.2	0.3	0.0	0.0	0.1	0.1	0.0
																386.4	1.9	3.4	0.1	0.1	0.7	0.8	0.0

Monopile Installation (tons) - Sparrows Point, MD

Type of Equipment/Emission Source Description (list others as needed)	No. of Each Type of Equipment	Engine Size on Equipment (specify units)	Equipment Size HP	Equipment Size kW	Fuel Type	Emission Factor used	Engine Use	Vent/Stack Height (feet)	Vent/Stack Diameter (inches)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Work Task	Load Factor	Auxillary Engine Power Adjustment	Emission (tons) CO2	CO	NOx	PM10	PM2.5	SO2	VOC	HAP
Floating/Jack-up Crane	1	Main Engines 40,000 hp	40000	29827.996	Diesel	OGV	Propulsion/DP/ General Power	20-200	10-100	24	33	594	Monopile Installation										
	1	Hammer Power Pack	1500	1118.54985	Diesel	Nonroad 2						168		1		144.9	0.7	1.3	0.0	0.0	0.3	0.3	0.0
	1	Noise Mitigation Power Pack	2000	1491.3998	Diesel	Nonroad 2						168		1		193.2	1.0	1.8	0.1	0.1	0.3	0.4	0.0
	1	Crawler crane 500 hp	500	372.84995	Diesel	Nonroad 1						168		1		48.3	0.2	0.3	0.0	0.0	0.1	0.1	0.0
																386.4	1.9	3.4	0.1	0.1	0.7	0.8	0.0

Monopile Installation (tons) - Port of Norfolk, VA

Type of Equipment/Emission Source Description (list others as needed)	No. of Each Type of Equipment	Engine Size on Equipment (specify units)	Equipment Size HP	Equipment Size kW	Fuel Type	Emission Factor used	Engine Use	Vent/Stack Height (feet)	Vent/Stack Diameter (inches)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Work Task	Load Factor	Auxillary Engine Power Adjustment	Emission (tons) CO2	CO	NOx	PM10	PM2.5	SO2	VOC	HAP
Floating/Jack-up Crane	1	Main Engines 40,000 hp	40000	29828	Diesel		Propulsion/DP/ General Power	20-200	10-100	24	33	594	Monopile Installation										
	1	Hammer Power Pack	1500	1119	Diesel	Nonroad 2						168		1		144.9	0.7	1.3	0.0	0.0	0.3	0.3	0.0
	1	Noise Mitigation Power	2000	1491	Diesel	Nonroad 2						168		1		193.2	1.0	1.8	0.1	0.1	0.3	0.4	0.0
	1	Crawler crane 500 hp	500	373	Diesel	Nonroad 1						168		1		48.3	0.2	0.3	0.0	0.0	0.1	0.1	0.0
																386.4	1.9	3.4	0.1	0.1	0.7	0.8	0.0

NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.

- Work Duration is for a build-out of 16 turbines

Table B6 - Construction Emissions - SFWF On-site Maneuvering

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

Emission calculation:

Vessel Emissions (ton) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Helicopter Emissions (ton) = Activity Hours (hours) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B6 - Construction Emissions - SFWF On-site Maneuvering

Monopile Installation (tons) - Port of New Bedford, MA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours - manuvering on-site	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	575.3	3705	0.0	0.2	1.3	8.7	60.3	1.8	1.7	0.1	0.0	0.8
Towing Tug	Tug	2	11186	447	288.5	1100	0.0	0.1	0.4	3.3	16.4	0.6	0.5	0.0	0.0	0.3
Material Barge	Barge	2	149	0	26.0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	229.1	247	0.0	0.0	0.1	0.7	3.6	0.1	0.1	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	389.0	2050	0.0	0.1	0.8	2.7	31.2	1.1	1.0	0.2	0.0	0.6
Crew Transport Vessel:	Crew	2	1491	37	567.5	272	0.0	0.0	0.1	0.9	3.9	0.1	0.1	0.0	0.0	0.1
Support Vessel/Inflatable boats:	Crew	1	373	0	337.2	18	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	169.7	534	0.0	0.0	0.2	0.6	11.3	0.3	0.3	0.2	0.0	0.3
Bunkering vessel	Shuttle Tanker	1	5966	336	57.6	197	0.0	0.0	0.1	0.4	3.0	0.1	0.1	0.1	0.0	0.2
					Total emissions	**8124**	**0.1**	**0.4**	**3.1**	**17.3**	**130.1**	**4.2**	**4.0**	**0.6**	**0.0**	**2.4**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Providence, RI

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours - manuvering on-site	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	575.3	3705	0.0	0.2	1.3	8.7	60.3	1.8	1.7	0.1	0.0	0.8
Towing Tug	Tug	2	11186	447	288.5	1100	0.0	0.1	0.4	3.3	16.4	0.6	0.5	0.0	0.0	0.3
Material Barge	Barge	2	149	0	26.0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	229.1	247	0.0	0.0	0.1	0.7	3.6	0.1	0.1	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	389.0	2050	0.0	0.1	0.8	2.7	31.2	1.1	1.0	0.2	0.0	0.6
Crew Transport Vessel:	Crew	2	1491	37	567.5	272	0.0	0.0	0.1	0.9	3.9	0.1	0.1	0.0	0.0	0.1
Support Vessel/Inflatable boats:	Crew	1	373	0	337.2	18	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	169.7	534	0.0	0.0	0.2	0.6	11.3	0.3	0.3	0.2	0.0	0.3
Bunkering vessel	Shuttle Tanker	1	5966	336	57.6	197	0.0	0.0	0.1	0.4	3.0	0.1	0.1	0.1	0.0	0.2
					Total emissions	**8124**	**0.1**	**0.4**	**3.1**	**17.3**	**130.1**	**4.2**	**4.0**	**0.6**	**0.0**	**2.4**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B6 - Construction Emissions - SFWF On-site Maneuvering

Monopile Installation (tons) - Port of New London, CT

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours - manuvering on-site	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	575.3	3705	0.0	0.2	1.3	8.7	60.3	1.8	1.7	0.1	0.0	0.8
Towing Tug	Tug	2	11186	447	288.5	1100	0.0	0.1	0.4	3.3	16.4	0.6	0.5	0.0	0.0	0.3
Material Barge	Barge	2	149	0	26.0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	229.1	247	0.0	0.0	0.1	0.7	3.6	0.1	0.1	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	389.0	2050	0.0	0.1	0.8	2.7	31.2	1.1	1.0	0.2	0.0	0.6
Description: For crew transfer	Crew	2	1491	37	567.5	272	0.0	0.0	0.1	0.9	3.9	0.1	0.1	0.0	0.0	0.1
Description: For transport of	Crew	1	373	0	337.2	18	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	169.7	534	0.0	0.0	0.2	0.6	11.3	0.3	0.3	0.2	0.0	0.3
Bunkering vessel	Shuttle Tanker	1	5966	336	57.6	197	0.0	0.0	0.1	0.4	3.0	0.1	0.1	0.1	0.0	0.2
					Total emissions	**8124.4**	**0.1**	**0.4**	**3.1**	**17.3**	**130.1**	**4.2**	**4.0**	**0.6**	**0.0**	**2.4**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Paulsboro Marine Terminal, NJ

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours - manuvering on-site	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	575.3	3705	0.0	0.2	1.3	8.7	60.3	1.8	1.7	0.1	0.0	0.8
Towing Tug	Tug	2	11186	447	288.5	1100	0.0	0.1	0.4	3.3	16.4	0.6	0.5	0.0	0.0	0.3
Material Barge	Barge	2	149	0	26.0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	229.1	247	0.0	0.0	0.1	0.7	3.6	0.1	0.1	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	389.0	2050	0.0	0.1	0.8	2.7	31.2	1.1	1.0	0.2	0.0	0.6
Description: For crew transfer	Crew	2	1491	37	567.5	272	0.0	0.0	0.1	0.9	3.9	0.1	0.1	0.0	0.0	0.1
Description: For transport of	Crew	1	373	0	337.2	18	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	169.7	534	0.0	0.0	0.2	0.6	11.3	0.3	0.3	0.2	0.0	0.3
Bunkering vessel	Shuttle Tanker	1	5966	336	57.6	197	0.0	0.0	0.1	0.4	3.0	0.1	0.1	0.1	0.0	0.2
					Total emissions	**8124.4**	**0.1**	**0.4**	**3.1**	**17.3**	**130.1**	**4.2**	**4.0**	**0.6**	**0.0**	**2.4**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B6 - Construction Emissions - SFWF On-site Maneuvering

Monopile Installation (tons) - Sparrows Point, MD

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours - manuvering on-site	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	575.3	3705	0.0	0.2	1.3	8.7	60.3	1.8	1.7	0.1	0.0	0.8
Towing Tug	Tug	2	11186	447	288.5	1100	0.0	0.1	0.4	3.3	16.4	0.6	0.5	0.0	0.0	0.3
Material Barge	Barge	2	149	0	26.0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	229.1	247	0.0	0.0	0.1	0.7	3.6	0.1	0.1	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	389.0	2050	0.0	0.1	0.8	2.7	31.2	1.1	1.0	0.2	0.0	0.6
Description: For crew transfer	Crew	2	1491	37	567.5	272	0.0	0.0	0.1	0.9	3.9	0.1	0.1	0.0	0.0	0.1
Description: For transport of	Crew	1	373	0	337.2	18	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	169.7	534	0.0	0.0	0.2	0.6	11.3	0.3	0.3	0.2	0.0	0.3
Bunkering vessel	Shuttle Tanker	1	5966	336	57.6	197	0.0	0.0	0.1	0.4	3.0	0.1	0.1	0.1	0.0	0.2
					Total emissions	**8124.4**	**0.1**	**0.4**	**3.1**	**17.3**	**130.1**	**4.2**	**4.0**	**0.6**	**0.0**	**2.4**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Norfolk, VA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours - manuvering on-site	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	575.3	3705	0.0	0.2	1.3	8.7	60.3	1.8	1.7	0.1	0.0	0.8
Towing Tug	Tug	2	11186	447	288.5	1100	0.0	0.1	0.4	3.3	16.4	0.6	0.5	0.0	0.0	0.3
Material Barge	Barge	2	149	0	26.0	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	229.1	247	0.0	0.0	0.1	0.7	3.6	0.1	0.1	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	389.0	2050	0.0	0.1	0.8	2.7	31.2	1.1	1.0	0.2	0.0	0.6
Description: For crew transfer	Crew	2	1491	37	567.5	272	0.0	0.0	0.1	0.9	3.9	0.1	0.1	0.0	0.0	0.1
Description: For transport of	Crew	1	373	0	337.2	18	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	169.7	534	0.0	0.0	0.2	0.6	11.3	0.3	0.3	0.2	0.0	0.3
Bunkering vessel	Shuttle Tanker	1	5966	336	57.6	197	0.0	0.0	0.1	0.4	3.0	0.1	0.1	0.1	0.0	0.2
					Total emissions	**8124.4**	**0.1**	**0.4**	**3.1**	**17.3**	**130.1**	**4.2**	**4.0**	**0.6**	**0.0**	**2.4**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B7 - Construction Emissions - Transit beyond OCS area and within 25-NM of Massachusetts

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Vessel Emissions (ton) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Helicopter Emissions (ton) = Activity Hours (hours) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B7 - Construction Emissions - Transit beyond OCS area and within 25-NM of Massachusetts

Monopile Installation (tons) - Port of New Bedford, MA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	7.0	138	0.0	0.0	0.0	0.4	2.2	0.1	0.1	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	25.5	348	0.0	0.0	0.1	1.2	5.2	0.2	0.2	0.0	0.0	0.1
Material Barge	Barge	2	149	0	26.3	4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	47.8	175	0.0	0.0	0.1	0.6	2.6	0.1	0.1	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	27.0	315	0.0	0.0	0.1	0.8	4.8	0.2	0.2	0.0	0.0	0.1
Crew Transport Vessel:	Crew	2	1491	37	12.2	22	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	19.8	4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	9.8	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	70.1	557	0.0	0.0	0.3	1.1	12.5	0.4	0.4	0.3	0.0	0.5
Bunkering vessel	Shuttle Tanker	1	5966	336	8.4	29	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1598**	**0.0**	**0.1**	**0.7**	**4.2**	**28.1**	**0.9**	**0.9**	**0.4**	**0.0**	**0.9**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Providence, RI

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B7 - Construction Emissions - Transit beyond OCS area and within 25-NM of Massachusetts

Monopile Installation (tons) - Port of New London, CT

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Paulsboro Marine Terminal, NJ

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B7 - Construction Emissions - Transit beyond OCS area and within 25-NM of Massachusetts

Monopile Installation (tons) - Sparrows Point, MD

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Norfolk, VA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B7 - Construction Emissions - Transit beyond OCS area and within 25-NM of Massachusetts

Cable Installation (tons) - Port of New Bedford, MA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	9.6	25	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	12.7	174	0.0	0.0	0.1	0.6	2.6	0.1	0.1	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	35.1	3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	12.7	47	0.0	0.0	0.0	0.1	0.7	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	8.5	35	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	52.6	345	0.0	0.0	0.1	1.2	5.1	0.2	0.2	0.0	0.0	0.1
Work Vessel Support Tug:	Tug	1	11186	447	47.8	326	0.0	0.0	0.1	1.1	4.8	0.2	0.2	0.0	0.0	0.1
Crew Transport Vessel:	Crew	2	2013	37	22.9	55	0.0	0.0	0.0	0.2	0.8	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	15.2	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	9.8	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1019**	**0.0**	**0.0**	**0.4**	**3.3**	**15.0**	**0.5**	**0.5**	**0.1**	**0.0**	**0.3**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**679**	**0.0**	**0.0**	**0.3**	**2.2**	**10.0**	**0.3**	**0.3**	**0.0**	**0.0**	**0.2**
					SFEC	**340**	**0.0**	**0.0**	**0.1**	**1.1**	**5.0**	**0.2**	**0.2**	**0.0**	**0.0**	**0.1**

Cable Installation (tons) - Port of Providence, RI based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Table B7 - Construction Emissions - Transit beyond OCS area and within 25-NM of Massachusetts

Cable Installation (tons) - Port of New London, CT based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Paulsboro Marine Terminal, NJ based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Table B7 - Construction Emissions - Transit beyond OCS area and within 25-NM of Massachusetts

Cable Installation (tons) - Sparrows Point, MD based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Port of Norfolk, VA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B8 - Construction Emissions - Transit beyond OCS area and within 25-NM of Rhode Island

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Vessel Emissions (ton) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Helicopter Emissions (ton) = Activity Hours (hours) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B8 - Construction Emissions - Transit beyond OCS area and within 25-NM of Rhode Island

Monopile Installation (tons) - Port of New Bedford, MA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Providence, RI

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	11.4	224	0.0	0.0	0.1	0.7	3.5	0.1	0.1	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	41.4	566	0.0	0.0	0.2	1.9	8.4	0.3	0.3	0.0	0.0	0.2
Material Barge	Barge	2	149	0	42.7	7	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	77.7	285	0.0	0.0	0.1	0.9	4.2	0.2	0.1	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	43.8	513	0.0	0.0	0.2	1.3	7.8	0.3	0.3	0.1	0.0	0.2
Crew Transport Vessel:	Crew	2	1491	37	19.8	36	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	32.2	7	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	15.9	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	114.0	906	0.0	0.0	0.5	1.7	20.3	0.6	0.6	0.4	0.0	0.8
Bunkering vessel	Shuttle Tanker	1	5966	336	13.7	47	0.0	0.0	0.0	0.1	0.7	0.0	0.0	0.0	0.0	0.0
					Total emissions	**2598**	**0.0**	**0.1**	**1.1**	**6.8**	**45.6**	**1.5**	**1.5**	**0.6**	**0.0**	**1.4**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B8 - Construction Emissions - Transit beyond OCS area and within 25-NM of Rhode Island

Monopile Installation (tons) - Port of New London, CT

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	7.7	152	0.0	0.0	0.1	0.5	2.4	0.1	0.1	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	28.1	384	0.0	0.0	0.1	1.3	5.7	0.2	0.2	0.0	0.0	0.1
Material Barge	Barge	2	149	0	29.0	5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	52.7	193	0.0	0.0	0.1	0.6	2.8	0.1	0.1	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	29.7	348	0.0	0.0	0.1	0.9	5.3	0.2	0.2	0.0	0.0	0.1
Description: For crew transfer	Crew	2	1491	37	13.4	24	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	21.8	5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	10.8	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	77.3	615	0.0	0.0	0.3	1.2	13.7	0.4	0.4	0.3	0.0	0.6
Bunkering vessel	Shuttle Tanker	1	5966	336	9.3	32	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1761.8**	**0.0**	**0.1**	**0.8**	**4.6**	**31.0**	**1.0**	**1.0**	**0.4**	**0.0**	**0.9**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Paulsboro Marine Terminal, NJ

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B8 - Construction Emissions - Transit beyond OCS area and within 25-NM of Rhode Island

Monopile Installation (tons) - Sparrows Point, MD

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Norfolk, VA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B8 - Construction Emissions - Transit beyond OCS area and within 25-NM of Rhode Island

Cable Installation (tons) - Port of New Bedford, MA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	CO2	CH4	N2O	Black Carbor	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Port of Providence, RI based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	CO2	CH4	N2O	Black Carbor	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	15.5	41	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	20.7	283	0.0	0.0	0.1	1.0	4.2	0.1	0.1	0.0	0.0	0.1
Material Barge:	Barge	1	149	0	57.0	5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	20.7	76	0.0	0.0	0.0	0.2	1.1	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	13.8	56	0.0	0.0	0.0	0.1	0.9	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	85.5	562	0.0	0.0	0.2	2.0	8.2	0.3	0.3	0.0	0.0	0.1
Work Vessel Support Tug:	Tug	1	11186	447	77.7	531	0.0	0.0	0.2	1.8	7.9	0.3	0.3	0.0	0.0	0.1
Crew Transport Vessel:	Crew	2	2013	37	37.2	90	0.0	0.0	0.0	0.3	1.3	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	24.8	5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	15.9	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1656**	**0.0**	**0.1**	**0.6**	**5.4**	**24.4**	**0.8**	**0.8**	**0.1**	**0.0**	**0.5**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**1104**	**0.0**	**0.1**	**0.4**	**3.6**	**16.2**	**0.6**	**0.5**	**0.1**	**0.0**	**0.3**
					SFEC	**552**	**0.0**	**0.0**	**0.2**	**1.8**	**8.1**	**0.3**	**0.3**	**0.0**	**0.0**	**0.2**

Table B8 - Construction Emissions - Transit beyond OCS area and within 25-NM of Rhode Island

Cable Installation (tons) - Port of New London, CT based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	CO2	CH4	N2O	Black Carbor	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	10.5	28	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	14.1	192	0.0	0.0	0.1	0.7	2.8	0.1	0.1	0.0	0.0	0.1
Material Barge:	Barge	1	149	0	38.7	3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	14.1	52	0.0	0.0	0.0	0.2	0.8	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	9.4	38	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	58.0	381	0.0	0.0	0.1	1.3	5.6	0.2	0.2	0.0	0.0	0.1
Work Vessel Support Tug:	Tug	1	11186	447	52.7	360	0.0	0.0	0.1	1.2	5.3	0.2	0.2	0.0	0.0	0.1
Crew Transport Vessel:	Crew	2	2013	37	25.2	61	0.0	0.0	0.0	0.2	0.9	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	16.8	4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	10.8	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1123**	**0.0**	**0.1**	**0.4**	**3.7**	**16.5**	**0.6**	**0.5**	**0.1**	**0.0**	**0.3**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**749**	**0.0**	**0.0**	**0.3**	**2.5**	**11.0**	**0.4**	**0.4**	**0.0**	**0.0**	**0.2**
					SFEC	**374**	**0.0**	**0.0**	**0.1**	**1.2**	**5.5**	**0.2**	**0.2**	**0.0**	**0.0**	**0.1**

Cable Installation (tons) - Paulsboro Marine Terminal, NJ based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	CO2	CH4	N2O	Black Carbor	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Table B8 - Construction Emissions - Transit beyond OCS area and within 25-NM of Rhode Island

Cable Installation (tons) - Sparrows Point, MD based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	CO2	CH4	N2O	Black Carbor	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Port of Norfolk, VA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	CO2	CH4	N2O	Black Carbor	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B9 - Construction Emissions - Transit beyond OCS area and within 25-NM of New York

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Vessel Emissions (ton) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Helicopter Emissions (ton) = Activity Hours (hours) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B9 - Construction Emissions - Transit beyond OCS area and within 25-NM of New York

Monopile Installation (tons) - Port of New Bedford, MA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Providence, RI

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B9 - Construction Emissions - Transit beyond OCS area and within 25-NM of New York

Monopile Installation (tons) - Port of New London, CT

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Paulsboro Marine Terminal, NJ

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	20.0	392	0.0	0.0	0.1	1.2	6.2	0.2	0.2	0.0	0.0	0.1
Towing Tug	Tug	2	11186	447	72.7	992	0.0	0.0	0.4	3.4	14.7	0.5	0.5	0.0	0.0	0.3
Material Barge	Barge	2	149	0	74.9	12	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	136.3	500	0.0	0.0	0.2	1.6	7.3	0.3	0.3	0.1	0.0	0.2
Rock Dumping Vessel	Dredging	1	14914	4474	76.9	899	0.0	0.0	0.4	2.2	13.7	0.5	0.5	0.1	0.0	0.3
Description: For crew transfer	Crew	2	1491	37	34.8	63	0.0	0.0	0.0	0.2	0.9	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	56.5	12	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	27.9	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	199.9	1589	0.0	0.1	0.8	3.0	35.5	1.1	1.1	0.8	0.0	1.4
Bunkering vessel	Shuttle Tanker	1	5966	336	24.0	82	0.0	0.0	0.0	0.2	1.3	0.1	0.1	0.0	0.0	0.1
					Total emissions	**4555.0**	**0.0**	**0.2**	**2.0**	**11.9**	**80.0**	**2.7**	**2.6**	**1.1**	**0.0**	**2.4**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B9 - Construction Emissions - Transit beyond OCS area and within 25-NM of New York

Monopile Installation (tons) - Sparrows Point, MD

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	8.3	162	0.0	0.0	0.1	0.5	2.6	0.1	0.1	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	30.1	411	0.0	0.0	0.2	1.4	6.1	0.2	0.2	0.0	0.0	0.1
Material Barge	Barge	2	149	0	31.0	5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	56.4	207	0.0	0.0	0.1	0.7	3.0	0.1	0.1	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	31.8	372	0.0	0.0	0.2	0.9	5.7	0.2	0.2	0.0	0.0	0.1
Description: For crew transfer	Crew	2	1491	37	14.4	26	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	23.4	5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	11.5	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	82.7	658	0.0	0.0	0.3	1.2	14.7	0.5	0.4	0.3	0.0	0.6
Bunkering vessel	Shuttle Tanker	1	5966	336	9.9	34	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1885.4**	**0.0**	**0.1**	**0.8**	**4.9**	**33.1**	**1.1**	**1.1**	**0.4**	**0.0**	**1.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Norfolk, VA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	8.2	160	0.0	0.0	0.1	0.5	2.5	0.1	0.1	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	29.7	406	0.0	0.0	0.2	1.4	6.0	0.2	0.2	0.0	0.0	0.1
Material Barge	Barge	2	149	0	30.6	5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	55.7	204	0.0	0.0	0.1	0.6	3.0	0.1	0.1	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	31.4	368	0.0	0.0	0.1	0.9	5.6	0.2	0.2	0.0	0.0	0.1
Description: For crew transfer	Crew	2	1491	37	14.2	26	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	23.1	5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	11.4	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	81.7	649	0.0	0.0	0.3	1.2	14.5	0.5	0.4	0.3	0.0	0.6
Bunkering vessel	Shuttle Tanker	1	5966	336	9.8	33	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1861.6**	**0.0**	**0.1**	**0.8**	**4.9**	**32.7**	**1.1**	**1.0**	**0.4**	**0.0**	**1.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B9 - Construction Emissions - Transit beyond OCS area and within 25-NM of New York

Cable Installation (tons) - Port of New Bedford, MA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Port of Providence, RI based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Table B9 - Construction Emissions - Transit beyond OCS area and within 25-NM of New York

Cable Installation (tons) - Port of New London, CT based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Paulsboro Marine Terminal, NJ based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	27.3	73	0.0	0.0	0.0	0.1	1.1	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	36.3	496	0.0	0.0	0.2	1.7	7.4	0.3	0.2	0.0	0.0	0.1
Material Barge:	Barge	1	149	0	99.9	8	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	36.3	133	0.0	0.0	0.1	0.4	1.9	0.1	0.1	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	24.2	99	0.0	0.0	0.0	0.1	1.5	0.1	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	149.9	985	0.0	0.0	0.4	3.5	14.4	0.5	0.5	0.0	0.0	0.3
Work Vessel Support Tug:	Tug	1	11186	447	136.3	930	0.0	0.0	0.4	3.2	13.8	0.5	0.5	0.0	0.0	0.3
Crew Transport Vessel:	Crew	2	2013	37	65.2	157	0.0	0.0	0.1	0.5	2.2	0.1	0.1	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	43.4	9	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	27.9	13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**2905**	**0.0**	**0.1**	**1.1**	**9.5**	**42.7**	**1.5**	**1.4**	**0.2**	**0.0**	**0.8**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**1936**	**0.0**	**0.1**	**0.7**	**6.3**	**28.5**	**1.0**	**0.9**	**0.1**	**0.0**	**0.5**
					SFEC	**968**	**0.0**	**0.0**	**0.4**	**3.2**	**14.2**	**0.5**	**0.5**	**0.1**	**0.0**	**0.3**

Table B9 - Construction Emissions - Transit beyond OCS area and within 25-NM of New York

Cable Installation (tons) - Sparrows Point, MD based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	11.3	30	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	15.0	205	0.0	0.0	0.1	0.7	3.0	0.1	0.1	0.0	0.0	0.1
Material Barge:	Barge	1	149	0	41.4	3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	15.0	55	0.0	0.0	0.0	0.2	0.8	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	10.0	41	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	62.0	408	0.0	0.0	0.2	1.4	6.0	0.2	0.2	0.0	0.0	0.1
Work Vessel Support Tug:	Tug	1	11186	447	56.4	385	0.0	0.0	0.1	1.3	5.7	0.2	0.2	0.0	0.0	0.1
Crew Transport Vessel:	Crew	2	2013	37	27.0	65	0.0	0.0	0.0	0.2	0.9	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	18.0	4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	11.5	6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1202**	**0.0**	**0.1**	**0.4**	**3.9**	**17.7**	**0.6**	**0.6**	**0.1**	**0.0**	**0.3**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**801**	**0.0**	**0.0**	**0.3**	**2.6**	**11.8**	**0.4**	**0.4**	**0.0**	**0.0**	**0.2**
					SFEC	**401**	**0.0**	**0.0**	**0.1**	**1.3**	**5.9**	**0.2**	**0.2**	**0.0**	**0.0**	**0.1**

Cable Installation (tons) - Port of Norfolk, VA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	11.1	30	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	14.9	203	0.0	0.0	0.1	0.7	3.0	0.1	0.1	0.0	0.0	0.1
Material Barge:	Barge	1	149	0	40.8	3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	14.9	55	0.0	0.0	0.0	0.2	0.8	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	9.9	40	0.0	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	61.3	403	0.0	0.0	0.1	1.4	5.9	0.2	0.2	0.0	0.0	0.1
Work Vessel Support Tug:	Tug	1	11186	447	55.7	380	0.0	0.0	0.1	1.3	5.6	0.2	0.2	0.0	0.0	0.1
Crew Transport Vessel:	Crew	2	2013	37	26.6	64	0.0	0.0	0.0	0.2	0.9	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	17.8	4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	11.4	5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1187**	**0.0**	**0.1**	**0.4**	**3.9**	**17.5**	**0.6**	**0.6**	**0.1**	**0.0**	**0.3**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**791**	**0.0**	**0.0**	**0.3**	**2.6**	**11.6**	**0.4**	**0.4**	**0.0**	**0.0**	**0.2**
					SFEC	**396**	**0.0**	**0.0**	**0.1**	**1.3**	**5.8**	**0.2**	**0.2**	**0.0**	**0.0**	**0.1**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B10 - Construction Emissions - Transit beyond OCS area and within 25-NM of Connecticut

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Vessel Emissions (ton) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Helicopter Emissions (ton) = Activity Hours (hours) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B10 - Construction Emissions - Transit beyond OCS area and within 25-NM of Connecticut

Monopile Installation (tons) - Port of New Bedford, MA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Providence, RI

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B10 - Construction Emissions - Transit beyond OCS area and within 25-NM of Connecticut

Monopile Installation (tons) - Port of New London, CT

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	4.5	89	0.0	0.0	0.0	0.3	1.4	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	16.5	225	0.0	0.0	0.1	0.8	3.3	0.1	0.1	0.0	0.0	0.1
Material Barge	Barge	2	149	0	17.0	3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	30.9	113	0.0	0.0	0.0	0.4	1.7	0.1	0.1	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	17.4	204	0.0	0.0	0.1	0.5	3.1	0.1	0.1	0.0	0.0	0.1
Description: For crew transfer	Crew	2	1491	37	7.9	14	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	12.8	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	6.3	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	45.4	361	0.0	0.0	0.2	0.7	8.1	0.3	0.2	0.2	0.0	0.3
Bunkering vessel	Shuttle Tanker	1	5966	336	5.4	19	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1033.8**	**0.0**	**0.1**	**0.4**	**2.7**	**18.2**	**0.6**	**0.6**	**0.2**	**0.0**	**0.6**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Paulsboro Marine Terminal, NJ

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B10 - Construction Emissions - Transit beyond OCS area and within 25-NM of Connecticut

Monopile Installation (tons) - Sparrows Point, MD

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Norfolk, VA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B10 - Construction Emissions - Transit beyond OCS area and within 25-NM of Connecticut

Cable Installation (tons) - Port of New Bedford, MA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Port of Providence, RI based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Table B10 - Construction Emissions - Transit beyond OCS area and within 25-NM of Connecticut

Cable Installation (tons) - Port of New London, CT based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	6.2	16	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	8.2	113	0.0	0.0	0.0	0.4	1.7	0.1	0.1	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	22.7	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	8.2	30	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	5.5	22	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	34.0	224	0.0	0.0	0.1	0.8	3.3	0.1	0.1	0.0	0.0	0.1
Work Vessel Support Tug:	Tug	1	11186	447	30.9	211	0.0	0.0	0.1	0.7	3.1	0.1	0.1	0.0	0.0	0.1
Crew Transport Vessel:	Crew	2	2013	37	14.8	36	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	9.9	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	6.3	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**659**	**0.0**	**0.0**	**0.2**	**2.2**	**9.7**	**0.3**	**0.3**	**0.0**	**0.0**	**0.2**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**439**	**0.0**	**0.0**	**0.2**	**1.4**	**6.5**	**0.2**	**0.2**	**0.0**	**0.0**	**0.1**
					SFEC	**220**	**0.0**	**0.0**	**0.1**	**0.7**	**3.2**	**0.1**	**0.1**	**0.0**	**0.0**	**0.1**

Cable Installation (tons) - Paulsboro Marine Terminal, NJ based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Table B10 - Construction Emissions - Transit beyond OCS area and within 25-NM of Connecticut

Cable Installation (tons) - Sparrows Point, MD based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Port of Norfolk, VA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B11 - Construction Emissions - Transit beyond OCS area and within 25-NM of New Jersey

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Vessel Emissions (ton) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Helicopter Emissions (ton) = Activity Hours (hours) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B11 - Construction Emissions - Transit beyond OCS area and within 25-NM of New Jersey

Monopile Installation (tons) - Port of New Bedford, MA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Providence, RI

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B11 - Construction Emissions - Transit beyond OCS area and within 25-NM of New Jersey

Monopile Installation (tons) - Port of New London, CT

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Paulsboro Marine Terminal, NJ

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	67.5	1326	0.0	0.1	0.5	4.2	20.9	0.6	0.6	0.0	0.0	0.3
Towing Tug	Tug	2	11186	447	245.6	3353	0.0	0.2	1.3	11.4	49.7	1.7	1.6	0.2	0.0	0.9
Material Barge	Barge	2	149	0	253.3	40	0.0	0.0	0.0	0.1	0.9	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	460.5	1690	0.0	0.1	0.7	5.4	24.7	0.9	0.9	0.2	0.0	0.6
Rock Dumping Vessel	Dredging	1	14914	4474	259.8	3039	0.0	0.1	1.2	7.5	46.2	1.7	1.6	0.4	0.0	1.2
Description: For crew transfer	Crew	2	1491	37	117.5	212	0.0	0.0	0.1	0.7	3.0	0.1	0.1	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	190.9	42	0.0	0.0	0.0	0.1	0.6	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	94.1	45	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
Feeder Barge: Monco 335	Barge	2	5966	1119	675.4	5369	0.0	0.3	2.8	10.2	120.1	3.8	3.6	2.6	0.0	4.8
Bunkering vessel	Shuttle Tanker	1	5966	336	81.0	277	0.0	0.0	0.1	0.6	4.2	0.2	0.2	0.2	0.0	0.3
					Total emissions	**15391.9**	**0.1**	**0.8**	**6.6**	**40.2**	**270.5**	**9.1**	**8.6**	**3.6**	**0.0**	**8.3**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B11 - Construction Emissions - Transit beyond OCS area and within 25-NM of New Jersey

Monopile Installation (tons) - Sparrows Point, MD

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Norfolk, VA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B11 - Construction Emissions - Transit beyond OCS area and within 25-NM of New Jersey

Cable Installation (tons) - Port of New Bedford, MA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Port of Providence, RI based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Table B11 - Construction Emissions - Transit beyond OCS area and within 25-NM of New Jersey

Cable Installation (tons) - Port of New London, CT based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Paulsboro Marine Terminal, NJ based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	92.1	246	0.0	0.0	0.1	0.2	3.7	0.1	0.1	0.0	0.0	0.1
Towing Tug:	Tug	2	11186	447	122.8	1677	0.0	0.1	0.6	5.7	24.9	0.9	0.8	0.1	0.0	0.5
Material Barge:	Barge	1	149	0	337.7	27	0.0	0.0	0.0	0.1	0.6	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	122.8	451	0.0	0.0	0.2	1.4	6.6	0.2	0.2	0.1	0.0	0.2
Cable Laying Vessel:	Cable Laying	1	2312	3878	81.7	335	0.0	0.0	0.1	0.4	5.1	0.2	0.2	0.0	0.0	0.1
Work Vessel:	Supply Ship	1	11186	75	506.5	3328	0.0	0.2	1.2	11.7	48.8	1.6	1.6	0.1	0.0	0.9
Work Vessel Support Tug:	Tug	1	11186	447	460.5	3144	0.0	0.2	1.2	10.7	46.6	1.6	1.5	0.2	0.0	0.9
Crew Transport Vessel:	Crew	2	2013	37	220.2	531	0.0	0.0	0.2	1.8	7.5	0.3	0.2	0.0	0.0	0.1
Support Vessel/Inflatable boats:	Crew	1	373	0	146.8	32	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	94.1	45	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
					Total emissions	**9815**	**0.1**	**0.5**	**3.7**	**32.2**	**144.4**	**4.9**	**4.8**	**0.5**	**0.0**	**2.8**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**6543**	**0.0**	**0.3**	**2.4**	**21.4**	**96.2**	**3.3**	**3.2**	**0.4**	**0.0**	**1.8**
					SFEC	**3272**	**0.0**	**0.2**	**1.2**	**10.7**	**48.1**	**1.6**	**1.6**	**0.2**	**0.0**	**0.9**

Table B11 - Construction Emissions - Transit beyond OCS area and within 25-NM of New Jersey

Cable Installation (tons) - Sparrows Point, MD based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Port of Norfolk, VA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B12 - Construction Emissions - Transit beyond OCS area and within 25-NM of Dalaware

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Vessel Emissions (ton) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Helicopter Emissions (ton) = Activity Hours (hours) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B12 - Construction Emissions - Transit beyond OCS area and within 25-NM of Dalaware

Monopile Installation (tons) - Port of New Bedford, MA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and in Other Water Offshore	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Providence, RI

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and in Other Water Offshore	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B12 - Construction Emissions - Transit beyond OCS area and within 25-NM of Dalaware

Monopile Installation (tons) - Port of New London, CT

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and in Other Water Offshore	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Paulsboro Marine Terminal, NJ

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and in Other Water Offshore	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	26.0	510	0.0	0.0	0.2	1.6	8.0	0.2	0.2	0.0	0.0	0.1
Towing Tug	Tug	2	11186	447	94.5	1291	0.0	0.1	0.5	4.4	19.1	0.7	0.6	0.1	0.0	0.4
Material Barge	Barge	2	149	0	97.5	15	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	177.3	651	0.0	0.0	0.3	2.1	9.5	0.3	0.3	0.1	0.0	0.2
Rock Dumping Vessel	Dredging	1	14914	4474	100.0	1170	0.0	0.1	0.5	2.9	17.8	0.6	0.6	0.2	0.0	0.5
Description: For crew transfer	Crew	2	1491	37	45.2	81	0.0	0.0	0.0	0.3	1.2	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	73.5	16	0.0	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	36.2	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	260.0	2067	0.0	0.1	1.1	3.9	46.2	1.5	1.4	1.0	0.0	1.9
Bunkering vessel	Shuttle Tanker	1	5966	336	31.2	107	0.0	0.0	0.1	0.2	1.6	0.1	0.1	0.1	0.0	0.1
					Total emissions	**5925.4**	**0.0**	**0.3**	**2.6**	**15.5**	**104.1**	**3.5**	**3.3**	**1.4**	**0.0**	**3.2**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B12 - Construction Emissions - Transit beyond OCS area and within 25-NM of Dalaware

Monopile Installation (tons) - Sparrows Point, MD

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and in Other Water Offshore	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	75.5	1483	0.0	0.1	0.5	4.7	23.4	0.7	0.7	0.0	0.0	0.3
Towing Tug	Tug	2	11186	447	274.7	3750	0.0	0.2	1.4	12.7	55.6	1.9	1.8	0.2	0.0	1.0
Material Barge	Barge	2	149	0	283.2	45	0.0	0.0	0.0	0.1	1.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	515.0	1890	0.0	0.1	0.8	6.0	27.6	1.0	1.0	0.2	0.0	0.7
Rock Dumping Vessel	Dredging	1	14914	4474	290.5	3398	0.0	0.2	1.4	8.3	51.7	1.9	1.8	0.4	0.0	1.3
Description: For crew transfer	Crew	2	1491	37	131.4	237	0.0	0.0	0.1	0.8	3.4	0.1	0.1	0.0	0.0	0.1
Description: For transport of	Crew	1	373	0	213.5	47	0.0	0.0	0.0	0.2	0.7	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	105.3	50	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
Feeder Barge: Monco 335	Barge	2	5966	1119	755.3	6004	0.0	0.3	3.1	11.4	134.3	4.3	4.0	3.0	0.0	5.4
Bunkering vessel	Shuttle Tanker	1	5966	336	90.6	310	0.0	0.0	0.2	0.7	4.8	0.2	0.2	0.2	0.0	0.3
					Total emissions	**17213.9**	**0.1**	**0.9**	**7.4**	**45.0**	**302.5**	**10.2**	**9.7**	**4.1**	**0.0**	**9.3**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Norfolk, VA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and in Other Water Offshore	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	76.0	1492	0.0	0.1	0.5	4.7	23.5	0.7	0.7	0.0	0.0	0.3
Towing Tug	Tug	2	11186	447	276.3	3773	0.0	0.2	1.4	12.8	56.0	1.9	1.8	0.2	0.0	1.0
Material Barge	Barge	2	149	0	284.9	45	0.0	0.0	0.0	0.1	1.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	518.1	1901	0.0	0.1	0.8	6.0	27.8	1.0	1.0	0.2	0.0	0.7
Rock Dumping Vessel	Dredging	1	14914	4474	292.2	3419	0.0	0.2	1.4	8.4	52.0	1.9	1.8	0.4	0.0	1.3
Description: For crew transfer	Crew	2	1491	37	132.1	238	0.0	0.0	0.1	0.8	3.4	0.1	0.1	0.0	0.0	0.1
Description: For transport of	Crew	1	373	0	214.7	47	0.0	0.0	0.0	0.2	0.7	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	105.9	51	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
Feeder Barge: Monco 335	Barge	2	5966	1119	759.8	6040	0.0	0.3	3.1	11.5	135.1	4.3	4.0	3.0	0.0	5.4
Bunkering vessel	Shuttle Tanker	1	5966	336	91.2	311	0.0	0.0	0.2	0.7	4.8	0.2	0.2	0.2	0.0	0.3
					Total emissions	**17316.9**	**0.1**	**0.9**	**7.5**	**45.3**	**304.3**	**10.2**	**9.7**	**4.1**	**0.0**	**9.3**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B12 - Construction Emissions - Transit beyond OCS area and within 25-NM of Dalaware

Cable Installation (tons) - Port of New Bedford, MA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and in Other Water Offshore	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Port of Providence, RI based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and in Other Water Offshore	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Table B12 - Construction Emissions - Transit beyond OCS area and within 25-NM of Dalaware

Cable Installation (tons) - Port of New London, CT based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and in Other Water Offshore	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Paulsboro Marine Terminal, NJ based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and in Other Water Offshore	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	35.5	95	0.0	0.0	0.0	0.1	1.4	0.1	0.1	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	47.3	645	0.0	0.0	0.2	2.2	9.6	0.3	0.3	0.0	0.0	0.2
Material Barge:	Barge	1	149	0	130.0	10	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	47.3	173	0.0	0.0	0.1	0.6	2.5	0.1	0.1	0.0	0.0	0.1
Cable Laying Vessel:	Cable Laying	1	2312	3878	31.5	129	0.0	0.0	0.0	0.1	2.0	0.1	0.1	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	195.0	1281	0.0	0.1	0.5	4.5	18.8	0.6	0.6	0.1	0.0	0.3
Work Vessel Support Tug:	Tug	1	11186	447	177.3	1210	0.0	0.1	0.5	4.1	17.9	0.6	0.6	0.1	0.0	0.3
Crew Transport Vessel:	Crew	2	2013	37	84.8	205	0.0	0.0	0.1	0.7	2.9	0.1	0.1	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	56.5	12	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	36.2	17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**3778**	**0.0**	**0.2**	**1.4**	**12.4**	**55.6**	**1.9**	**1.8**	**0.2**	**0.0**	**1.1**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**2519**	**0.0**	**0.1**	**0.9**	**8.3**	**37.1**	**1.3**	**1.2**	**0.1**	**0.0**	**0.7**
					SFEC	**1259**	**0.0**	**0.1**	**0.5**	**4.1**	**18.5**	**0.6**	**0.6**	**0.1**	**0.0**	**0.4**

Table B12 - Construction Emissions - Transit beyond OCS area and within 25-NM of Dalaware

Cable Installation (tons) - Sparrows Point, MD based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and in Other Water Offshore	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	103.0	275	0.0	0.0	0.1	0.2	4.2	0.2	0.2	0.1	0.0	0.1
Towing Tug:	Tug	2	11186	447	137.3	1875	0.0	0.1	0.7	6.4	27.8	1.0	0.9	0.1	0.0	0.5
Material Barge:	Barge	1	149	0	377.7	30	0.0	0.0	0.0	0.1	0.7	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	137.3	504	0.0	0.0	0.2	1.6	7.4	0.3	0.3	0.1	0.0	0.2
Cable Laying Vessel:	Cable Laying	1	2312	3878	91.4	374	0.0	0.0	0.1	0.4	5.7	0.2	0.2	0.0	0.0	0.1
Work Vessel:	Supply Ship	1	11186	75	566.5	3722	0.0	0.2	1.4	13.1	54.6	1.8	1.8	0.2	0.0	1.0
Work Vessel Support Tug:	Tug	1	11186	447	515.0	3516	0.0	0.2	1.3	11.9	52.1	1.8	1.7	0.2	0.0	1.0
Crew Transport Vessel:	Crew	2	2013	37	246.3	594	0.0	0.0	0.2	2.1	8.4	0.3	0.3	0.0	0.0	0.1
Support Vessel/Inflatable boats:	Crew	1	373	0	164.2	36	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	105.3	50	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
					Total emissions	**10977**	**0.1**	**0.5**	**4.1**	**36.0**	**161.5**	**5.5**	**5.3**	**0.6**	**0.0**	**3.1**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**7318**	**0.0**	**0.4**	**2.7**	**24.0**	**107.6**	**3.7**	**3.6**	**0.4**	**0.0**	**2.1**
					SFEC	**3659**	**0.0**	**0.2**	**1.4**	**12.0**	**53.8**	**1.8**	**1.8**	**0.2**	**0.0**	**1.0**

Cable Installation (tons) - Port of Norfolk, VA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and in Other Water Offshore	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	103.6	276	0.0	0.0	0.1	0.2	4.2	0.2	0.2	0.1	0.0	0.1
Towing Tug:	Tug	2	11186	447	138.2	1886	0.0	0.1	0.7	6.4	28.0	1.0	0.9	0.1	0.0	0.5
Material Barge:	Barge	1	149	0	379.9	30	0.0	0.0	0.0	0.1	0.7	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	138.2	507	0.0	0.0	0.2	1.6	7.4	0.3	0.3	0.1	0.0	0.2
Cable Laying Vessel:	Cable Laying	1	2312	3878	91.9	377	0.0	0.0	0.1	0.4	5.7	0.2	0.2	0.0	0.0	0.1
Work Vessel:	Supply Ship	1	11186	75	569.9	3744	0.0	0.2	1.4	13.2	54.9	1.9	1.8	0.2	0.0	1.0
Work Vessel Support Tug:	Tug	1	11186	447	518.1	3537	0.0	0.2	1.3	12.0	52.5	1.8	1.7	0.2	0.0	1.0
Crew Transport Vessel:	Crew	2	2013	37	247.8	598	0.0	0.0	0.2	2.1	8.5	0.3	0.3	0.0	0.0	0.1
Support Vessel/Inflatable boats:	Crew	1	373	0	165.2	36	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	105.9	51	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
					Total emissions	**11042**	**0.1**	**0.5**	**4.1**	**36.2**	**162.4**	**5.6**	**5.4**	**0.6**	**0.0**	**3.1**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**7362**	**0.0**	**0.4**	**2.8**	**24.1**	**108.3**	**3.7**	**3.6**	**0.4**	**0.0**	**2.1**
					SFEC	**3681**	**0.0**	**0.2**	**1.4**	**12.1**	**54.1**	**1.9**	**1.8**	**0.2**	**0.0**	**1.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B13 - Construction Emissions - Transit beyond OCS area and within 25-NM of Maryland

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Vessel Emissions (ton) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Helicopter Emissions (ton) = Activity Hours (hours) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B13 - Construction Emissions - Transit beyond OCS area and within 25-NM of Maryland

Monopile Installation (tons) - Port of New Bedford, MA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of MD	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Providence, RI

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of MD	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B13 - Construction Emissions - Transit beyond OCS area and within 25-NM of Maryland

Monopile Installation (tons) - Port of New London, CT

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Paulsboro Marine Terminal, NJ

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B13 - Construction Emissions - Transit beyond OCS area and within 25-NM of Maryland

Monopile Installation (tons) - Sparrows Point, MD

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	46.2	908	0.0	0.0	0.3	2.9	14.3	0.4	0.4	0.0	0.0	0.2
Towing Tug	Tug	2	11186	447	168.1	2295	0.0	0.1	0.9	7.8	34.0	1.2	1.1	0.1	0.0	0.6
Material Barge	Barge	2	149	0	173.4	28	0.0	0.0	0.0	0.1	0.6	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	315.2	1157	0.0	0.1	0.5	3.7	16.9	0.6	0.6	0.1	0.0	0.4
Rock Dumping Vessel	Dredging	1	14914	4474	177.8	2080	0.0	0.1	0.8	5.1	31.6	1.1	1.1	0.3	0.0	0.8
Description: For crew transfer	Crew	2	1491	37	80.4	145	0.0	0.0	0.1	0.5	2.1	0.1	0.1	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	130.6	29	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	64.4	31	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
Feeder Barge: Monco 335	Barge	2	5966	1119	462.3	3675	0.0	0.2	1.9	7.0	82.2	2.6	2.4	1.8	0.0	3.3
Bunkering vessel	Shuttle Tanker	1	5966	336	55.5	189	0.0	0.0	0.1	0.4	2.9	0.1	0.1	0.1	0.0	0.2
					Total emissions	**10535.9**	**0.1**	**0.5**	**4.6**	**27.5**	**185.1**	**6.2**	**5.9**	**2.5**	**0.0**	**5.7**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Norfolk, VA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	12.1	237	0.0	0.0	0.1	0.7	3.7	0.1	0.1	0.0	0.0	0.1
Towing Tug	Tug	2	11186	447	43.9	599	0.0	0.0	0.2	2.0	8.9	0.3	0.3	0.0	0.0	0.2
Material Barge	Barge	2	149	0	45.2	7	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	82.2	302	0.0	0.0	0.1	1.0	4.4	0.2	0.2	0.0	0.0	0.1
Rock Dumping Vessel	Dredging	1	14914	4474	46.4	543	0.0	0.0	0.2	1.3	8.3	0.3	0.3	0.1	0.0	0.2
Description: For crew transfer	Crew	2	1491	37	21.0	38	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	34.1	7	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	16.8	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	120.6	959	0.0	0.0	0.5	1.8	21.4	0.7	0.6	0.5	0.0	0.9
Bunkering vessel	Shuttle Tanker	1	5966	336	14.5	49	0.0	0.0	0.0	0.1	0.8	0.0	0.0	0.0	0.0	0.0
					Total emissions	**2748.8**	**0.0**	**0.1**	**1.2**	**7.2**	**48.3**	**1.6**	**1.5**	**0.6**	**0.0**	**1.5**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B13 - Construction Emissions - Transit beyond OCS area and within 25-NM of Maryland

Cable Installation (tons) - Port of New Bedford, MA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of MD	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Port of Providence, RI based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of MD	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Table B13 - Construction Emissions - Transit beyond OCS area and within 25-NM of Maryland

Cable Installation (tons) - Port of New London, CT based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of MD	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Paulsboro Marine Terminal, NJ based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of MD	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Table B13 - Construction Emissions - Transit beyond OCS area and within 25-NM of Maryland

Cable Installation (tons) - Sparrows Point, MD based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of MD	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	63.0	168	0.0	0.0	0.1	0.1	2.6	0.1	0.1	0.0	0.0	0.1
Towing Tug:	Tug	2	11186	447	84.1	1148	0.0	0.1	0.4	3.9	17.0	0.6	0.6	0.1	0.0	0.3
Material Barge:	Barge	1	149	0	231.1	18	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	84.1	308	0.0	0.0	0.1	1.0	4.5	0.2	0.2	0.0	0.0	0.1
Cable Laying Vessel:	Cable Laying	1	2312	3878	55.9	229	0.0	0.0	0.1	0.3	3.5	0.1	0.1	0.0	0.0	0.1
Work Vessel:	Supply Ship	1	11186	75	346.7	2278	0.0	0.1	0.8	8.0	33.4	1.1	1.1	0.1	0.0	0.6
Work Vessel Support Tug:	Tug	1	11186	447	315.2	2152	0.0	0.1	0.8	7.3	31.9	1.1	1.1	0.1	0.0	0.6
Crew Transport Vessel:	Crew	2	2013	37	150.7	364	0.0	0.0	0.1	1.3	5.1	0.2	0.2	0.0	0.0	0.1
Support Vessel/Inflatable boats:	Crew	1	373	0	100.5	22	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	64.4	31	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
					Total emissions	**6718**	**0.0**	**0.3**	**2.5**	**22.0**	**98.8**	**3.4**	**3.3**	**0.4**	**0.0**	**1.9**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**4479**	**0.0**	**0.2**	**1.7**	**14.7**	**65.9**	**2.3**	**2.2**	**0.2**	**0.0**	**1.3**
					SFEC	**2239**	**0.0**	**0.1**	**0.8**	**7.3**	**32.9**	**1.1**	**1.1**	**0.1**	**0.0**	**0.6**

Cable Installation (tons) - Port of Norfolk, VA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	outside 25-mile of SFWF and within 25M boundary of MD	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	16.4	44	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	21.9	299	0.0	0.0	0.1	1.0	4.4	0.2	0.1	0.0	0.0	0.1
Material Barge:	Barge	1	149	0	60.3	5	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	21.9	80	0.0	0.0	0.0	0.3	1.2	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	14.6	60	0.0	0.0	0.0	0.1	0.9	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	90.5	594	0.0	0.0	0.2	2.1	8.7	0.3	0.3	0.0	0.0	0.2
Work Vessel Support Tug:	Tug	1	11186	447	82.2	561	0.0	0.0	0.2	1.9	8.3	0.3	0.3	0.0	0.0	0.2
Crew Transport Vessel:	Crew	2	2013	37	39.3	95	0.0	0.0	0.0	0.3	1.3	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	26.2	6	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	16.8	8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**1753**	**0.0**	**0.1**	**0.7**	**5.7**	**25.8**	**0.9**	**0.9**	**0.1**	**0.0**	**0.5**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**1169**	**0.0**	**0.1**	**0.4**	**3.8**	**17.2**	**0.6**	**0.6**	**0.1**	**0.0**	**0.3**
					SFEC	**584**	**0.0**	**0.0**	**0.2**	**1.9**	**8.6**	**0.3**	**0.3**	**0.0**	**0.0**	**0.2**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B14 - Construction Emissions - Transit beyond OCS area and within 25-NM of Virginia

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Vessel Emissions (ton) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Helicopter Emissions (ton) = Activity Hours (hours) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B14 - Construction Emissions - Transit beyond OCS area and within 25-NM of Virginia

Monopile Installation (tons) - Port of New Bedford, MA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Providence, RI

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter:	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B14 - Construction Emissions - Transit beyond OCS area and within 25-NM of Virginia

Monopile Installation (tons) - Port of New London, CT

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Paulsboro Marine Terminal, NJ

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge	Barge	2	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rock Dumping Vessel	Dredging	1	14914	4474	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For crew transfer	Crew	2	1491	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Bunkering vessel	Shuttle Tanker	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B14 - Construction Emissions - Transit beyond OCS area and within 25-NM of Virginia

Monopile Installation (tons) - Sparrows Point, MD

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	51.2	1004	0.0	0.0	0.4	3.2	15.8	0.5	0.5	0.0	0.0	0.2
Towing Tug	Tug	2	11186	447	186.1	2541	0.0	0.1	1.0	8.6	37.7	1.3	1.2	0.1	0.0	0.7
Material Barge	Barge	2	149	0	191.9	30	0.0	0.0	0.0	0.1	0.7	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	348.9	1280	0.0	0.1	0.5	4.1	18.7	0.7	0.7	0.1	0.0	0.5
Rock Dumping Vessel	Dredging	1	14914	4474	196.8	2302	0.0	0.1	0.9	5.6	35.0	1.3	1.2	0.3	0.0	0.9
Description: For crew transfer	Crew	2	1491	37	89.0	160	0.0	0.0	0.1	0.6	2.3	0.1	0.1	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	144.6	32	0.0	0.0	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	71.3	34	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
Feeder Barge: Monco 335	Barge	2	5966	1119	511.7	4067	0.0	0.2	2.1	7.7	91.0	2.9	2.7	2.0	0.0	3.7
Bunkering vessel	Shuttle Tanker	1	5966	336	61.4	210	0.0	0.0	0.1	0.5	3.2	0.2	0.1	0.1	0.0	0.2
					Total emissions	**11660.8**	**0.1**	**0.6**	**5.0**	**30.5**	**204.9**	**6.9**	**6.5**	**2.8**	**0.0**	**6.3**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Monopile Installation (tons) - Port of Norfolk, VA

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	37.8	742	0.0	0.0	0.3	2.3	11.7	0.4	0.3	0.0	0.0	0.2
Towing Tug	Tug	2	11186	447	137.5	1878	0.0	0.1	0.7	6.4	27.8	1.0	0.9	0.1	0.0	0.5
Material Barge	Barge	2	149	0	141.8	23	0.0	0.0	0.0	0.1	0.5	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug	Anchor Handling Tugs	1	5966	336	257.8	946	0.0	0.0	0.4	3.0	13.8	0.5	0.5	0.1	0.0	0.3
Rock Dumping Vessel	Dredging	1	14914	4474	145.5	1702	0.0	0.1	0.7	4.2	25.9	0.9	0.9	0.2	0.0	0.7
Description: For crew transfer	Crew	2	1491	37	65.8	118	0.0	0.0	0.0	0.4	1.7	0.1	0.1	0.0	0.0	0.0
Description: For transport of	Crew	1	373	0	106.9	23	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0
Description: For emergency	Helicopter	1	2759	0	52.7	25	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Feeder Barge: Monco 335	Barge	2	5966	1119	378.2	3006	0.0	0.2	1.5	5.7	67.2	2.1	2.0	1.5	0.0	2.7
Bunkering vessel	Shuttle Tanker	1	5966	336	45.4	155	0.0	0.0	0.1	0.3	2.4	0.1	0.1	0.1	0.0	0.2
					Total emissions	**8618.8**	**0.1**	**0.4**	**3.7**	**22.5**	**151.5**	**5.1**	**4.8**	**2.0**	**0.0**	**4.6**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B14 - Construction Emissions - Transit beyond OCS area and within 25-NM of Virginia

Cable Installation (tons) - Port of New Bedford, MA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Port of Providence, RI based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Table B14 - Construction Emissions - Transit beyond OCS area and within 25-NM of Virginia

Cable Installation (tons) - Port of New London, CT based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter		1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Cable Installation (tons) - Paulsboro Marine Terminal, NJ based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towing Tug:	Tug	2	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel:	Supply Ship	1	11186	75	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Work Vessel Support Tug:	Tug	1	11186	447	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crew Transport Vessel:	Crew	2	2013	37	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Support Vessel/Inflatable boats:	Crew	1	373	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
					SFEC	**0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**

Table B14 - Construction Emissions - Transit beyond OCS area and within 25-NM of Virginia

Cable Installation (tons) - Sparrows Point, MD based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	69.8	186	0.0	0.0	0.1	0.1	2.8	0.1	0.1	0.0	0.0	0.1
Towing Tug:	Tug	2	11186	447	93.0	1270	0.0	0.1	0.5	4.3	18.8	0.6	0.6	0.1	0.0	0.3
Material Barge:	Barge	1	149	0	255.8	20	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	93.0	341	0.0	0.0	0.1	1.1	5.0	0.2	0.2	0.0	0.0	0.1
Cable Laying Vessel:	Cable Laying	1	2312	3878	61.9	254	0.0	0.0	0.1	0.3	3.8	0.1	0.1	0.0	0.0	0.1
Work Vessel:	Supply Ship	1	11186	75	383.7	2521	0.0	0.1	0.9	8.9	37.0	1.3	1.2	0.1	0.0	0.7
Work Vessel Support Tug:	Tug	1	11186	447	348.9	2382	0.0	0.1	0.9	8.1	35.3	1.2	1.2	0.1	0.0	0.6
Crew Transport Vessel:	Crew	2	2013	37	166.8	403	0.0	0.0	0.1	1.4	5.7	0.2	0.2	0.0	0.0	0.1
Support Vessel/Inflatable boats:	Crew	1	373	0	111.2	24	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	71.3	34	0.0	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.1
					Total emissions	**7436**	**0.0**	**0.4**	**2.8**	**24.4**	**109.4**	**3.7**	**3.6**	**0.4**	**0.0**	**2.1**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**4957**	**0.0**	**0.2**	**1.9**	**16.2**	**72.9**	**2.5**	**2.4**	**0.3**	**0.0**	**1.4**
					SFEC	**2479**	**0.0**	**0.1**	**0.9**	**8.1**	**36.5**	**1.2**	**1.2**	**0.1**	**0.0**	**0.7**

Cable Installation (tons) - Port of Norfolk, VA based

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	51.6	138	0.0	0.0	0.1	0.1	2.1	0.1	0.1	0.0	0.0	0.1
Towing Tug:	Tug	2	11186	447	68.8	939	0.0	0.0	0.4	3.2	13.9	0.5	0.5	0.0	0.0	0.3
Material Barge:	Barge	1	149	0	189.1	15	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	68.8	252	0.0	0.0	0.1	0.8	3.7	0.1	0.1	0.0	0.0	0.1
Cable Laying Vessel:	Cable Laying	1	2312	3878	45.7	187	0.0	0.0	0.1	0.2	2.8	0.1	0.1	0.0	0.0	0.1
Work Vessel:	Supply Ship	1	11186	75	283.6	1864	0.0	0.1	0.7	6.6	27.3	0.9	0.9	0.1	0.0	0.5
Work Vessel Support Tug:	Tug	1	11186	447	257.8	1760	0.0	0.1	0.7	6.0	26.1	0.9	0.9	0.1	0.0	0.5
Crew Transport Vessel:	Crew	2	2013	37	123.3	298	0.0	0.0	0.1	1.0	4.2	0.1	0.1	0.0	0.0	0.1
Support Vessel/Inflatable boats:	Crew	1	373	0	82.2	18	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0
Helicopter	0	1	2759	0	52.7	25	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
					Total emissions	**5496**	**0.0**	**0.3**	**2.1**	**18.0**	**80.8**	**2.8**	**2.7**	**0.3**	**0.0**	**1.5**
(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info					**SFWF**	**3664**	**0.0**	**0.2**	**1.4**	**12.0**	**53.9**	**1.8**	**1.8**	**0.2**	**0.0**	**1.0**
					SFEC	**1832**	**0.0**	**0.1**	**0.7**	**6.0**	**26.9**	**0.9**	**0.9**	**0.1**	**0.0**	**0.5**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

Table B15- Construction Emissions - Interarray Cable Laying in SFWF

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbo	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Vessel Emissions (ton) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Helicopter Emissions (ton) = Activity Hours (hours) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B15- Construction Emissions - Interarray Cable Laying in SFWF

Cable Installation (tons)

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours - inter-array cable laying in SFWF	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	18.1	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	174.4	465.0	0.0	0.0	0.2	0.3	7.1	0.3	0.3	0.1	0.0	0.2
Towing Tug:	Tug	2	11186	447	31.2	426.6	0.0	0.0	0.2	1.4	6.3	0.2	0.2	0.0	0.0	0.1
Material Barge:	Barge	1	149	0	0.7	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	31.2	115	0.0	0.0	0.0	0.4	1.7	0.1	0.1	0.0	0.0	0.0
Cable Laying Vessel:	Cable Laying	1	2312	3878	416.1	1705	0.0	0.1	0.6	1.9	25.8	0.9	0.8	0.1	0.0	0.5
Work Vessel:	Supply Ship	1	11186	75	54.3	357	0.0	0.0	0.1	1.3	5.2	0.2	0.2	0.0	0.0	0.1
Work Vessel Support Tug:	Tug	1	11186	447	57.5	392.7	0.0	0.0	0.1	1.3	5.8	0.2	0.2	0.0	0.0	0.1
Crew Transport Vessel:	Crew	2	2013	37	346.2	835.2	0.0	0.0	0.3	2.9	11.8	0.4	0.4	0.0	0.0	0.2
Support Vessel/Inflatable boats:	Crew	1	373	0	98.3	21.5	0.0	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0	0.0
Helicopter	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**4319.0**	**0.0**	**0.2**	**1.6**	**9.6**	**64.1**	**2.2**	**2.1**	**0.3**	**0.0**	**1.2**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

**- Work Duration is for a build-out of 16 turbines*

Table B16 - Construction Emissions - Export Cable Laying within 25-NM of SFWF

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Vessel Emissions (ton) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Helicopter Emissions (ton) = Activity Hours (hours) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B16 - Construction Emissions - Export Cable Laying within 25-NM of SFWF

Cable Installation (tons)

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours - cable laying within 25 mile of SFWF	CO2	CH4	N2O	Black Carbor	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	53.9	4.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	520.2	1387.2	0.0	0.1	0.6	1.0	21.1	0.8	0.8	0.3	0.0	0.7
Towing Tug:	Tug	2	11186	447	93.2	1272.9	0.0	0.1	0.5	4.3	18.9	0.6	0.6	0.1	0.0	0.3
Material Barge:	Barge	1	149	0	2.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	93.2	342	0.0	0.0	0.1	1.1	5.0	0.2	0.2	0.0	0.0	0.1
Cable Laying Vessel:	Cable Laying	1	2312	3878	1241.3	5086	0.0	0.2	1.9	5.7	77.1	2.6	2.5	0.3	0.0	1.4
Work Vessel:	Supply Ship	1	11186	75	162.1	1065	0.0	0.1	0.4	3.8	15.6	0.5	0.5	0.0	0.0	0.3
Work Vessel Support Tug:	Tug	1	11186	447	171.6	1171.7	0.0	0.1	0.4	4.0	17.4	0.6	0.6	0.1	0.0	0.3
Crew Transport Vessel:	Crew	2	2013	37	1032.9	2491.9	0.0	0.1	0.9	8.6	35.3	1.2	1.2	0.0	0.0	0.5
Support Vessel/Inflatable boats:	Crew	1	373	0	293.2	64.0	0.0	0.0	0.0	0.2	0.9	0.0	0.0	0.0	0.0	0.0
Helicopter	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**12885.6**	**0.1**	**0.6**	**4.9**	**28.7**	**191.3**	**6.6**	**6.3**	**0.8**	**0.0**	**3.6**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

**- Work Duration is for a build-out of 16 turbines*

Table B17 - Construction Emissions - Export Cable Laying within 25-NM of NY

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Vessel Emissions (ton) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Helicopter Emissions (ton) = Activity Hours (hours) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B17 - Construction Emissions - Export Cable Laying within 25-NM of NY

Cable Installation (tons)

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (KW)	Auxillary Engine Rating (kW)	Hours -cable laying outside 25-mile of SFWF and within 3-mile boundary of NY	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Transportation Barge:	Barge	1	149	0	33.1	3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Fuel Bunkering Vessel:	Shuttle Tanker	1	1506	2610	319.1	851	0.0	0.0	0.4	0.6	12.9	0.5	0.5	0.2	0.0	0.4
Towing Tug:	Tug	2	11186	447	57.2	781	0.0	0.0	0.3	2.6	11.6	0.4	0.4	0.0	0.0	0.2
Material Barge:	Barge	1	149	0	1.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Anchor Handling Tug:	Anchor Handling Tugs	1	5966	336	57.2	210	0.0	0.0	0.1	0.7	3.1	0.1	0.1	0.0	0.0	0.1
Cable Laying Vessel:	Cable Laying	1	2312	3878	761.5	3120	0.0	0.2	1.2	3.5	47.3	1.6	1.5	0.2	0.0	0.8
Work Vessel:	Supply Ship	1	11186	75	99.4	653	0.0	0.0	0.2	2.3	9.6	0.3	0.3	0.0	0.0	0.2
Work Vessel Support Tug:	Tug	1	11186	447	105.2	718	0.0	0.0	0.3	2.4	10.7	0.4	0.4	0.0	0.0	0.2
Crew Transport Vessel:	Crew	2	2013	37	633.6	1529	0.0	0.1	0.5	5.3	21.6	0.7	0.7	0.0	0.0	0.3
Support Vessel/Inflatable boats:	Crew	1	373	0	179.8	39	0.0	0.0	0.0	0.1	0.6	0.0	0.0	0.0	0.0	0.0
Helicopter	Helicopter	1	2759	0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
					Total emissions	**7903**	**0.0**	**0.4**	**3.0**	**17.6**	**117.3**	**4.0**	**3.9**	**0.5**	**0.0**	**2.2**

*NOTE: * - both engines used in vessels, and stationary engines will have to be EPA-certified engines for the type and model year of engine used.*

**- Work Duration is for a build-out of 16 turbines*

Table B18 - South Fork Wind Farm Project - Onshore Construction

1 Emission Factors - Non-road CI Engine (g/kW-hr)

Emission Factor ID	Engine Rated Power	CO2*	CO	NOX	PM10 (as PM)	PM2.5 (as PM	SO2*	VOC*	HAPs*	Data Source
Nonroad 1	130 ≤ kW < 560 (Tier 3)	699.504	3.5	4	0.2	0.2	1.25	1.50	2.71E-02	(a)
Nonroad 2	kW > 900 (Tier 2)	699.504	3.5	6.4	0.2	0.2	1.25	1.50	2.71E-02	

Note:
(a) EPA Federal Nonroad Compression-Ignition Engines: Exhaust Emission Standards (EPA-420-B-16-022, March 2016
* Emission factor are from AP-42 section 3.3

AP-42	CO2		SO2		VOC		HAPs		
	(lb/hp-hr)	(g/kW-hr)	(lb/hp-hr)	(g/kW-hr)	(lb/hp-hr)	(g/kW-hr)	(lb/MMBTU)	(lb/hp-hr)	(g/kW-hr)
Section 3.3	1.15	700	2.05E-03	1.25	2.47E-03	2	6.37E-03	4.46E-05	2.71E-02

HAP is the sum of avaiable emissions factors for HAPs listed in Clean Air Act

Emissions (tons) = Engine Power Rating (kW) x Loading Factor (%) x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Type of Equipment/Emission Source Description (list others as needed)	No. of Each Type of Equipment	Engine Size on Equipment (specify units)	Equipment Size HP	Equipment Size kW	Fuel Type	Emission Factor used	Engine Use	Vent/Stack Height (feet)	Vent/Stack Diameter (inches)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Work Task	Work Task Duration in	Work Task Duration in State Waters (days) NYC	Work Task Duration in Other State Waters	Load Factor	Emissions (tons) CO2	CO	NOx	PM10	PM2.5	SO2	VOC	HAP
Onshore Substation Installation (138kV/69kV Substation with Power transformer and shunt reactors)																		4901	25	43	1	1	9	11	0
Cranes:	1	Main Engine	1400	1,044	diesel	Nonroad 2	General Power		20 4" - 6"	12	50	720	0		120	0	1	580	2.9	5.3	0.2	0.2	1.0	1.2	0.0
Excavator:	1	Main Engine	800	597	diesel	Nonroad 2	General Power		20 4" - 6"	12	50	720	0		120	0	1	331	1.7	3.0	0.1	0.1	0.6	0.7	0.0
Front-end Loader:	1	Main Engine	1000	746	diesel	Nonroad 2	General Power		20 4" - 6"	12	50	720	0		120	0	1	414	2.1	3.8	0.1	0.1	0.7	0.9	0.0
Trenchers:	1	Main Engine	100	75	diesel	Nonroad 1	General Power	10'-12'	3"-4"	12	75	1,080	0		120	0	1	62	0.3	0.4	0.0	0.0	0.1	0.1	0.0
Dump Trucks:	2	Main Engine	2500	1,864	diesel	Nonroad 2	General Power		20 4" - 6"	12	75	1,080	0		120	0	1	3105	15.5	28.4	0.9	0.9	5.5	6.7	0.1
Bucket Trucks	1	Main Engine	200	149	diesel	Nonroad 1	General Power			12	50	720	0		120	0	1	83	0.4	0.5	0.0	0.0	0.1	0.2	0.0
Lull Telescopic Forklift	1	Main Engine	150	112	diesel	Nonroad 1	General Power			12	50	720	0		120	0	1	62	0.3	0.4	0.0	0.0	0.1	0.1	0.0
Heavy-duty Trucks:	1	Main Engine	200	149	diesel	Nonroad 1	General Power		10 4" - 6"	6	25	180	0		120	0	1	21	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Catapiller D7 Bulldozer	1	Main Engine	250	186	diesel	Nonroad 1	General Power			12	50	540	0		120	0	1	78	0.4	0.4	0.0	0.0	0.1	0.2	0.0
Pickup Trucks:	4	Main Engine	200	149	diesel	Nonroad 1	General Power		10 4" - 6"	6	50	360	0		120	0	1	166	0.8	0.9	0.0	0.0	0.3	0.4	0.0
Onshore Duct Bank (138kV Duct Bank ~5																		2213	11	18	1	1	4	5	0
Cranes:	1	Main Engine	1400	1,044	diesel	Nonroad 2	General Power		20 4" - 6"	12	50	360	0		60	0	1	290	1.5	2.7	0.1	0.1	0.5	0.6	0.0
Excavator:	1	Main Engine	800	597	diesel	Nonroad 2	General Power		20 4" - 6"	12	50	360	0		60	0	1	166	0.8	1.5	0.0	0.0	0.3	0.4	0.0
Front-end Loader:	1	Main Engine	1000	746	diesel	Nonroad 2	General Power		20 4" - 6"	12	50	360	0		60	0	1	207	1.0	1.9	0.1	0.1	0.4	0.4	0.0
Trenchers:	1	Main Engine	100	75	diesel	Nonroad 1	General Power	10'-12'	3"-4"	12	75	540	0		60	0	1	31	0.2	0.2	0.0	0.0	0.1	0.1	0.0
Dump Trucks:	2	Main Engine	2500	1,864	diesel	Nonroad 2	General Power		20 4" - 6"	12	50	360	0		60	0	1	1035	5.2	9.5	0.3	0.3	1.8	2.2	0.0
Heavy-duty Trucks:	1	Main Engine	200	149	diesel	Nonroad 1	General Power		10 4" - 6"	12	25	180	0		60	0	1	21	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Catapiller D7 Bulldozer	1	Main Engine	250	186	diesel	Nonroad 1	General Power			12	50	540	0		60	0	1	78	0.4	0.4	0.0	0.0	0.1	0.2	0.0
Pickup Trucks:	4	Main Engine	200	149	diesel	Nonroad 1	General Power		10 4" - 6"	12	50	360	0		60	0	1	166	0.8	0.9	0.0	0.0	0.3	0.4	0.0
HDD Boring Machine:	1	Main Engine	400	298	diesel	Nonroad 1	Drill pipe		20 4" - 6"	16	100	960	0		60	0	1	221	1.1	1.3	0.1	0.1	0.4	0.5	0.0
Beach Lane HDD (3000 foot @138kV)																		3234	16	27	1	1	6	7	0
Cranes:	1	Main Engine	1400	1,044	diesel	Nonroad 2	General Power		20 4" - 6"	12	50	540	0		90	0	1	435	2.2	4.0	0.1	0.1	0.8	0.9	0.0
Excavator:	1	Main Engine	800	597	diesel	Nonroad 2	General Power		20 4" - 6"	12	50	540	0		90	0	1	248	1.2	2.3	0.1	0.1	0.4	0.5	0.0
Front-end Loader:	1	Main Engine	1000	746	diesel	Nonroad 2	General Power		20 4" - 6"	12	50	540	0		90	0	1	310	1.6	2.8	0.1	0.1	0.6	0.7	0.0
Dump Trucks:	2	Main Engine	2500	1,864	diesel	Nonroad 2	General Power		20 4" - 6"	12	50	540	0		90	0	1	1552	7.8	14.2	0.4	0.4	2.8	3.3	0.1
Heavy-duty Trucks:	1	Main Engine	200	149	diesel	Nonroad 1	General Power		10 4" - 6"	12	25	270	0		90	0	1	31	0.2	0.2	0.0	0.0	0.1	0.1	0.0
Catapiller D7 Bulldozer	1	Main Engine	250	186	diesel	Nonroad 1	General Power			12	50	540	0		90	0	1	78	0.4	0.4	0.0	0.0	0.1	0.2	0.0
Pickup Trucks:	4	Main Engine	200	149	diesel	Nonroad 1	General Power		10 4" - 6"	12	50	540	0		90	0	1	248	1.2	1.4	0.1	0.1	0.4	0.5	0.0
HDD Boring Machine:	1	Main Engine	400	298	diesel	Nonroad 1	Drill pipe		20 4" - 6"	16	100	1,440	0		90	0	1	331	1.7	1.9	0.1	0.1	0.6	0.7	0.0
Montauk Highway HDD (300 foot @ 138kV)																		1481	7	12	0	0	3	3	0
Cranes:	1	Main Engine	1400	1,044	diesel	Nonroad 2	General Power		20 4" - 6"	12	50	240	0		40	0	1	193	1.0	1.8	0.1	0.1	0.3	0.4	0.0
Excavator:	1	Main Engine	800	597	diesel	Nonroad 2	General Power		20 4" - 6"	12	50	240	0		40	0	1	110	0.6	1.0	0.0	0.0	0.2	0.2	0.0
Front-end Loader:	1	Main Engine	1000	746	diesel	Nonroad 2	General Power		20 4" - 6"	12	50	240	0		40	0	1	138	0.7	1.3	0.0	0.0	0.2	0.3	0.0
Dump Trucks:	2	Main Engine	2500	1,864	diesel	Nonroad 2	General Power		20 4" - 6"	12	50	240	0		40	0	1	690	3.5	6.3	0.2	0.2	1.2	1.5	0.0
Heavy-duty Trucks:	1	Main Engine	200	149	diesel	Nonroad 1	General Power		10 4" - 6"	12	25	120	0		40	0	1	14	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Catapiller D7 Bulldozer	1	Main Engine	250	186	diesel	Nonroad 1	General Power			12	50	540	0		40	0	1	78	0.4	0.4	0.0	0.0	0.1	0.2	0.0
Pickup Trucks:	4	Main Engine	200	149	diesel	Nonroad 1	General Power		10 4" - 6"	12	50	240	0		40	0	1	110	0.6	0.6	0.0	0.0	0.2	0.2	0.0
HDD Boring Machine:	1	Main Engine	400	298	diesel	Nonroad 1	Drill pipe		20 4" - 6"	16	100	640	0		40	0	1	147	0.7	0.8	0.0	0.0	0.3	0.3	0.0
																	total	11829	59.2	101	3.38	3.38	21.1	25.4	0.459

Onshore Port Activitites (RI)

Port Worker Commute																		**11**	**0.1**	**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
Pickup Trucks: Description: For activities/transport of crew to/from worksite during construction, operation, and decommissioning	2	Main Engine	200	149	Petrol	Nonroad 1	General Power		10 4" - 6"	0.5	100	46	General construction	0	92	0	1	11	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Construction Staging Activitites (Loading/Staging/Unloading)																		**1140**	**4.8**	**13.9**	**0.5**	**0.5**	**0.9**	**1.2**	**0.0**
Crane work	2		1440	1,074	Diesel	Nonroad 2	General Power		20 4" - 6"	8	75	294	staging	0	49	0	1	487	2.4	4.5	0.1	0.1	0.9	1.0	0.0
Parts Delivery	1		6000	4,474		Tug				2	75	147			98		0.68	317	1.1	4.7	0.2	0.2	0.0	0.1	
Self-propelled modular transporter (SPMT)	2		400	298	Diesel	Crew	General Power			2.4	60	788					1	336	1.2	4.7	0.2	0.2	0.0	0.1	
																		1151	4.8	14.0	0.5	0.5	0.9	1.2	0.0

SFWF Operations and Maintenance Phase Emission Worktabs

Table B19a - Information (for worst-case conformity emissions estimates) on Operations and Maintenance Emission Estimates

Nautical Mile (M)
1 km = 0.5399555 M
1 mile = 0.8689741 M

	Transit distance													Cable Route								
	New London, CT			New Bedford, MA			ProvPort, RI			Shinnecock, NY			Paulsboro Marine Terminal, NJ			Sparrows Point, MD			Port of Norfold, VA			substation in NY			
	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (M)	%	Trip Distances (mile)	Trip Distances (M)	%	Trip Distances (mile)	Trip Distances (M)	%	Trip Distances (mile)	Trip Distances (NM)	%	
Total distance to port	55.79	48.5		39.5	34.30		53.8	46.7		76.0	66.0		351.6	305.5		546.3	474.7		410.6	356.8		82.2	71.4		
																						20.7	18.0	25%	interarray cable lay within 25 mile of SFWF
Within 25-mile of SFWF outside State Water	20.5	17.81	37%	19.3	16.77	49%	21.0	18.2	39%	25.0	21.7	33%	25	21.7	7%	25.0	21.7	5%	25.0	21.7	6%	23.7	20.6	29%	Within 25-mile of SFWF outside State Water
Outside 25-mile of SFWF and in state water inside 25-mile of SFWF	35.29	30.67	63%	20.2	17.53	51%	32.8	28.5	61%	51.0	44.3	67%	326.6	283.8	93%	521.3	453.0	95%	385.6	335.1	94%	37.8	32.8	46%	Outside 25-mile of SFWF and in state water inside 25-mile of SFWF
outside 25 mile of SFWF and within 25mi of MA				20.2	17.53	51%																			outside 25 mile of SFWF and within 25 mile of MA
outside 25 mile of SFWF and within 25mi of RI	22.2	19.33	40%				32.8	28.5	61%																outside 25 mile of SFWF and within 25-mile of RI
outside 25 mile of SFWF and within 25mi of NY										51.0	44.27	67%	57.5	50.0	16%	23.8	20.7	4%	23.5	20.4	6%	37.8	32.80	46%	outside 25 mile of SFWF and within 25-mile of NY
outside 25 mile of SFWF and within 25mi of CT	13.1	11.34	23%																						outside 25 mile of SFWF and within 25-mile of CT
outside 25 mile of SFWF and within 25mi of NJ													194.3	168.8	55%	0.0	0.0	0%	0.0	0.0	0%				outside 25 mile of SFWF and within 25mi of NJ
outside 25 mile of SFWF and in Other Water Offshore													74.8	65.0	21%	217.3	188.8	40%	218.6	190.0	53%				outside 25 mile of SFWF and in Other Water Offshore
outside 25 mile of SFWF and within 25mi of MD																133.0	115.6	24%	34.7	30.2	8%				outside 25 mile of SFWF and within 25mi of MD
outside 25mile of SFWF and within 25mi of VA																147.2	127.9	27%	108.8	94.5	26%				outside 25mile of SFWF and within 25mi of VA

Trip Distances (NM)						
New Bedford	Prov Port	New London	Paulsboro Marine	Sparrows Point	Port of Norfold	Shinnecock NY
34.3	46.7	48.5	305.5	474.7	356.8	66.0

Vessels

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (kW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - maneuvering on-site*	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Realistic Work Task Duration (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Operation (One-Way)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to New London (%)	Percentage of Trips to Paulsboro Marine Terminal (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfold (%)	Percentage of Trips to Port of Shinnecock (%)	Total Number of Miles Traveled
Shinnecock NY based																																
Crew Transport Vessel	Crew	1	2,000	1491	50	37	23	24	50	3840	605	1232	2004	0	0	1232					320			640	0	0	0	0	0	0	100	42239
Port of New Bedford, MA based																																
Floating/Jack-up Crane Barge	Jackup	1	40000	29828	4100	3057.37	9.6	24	33	112	10	11	91	11	0	0	0	0	0	0	0	14			6	100							206
Crew Transport Vessel	Crew	1	2000	1491.4	50	37.285	23	24	50	168	19	20	129	20	0	0	0	0	0	0	0	14			26	100							892
Feeder Barge: Monco 335	Barge	2	8000	5965.6	1500	1118.55	4	24	33	112	8	9	95	9	0	0	0	0	0	0	0	14			2	100							69
Port of Providence, RI based																																
Floating/Jack-up Crane Barge	Jackup	1	40000	29828	4100	3057	9.6	24	33	112	11	18	91	0	18	0	0	0	0	0	0	14			6		100						280
Crew Transport Vessel	Crew	1	2000	1491	50	37	23	24	50	168	21	32	129	0	32	0	0	0	0	0	0	14			26		100						1214
Feeder Barge: Monco 335	Barge	2	8000	5966	1500	1119	4	24	33	112	9	14	95	0	14	0	0	0	0	0	0	14			2		100						93
Port of New London, CT based																																
Floating/Jack-up Crane Barge	Jackup	1	40000	29828	4100	3057.37	9.6	24	33	112	11	19	91	0	12	0	7	0	0	0	0	14			6			100					291
Crew Transport Vessel	Crew	1	2000	1491.4	50	37.285	23	24	50	168	20	35	129	0	22	0	13	0	0	0	0	14			26			100					1260
Feeder Barge: Monco 335	Barge	2	8000	5965.6	1500	1118.55	4	24	33	112	9	15	95	0	10	0	6	0	0	0	0	14			2			100					97
Port of Paulsboro Marine Terminal, NJ based																																
Floating/Jack-up Crane Barge	Jackup	1	40000	29828	4100	3057.37	9.6	24	33	112	14	177	91	0	0	31	0	106	41	0	0	14			6				100				1833
Crew Transport Vessel	Crew	1	2000	1491.4	50	37.285	23	24	50	168	25	321	129	0	0	56	0	191	73	0	0	14			26				100				7944
Feeder Barge: Monco 335	Barge	2	8000	5965.6	1500	1118.55	4	24	33	112	11	142	95	0	0	25	0	84	32	0	0	14			2				100				611
Sparrows Point, MD based																																
Floating/Jack-up Crane Barge	Jackup	1	40000	29828	4100	3057.37	9.6	24	33	112	14	283	91	0	0	13	0	0	118	72	80	14			6					100			2848
Crew Transport Vessel	Crew	1	2000	1491.4	50	37.285	23	24	50	168	25	512	129	0	0	23	0	0	213	131	145	14			26					100			12343
Feeder Barge: Monco 335	Barge	2	8000	5965.6	1500	1118.55	4	24	33	112	11	226	95	0	0	10	0	0	94	58	64	14			2					100			949
Port of Norfold, VA based																																
Floating/Jack-up Crane Barge	Jackup	1	40000	29828	4100	3057.37	9.6	24	33	112	14	209	91	0	0	13	0	0	119	19	59	14			6						100		2141
Crew Transport Vessel	Crew	1	2000	1491.4	50	37.285	23	24	50	168	25	379	129	0	0	23	0	0	215	34	107	14			26						100		9277
Feeder Barge: Monco 335	Barge	2	8000	5965.6	1500	1118.55	4	24	33	112	11	168	95	0	0	10	0	0	95	15	47	14			2						100		714

Note: *- onsite maneuvering hours used the longest hours calculated for three scenarios

On-site Emergency Generators

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of equipment	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	Hours - Maintenance testing on-site
Substation emergency generator (400 hp)		1	298		6.0
emergency generator on each WTG (200 hp)		15	149		6.0

Onshore substation

Type of Equipment/Emission Source Description (list others as needed)	No. of Each Type of Equipment	Engine Size on Equipment (specify units)	Equipment Size		Fuel Type	Emission Factor used	Engine Use	Vent/Stack Height (feet)	Vent/Stack Diameter (inches)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Work Task	Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Work Task Duration in Other State Waters	Noise/Vibration Levels	Comments
			HP	kW														
Pick up trucks for Onshore substation	1	Main Engine	200	149	Petrol	Nonroad 1	General Power	10	4" - 6"	3	50	390	General construction	0	260	0		

Table B19b - Information on Operations and Maintenance Emission Estimates

Nautical Mile (M)

1 km = 0.5399555 M

1 mile = 0.8689741 M

	Transit distance												Cable Route										
	New London, CT			New Bedford, MA			ProvPort, RI			Shinnecock, NY			Paulsboro Marine Terminal, NJ			Sparrows Point, MD			Port of Norfold, VA			substation in NY			
	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (NM)	%	Trip Distances (mile)	Trip Distances (M)	%	Trip Distances (mile)	Trip Distances (M)	%	Trip Distances (mile)	Trip Distances (M)	%	Trip Distances (mile)	Trip Distances (NM)	%	
Total distance to port	55.9	48.6		39.5	34.30		53.7	46.7		76.0	66.0		351.6	305.5		546.3	474.7		410.6	356.8		82.5	71.7		
																						20.7	18.0	25%	interarray cable lay within 25 mile of SFWF
Within 25-mile of SFWF	43.7	37.97	78%	25.0	21.72	63%	25.9	22.5	48%	76.0	66.0	100%	62.1	54.0	18%	47.5	41.3	9%	47.3	41.1	12%	61.8	53.7	75%	Within 25-mile of SFWF
Outside 25-mile of SFWF	12.2	10.60	22%	14.5	12.57	37%	27.8	24.2	52%	0.0	0.0	0%	289.5	251.6	82%	498.8	433.4	91%	363.3	315.7	88%	0.0	0.0	0%	Outside 25-mile of SFWF
outside 25 mile of SFWF and within 25mi of MA				14.5	12.57	37%																			outside 25 mile of SFWF and within 25 mile of MA
outside 25 mile of SFWF and within 25mi of RI							27.8	24.2	52%																outside 25 mile of SFWF and within 25-mile of RI
outside 25 mile of SFWF and within 25mi of NY										0.0	0.00	0%	20.4	17.7	6%	1.3	1.1	0%	1.2	1.0	0%				outside 25 mile of SFWF and within 25-mile of NY
outside 25 mile of SFWF and within 25mi of CT	12.2	10.60	22%																						outside 25 mile of SFWF and within 25-mile of CT
outside 25 mile of SFWF and within 25mi of NJ													194.3	168.8	55%	0.0	0.0	0%	0.0	0.0	0%				outside 25 mile of SFWF and within 25mi of NJ
outside 25 mile of SFWF and in Other Water Offshore													74.8	65.0	21%	217.3	188.8	40%	218.6	190.0	53%				outside 25 mile of SFWF and in Other Water Offshore
outside 25 mile of SFWF and within 25mi of MD																133.0	115.6	24%	34.7	30.2	8%				outside 25 mile of SFWF and within 25mi of MD
outside 25mile of SFWF and within 25mi of VA																147.2	127.9	27%	108.8	94.5	26%				outside 25mile of SFWF and within 25mi of VA

Trip Distances (NM)						
New Bedford	Prov Port	New London	Paulsboro Marine	Sparrows Point	Port of Norfold	Shinnecock NY
34.3	46.7	48.6	305.5	474.7	356.8	66.0

Vessels

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (HP)	Main Engine Rating (kW)	Auxillary Engine Rating (HP)	Auxillary Engine Rating (kW)	Average Speed of Vessel (Knots)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Hours for transit within 25-mile of SFWF.	Hours -transit outside 25-mile of SFWF	Hours - maneuvering on-site*	Hours -transit outside 25-mile of SFWF and within 25M boundary of MA	Hours -transit outside 25-mile of SFWF and within 25M boundary of RI	Hours -transit outside 25-mile of SFWF and within 25M boundary of NY	Hours -transit outside 25-mile of SFWF and within 25M boundary of CT	Hours -transit outside 25-mile of SFWF and within 25M boundary of NJ	Hours -transit outside 25-mile of SFWF in Other Water Offshore	Hours -transit outside 25-mile of SFWF and within 25M boundary of MD	Hours -transit outside 25-mile of SFWF and within 25M boundary of VA	Realistic Work Task Duration (days)	Work Task Duration in State Waters (days) NYC	Other State Waters	Number of Supply Trips During Operation (One-Way)	Percentage of Trips to New Bedford (%)	Percentage of Trips to Prov Port (%)	Percentage of Trips to New London (%)	Percentage of Trips to Paulsboro Marine Terminal (%)	Percentage of Trips to Sparrows Point (%)	Percentage of Trips to Port of Norfold (%)	Percentage of Trips to Port of Shinnecock (%)	Total Number of Miles Traveled
Shinnecock NY based																																	
Crew Transport Vessel	Crew	1	2,000	1491	50	37	23	24	50	3840	1838	0	2002	0	0	0					320			640	0	0	0	0	0	0	100	42267
Port of New Bedford, MA based																																	
Floating/Jack-up Crane Barge	Jackup	1	40000	29828	4100	3057.37	9.6	24	33	112	14	8	91	8	0	0	0	0	0	0	0	14			6	100							206
Crew Transport Vessel	Crew	1	2000	1491.4	50	37.285	23	24	50	168	25	14	129	14	0	0	0	0	0	0	0	14			26	100							892
Feeder Barge: Monco 335	Barge	2	8000	5965.6	1500	1118.55	4	24	33	112	11	6	95	6	0	0	0	0	0	0	0	14			2	100							69
Port of Providence, RI based																																	
Floating/Jack-up Crane Barge	Jackup	1	40000	29828	4100	3057	9.6	24	33	112	14	15	91	0	15	0	0	0	0	0	0	14			6		100						280
Crew Transport Vessel	Crew	1	2000	1491	50	37	23	24	50	168	25	27	129	0	27	0	0	0	0	0	0	14			26		100						1213
Feeder Barge: Monco 335	Barge	2	8000	5966	1500	1119	4	24	33	112	11	12	95	0	12	0	0	0	0	0	0	14			2		100						93
Port of New London, CT based																																	
Floating/Jack-up Crane Barge	Jackup	1	40000	29828	4100	3057.37	9.6	24	33	112	24	7	91	0	0	0	7	0	0	0	0	14			6			100					291
Crew Transport Vessel	Crew	1	2000	1491.4	50	37.285	23	24	50	168	43	12	129	0	0	0	12	0	0	0	0	14			26			100					1263
Feeder Barge: Monco 335	Barge	2	8000	5965.6	1500	1118.55	4	24	33	112	19	5	95	0	0	0	5	0	0	0	0	14			2			100					97
Port of Paulsboro Marine Terminal, NJ based																																	
Floating/Jack-up Crane Barge	Jackup	1	40000	29828	4100	3057.37	9.6	24	33	112	34	157	91	0	0	11	0	106	41	0	0	14			6				100				1833
Crew Transport Vessel	Crew	1	2000	1491.4	50	37.285	23	24	50	168	61	284	129	0	0	20	0	191	73	0	0	14			26				100				7944
Feeder Barge: Monco 335	Barge	2	8000	5965.6	1500	1118.55	4	24	33	112	27	126	95	0	0	9	0	84	32	0	0	14			2				100				611
Sparrows Point, MD based																																	
Floating/Jack-up Crane Barge	Jackup	1	40000	29828	4100	3057.37	9.6	24	33	112	26	271	91	0	0	1	0	0	118	72	80	14			6					100			2848
Crew Transport Vessel	Crew	1	2000	1491.4	50	37.285	23	24	50	168	47	490	129	0	0	1	0	0	213	131	145	14			26					100			12343
Feeder Barge: Monco 335	Barge	2	8000	5965.6	1500	1118.55	4	24	33	112	21	217	95	0	0	1	0	0	94	58	64	14			2					100			949
Port of Norfold, VA based																																	
Floating/Jack-up Crane Barge	Jackup	1	40000	29828	4100	3057.37	9.6	24	33	112	26	197	91	0	0	1	0	0	119	19	59	14			6						100		2141
Crew Transport Vessel	Crew	1	2000	1491.4	50	37.285	23	24	50	168	46	357	129	0	0	1	0	0	215	34	107	14			26						100		9277
Feeder Barge: Monco 335	Barge	2	8000	5965.6	1500	1118.55	4	24	33	112	21	158	95	0	0	1	0	0	95	15	47	14			2						100		714

Note: *- onsite maneuvering hours used the longest hours calculated for three scenarios

On-site Emergency Generators

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of equipment	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	Hours - Maintenance testing on-site
Substation emergency generator (400 hp)		1	298		6.0
emergency generator on each WTG (200 hp)		15	149		6.0

Onshore substation

Type of Equipment/Emission Source Description (list others as needed)	No. of Each Type of Equipment	Engine Size on Equipment (specify units)	Equipment Size		Fuel Type	Emission Factor used	Engine Use	Vent/Stack Height (feet)	Vent/Stack Diameter (inches)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Work Task	Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Work Task Duration in Other State Waters	Noise/Vibration Levels	Comments
			HP	kW														
Pick up trucks for Onshore substation	1	Main Engine	200	149	Petrol	Nonroad 1	General Power	10	4" - 6"	3	50	390	General construction	0	260	0		

Table B20 - O & M Emissions - Transit outside 25-NM of SFWF

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Helicopter Emissions (tons/year) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours/year) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Vessel Emissions (tons/year) = Activity Hours (hours/year) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B20 - O & M Emissions - Transit outside 25-NM of SFWF

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours -transit outside 25-mile of SFWF	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Shinnecock, NY						**1109**	**0.01**	**0.05**	**0.40**	**3.82**	**15.72**	**0.53**	**0.51**	**0.01**	**0.00**	**0.23**
Crew Transport Vessel	Crew	1	1491	37	1232.0	1109	0.01	0.05	0.40	3.82	15.72	0.53	0.51	0.01	0.00	0.23
Port of New Bedford, MA based						**303**	**0.00**	**0.01**	**0.12**	**0.87**	**5.20**	**0.16**	**0.15**	**0.04**	**0.00**	**0.11**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	11.0	215	0.00	0.01	0.08	0.68	3.39	0.10	0.10	0.00	0.00	0.05
Crew Transport Vessel	Crew	1	1491	37	19.8	18	0.00	0.00	0.01	0.06	0.25	0.01	0.01	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	8.8	70	0.00	0.00	0.04	0.13	1.56	0.05	0.05	0.03	0.00	0.06
Port of Providence, RI based						**492**	**0.00**	**0.02**	**0.19**	**1.42**	**8.45**	**0.26**	**0.25**	**0.06**	**0.00**	**0.19**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	17.8	350	0.00	0.02	0.12	1.10	5.51	0.17	0.16	0.01	0.00	0.08
Crew Transport Vessel	Crew	1	1491	37	32.2	29	0.00	0.00	0.01	0.10	0.41	0.01	0.01	0.00	0.00	0.01
Feeder Barge: Monco 335	Barge	2	5966	1119	14.2	113	0.00	0.01	0.06	0.22	2.53	0.08	0.08	0.06	0.00	0.10
Port of New London, CT based						**529**	**0.00**	**0.03**	**0.21**	**1.53**	**9.10**	**0.28**	**0.27**	**0.07**	**0.00**	**0.20**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	19.2	376	0.00	0.02	0.13	1.19	5.93	0.18	0.17	0.01	0.00	0.08
Crew Transport Vessel	Crew	1	1491	37	34.7	31	0.00	0.00	0.01	0.11	0.44	0.01	0.01	0.00	0.00	0.01
Feeder Barge: Monco 335	Barge	2	5966	1119	15.3	122	0.00	0.01	0.06	0.23	2.73	0.09	0.08	0.06	0.00	0.11
Paulsboro Marine Terminal, NJ based						**4899**	**0.03**	**0.24**	**1.92**	**14.12**	**84.18**	**2.60**	**2.50**	**0.62**	**0.00**	**1.85**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	177.4	3482	0.02	0.17	1.24	10.98	54.85	1.66	1.61	0.06	0.00	0.77
Crew Transport Vessel	Crew	1	1491	37	320.8	289	0.00	0.01	0.10	0.99	4.09	0.14	0.13	0.00	0.00	0.06
Feeder Barge: Monco 335	Barge	2	5966	1119	141.9	1128	0.01	0.06	0.58	2.14	25.23	0.80	0.75	0.56	0.00	1.01
Sparrows Point, MD based						**7820**	**0.05**	**0.38**	**3.07**	**22.54**	**134.36**	**4.15**	**3.98**	**0.99**	**0.00**	**2.95**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	283.1	5558	0.03	0.27	1.98	17.53	87.55	2.65	2.57	0.10	0.00	1.24
Crew Transport Vessel	Crew	1	1491	37	512.1	461	0.00	0.02	0.16	1.59	6.53	0.22	0.21	0.00	0.00	0.10
Feeder Barge: Monco 335	Barge	2	5966	1119	226.5	1801	0.01	0.09	0.92	3.42	40.27	1.28	1.20	0.89	0.00	1.62
Port of Norfold, VA based						**5784**	**0.04**	**0.28**	**2.27**	**16.67**	**99.38**	**3.07**	**2.95**	**0.74**	**0.00**	**2.18**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	209.4	4111	0.03	0.20	1.46	12.97	64.76	1.96	1.90	0.08	0.00	0.91
Crew Transport Vessel	Crew	1	1491	37	378.8	341	0.00	0.02	0.12	1.17	4.83	0.16	0.16	0.00	0.00	0.07
Feeder Barge: Monco 335	Barge	2	5966	1119	167.5	1332	0.01	0.07	0.68	2.53	29.79	0.95	0.89	0.66	0.00	1.20

Table B21 - O & M Emissions - Transit within 25-NM of SFWF

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Helicopter Emissions (tons/year) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours/year) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Vessel Emissions (tons/year) = Activity Hours (hours/year) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B21 - O & M Emissions - Transit within 25-NM of SFWF

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxillary Engine Rating (kW)	Hours for transit within 25-mile of SFWF.	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Shinnecock, NY						**1655**	**0.01**	**0.08**	**0.59**	**5.69**	**23.45**	**0.79**	**0.77**	**0.02**	**0.00**	**0.35**
Crew Transport Vessel	Crew	1	1491	37	1837.7	1655	0.01	0.08	0.59	5.69	23.45	0.79	0.77	0.02	0.00	0.35
Port of New Bedford, MA based						**375**	**0.00**	**0.02**	**0.15**	**1.08**	**6.44**	**0.20**	**0.19**	**0.05**	**0.00**	**0.14**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	13.6	267	0.00	0.01	0.09	0.84	4.20	0.13	0.12	0.00	0.00	0.06
Crew Transport Vessel	Crew	1	1491	37	24.6	22	0.00	0.00	0.01	0.08	0.31	0.01	0.01	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	10.9	86	0.00	0.00	0.04	0.16	1.93	0.06	0.06	0.04	0.00	0.08
Port of Providence, RI based						**389**	**0.00**	**0.02**	**0.15**	**1.12**	**6.68**	**0.21**	**0.20**	**0.05**	**0.00**	**0.15**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	14.1	276	0.00	0.01	0.10	0.87	4.35	0.13	0.13	0.01	0.00	0.06
Crew Transport Vessel	Crew	1	1491	37	25.4	23	0.00	0.00	0.01	0.08	0.32	0.01	0.01	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	11.3	89	0.00	0.00	0.05	0.17	2.00	0.06	0.06	0.04	0.00	0.08
Port of New London, CT based						**656**	**0.00**	**0.03**	**0.26**	**1.89**	**11.26**	**0.35**	**0.33**	**0.08**	**0.00**	**0.25**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	23.7	466	0.00	0.02	0.17	1.47	7.34	0.22	0.22	0.01	0.00	0.10
Crew Transport Vessel	Crew	1	1491	37	42.9	39	0.00	0.00	0.01	0.13	0.55	0.02	0.02	0.00	0.00	0.01
Feeder Barge: Monco 335	Barge	2	5966	1119	19.0	151	0.00	0.01	0.08	0.29	3.38	0.11	0.10	0.07	0.00	0.14
Paulsboro Marine Terminal, NJ based						**932**	**0.01**	**0.05**	**0.37**	**2.68**	**16.01**	**0.49**	**0.47**	**0.12**	**0.00**	**0.35**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	33.7	662	0.00	0.03	0.24	2.09	10.43	0.32	0.31	0.01	0.00	0.15
Crew Transport Vessel	Crew	1	1491	37	61.0	55	0.00	0.00	0.02	0.19	0.78	0.03	0.03	0.00	0.00	0.01
Feeder Barge: Monco 335	Barge	2	5966	1119	27.0	214	0.00	0.01	0.11	0.41	4.80	0.15	0.14	0.11	0.00	0.19
Sparrows Point, MD based						**713**	**0.00**	**0.03**	**0.28**	**2.05**	**12.24**	**0.38**	**0.36**	**0.09**	**0.00**	**0.27**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	25.8	506	0.00	0.02	0.18	1.60	7.98	0.24	0.23	0.01	0.00	0.11
Crew Transport Vessel	Crew	1	1491	37	46.7	42	0.00	0.00	0.02	0.14	0.60	0.02	0.02	0.00	0.00	0.01
Feeder Barge: Monco 335	Barge	2	5966	1119	20.6	164	0.00	0.01	0.08	0.31	3.67	0.12	0.11	0.08	0.00	0.15
Port of Norfold, VA based						**710**	**0.00**	**0.03**	**0.28**	**2.04**	**12.19**	**0.38**	**0.36**	**0.09**	**0.00**	**0.27**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	25.7	504	0.00	0.02	0.18	1.59	7.94	0.24	0.23	0.01	0.00	0.11
Crew Transport Vessel	Crew	1	1491	37	46.5	42	0.00	0.00	0.01	0.14	0.59	0.02	0.02	0.00	0.00	0.01
Feeder Barge: Monco 335	Barge	2	5966	1119	20.6	163	0.00	0.01	0.08	0.31	3.65	0.12	0.11	0.08	0.00	0.15

Table B22 - O & M Emissions - SFWF Onsite Emergency Generators

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors									
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	VOC
FACILITY		Offshore Emergency generator	g_per_kW-hr	6.5E+02	4.0E-03	3.1E-02	8.5E-02	2.0E+00	6.0E+00	1.1E-01	1.1E-01	6.0E-03	7.0E-02

2, Emission calculation:

Generator Emissions (ton/year) = Engine Power Rating (kW) x Activity Hours (hours/year) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of equipment	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	Hours - annual testing and runing time	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	VOC
Substation emergency generator (400 hp)		1	298		200.0	0.21	1.3E-06	1.0E-05	2.8E-05	6.6E-04	2.0E-03	3.6E-05	3.6E-05	2.0E-06	2.3E-05
emergency generator on each WTG (200 hp)		15	149		200.0	1.60	9.9E-06	7.6E-05	2.1E-04	4.9E-03	1.5E-02	2.7E-04	2.7E-04	1.5E-05	1.7E-04
					Total emissions	**1.8116**	**0.0000**	**0.0001**	**0.0002**	**0.0056**	**0.0167**	**0.0003**	**0.0003**	**0.0000**	**0.0002**

Table B23 - O & M Emissions - SFWF Onsite Maneuvering

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Helicopter Emissions (tons/year) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours/year) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Vessel Emissions (tons/year) = Activity Hours (hours/year) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B23 - O & M Emissions - SFWF Onsite Maneuvering

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	Hours - maneuvering on-site	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Shinnecock, NY						**480**	**0.00**	**0.02**	**0.17**	**1.51**	**6.88**	**0.23**	**0.22**	**0.00**	**0.00**	**0.10**
Crew Transport Vessel	Crew	1	1491	37	2002.3	480	0.00	0.02	0.17	1.51	6.88	0.23	0.22	0.00	0.00	0.10
Port of New Bedford, MA based						**2648**	**0.02**	**0.13**	**1.06**	**7.44**	**46.52**	**1.44**	**1.38**	**0.41**	**0.00**	**1.10**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	90.6	1778	0.01	0.09	0.63	5.61	28.01	0.85	0.82	0.03	0.00	0.40
Crew Transport Vessel	Crew	1	1491	37	129.2	116	0.00	0.01	0.04	0.40	1.65	0.06	0.05	0.00	0.00	0.02
Feeder Barge: Monco 335	Barge	2	5966	1119	94.9	754	0.01	0.04	0.39	1.43	16.86	0.54	0.50	0.37	0.00	0.68
Port of Providence, RI based						**2648**	**0.02**	**0.13**	**1.06**	**7.44**	**46.52**	**1.44**	**1.38**	**0.41**	**0.00**	**1.10**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	90.6	1778	0.01	0.09	0.63	5.61	28.01	0.85	0.82	0.03	0.00	0.40
Crew Transport Vessel	Crew	1	1491	37	129.2	116	0.00	0.01	0.04	0.40	1.65	0.06	0.05	0.00	0.00	0.02
Feeder Barge: Monco 335	Barge	2	5966	1119	94.9	754	0.01	0.04	0.39	1.43	16.86	0.54	0.50	0.37	0.00	0.68
Port of New London, CT based						**2648**	**0.02**	**0.13**	**1.06**	**7.44**	**46.52**	**1.44**	**1.38**	**0.41**	**0.00**	**1.10**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	90.6	1778	0.01	0.09	0.63	5.61	28.01	0.85	0.82	0.03	0.00	0.40
Crew Transport Vessel	Crew	1	1491	37	129.2	116	0.00	0.01	0.04	0.40	1.65	0.06	0.05	0.00	0.00	0.02
Feeder Barge: Monco 335	Barge	2	5966	1119	94.9	754	0.01	0.04	0.39	1.43	16.86	0.54	0.50	0.37	0.00	0.68
Paulsboro Marine Terminal, NJ based						**2648**	**0.02**	**0.13**	**1.06**	**7.44**	**46.52**	**1.44**	**1.38**	**0.41**	**0.00**	**1.10**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	90.6	1778	0.01	0.09	0.63	5.61	28.01	0.85	0.82	0.03	0.00	0.40
Crew Transport Vessel	Crew	1	1491	37	129.2	116	0.00	0.01	0.04	0.40	1.65	0.06	0.05	0.00	0.00	0.02
Feeder Barge: Monco 335	Barge	2	5966	1119	94.9	754	0.01	0.04	0.39	1.43	16.86	0.54	0.50	0.37	0.00	0.68
Sparrows Point, MD based						**2648**	**0.02**	**0.13**	**1.06**	**7.44**	**46.52**	**1.44**	**1.38**	**0.41**	**0.00**	**1.10**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	90.6	1778	0.01	0.09	0.63	5.61	28.01	0.85	0.82	0.03	0.00	0.40
Crew Transport Vessel	Crew	1	1491	37	129.2	116	0.00	0.01	0.04	0.40	1.65	0.06	0.05	0.00	0.00	0.02
Feeder Barge: Monco 335	Barge	2	5966	1119	94.9	754	0.01	0.04	0.39	1.43	16.86	0.54	0.50	0.37	0.00	0.68
Port of Norfold, VA based						**2648**	**0.02**	**0.13**	**1.06**	**7.44**	**46.52**	**1.44**	**1.38**	**0.41**	**0.00**	**1.10**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	90.6	1778	0.01	0.09	0.63	5.61	28.01	0.85	0.82	0.03	0.00	0.40
Crew Transport Vessel	Crew	1	1491	37	129.2	116	0.00	0.01	0.04	0.40	1.65	0.06	0.05	0.00	0.00	0.02
Feeder Barge: Monco 335	Barge	2	5966	1119	94.9	754	0.01	0.04	0.39	1.43	16.86	0.54	0.50	0.37	0.00	0.68

Table B24 - O & M Emissions - Transit beyond OCS area and within 25-NM of Massachusetts

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Helicopter Emissions (tons/year) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours/year) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Vessel Emissions (tons/year) = Activity Hours (hours/year) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B24 - O & M Emissions - Transit beyond OCS area and within 25-NM of Massachusetts

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	Hours for transit within 25 mile of MA	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Shinnecock, NY						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of New Bedford, MA based						**303**	**0.00**	**0.01**	**0.12**	**0.87**	**5.20**	**0.16**	**0.15**	**0.04**	**0.00**	**0.11**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	11.0	215	0.00	0.01	0.08	0.68	3.39	0.10	0.10	0.00	0.00	0.05
Crew Transport Vessel	Crew	1	1491	37	19.8	18	0.00	0.00	0.01	0.06	0.25	0.01	0.01	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	8.8	70	0.00	0.00	0.04	0.13	1.56	0.05	0.05	0.03	0.00	0.06
Port of Providence, RI based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of New London, CT based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Paulsboro Marine Terminal, NJ based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sparrows Point, MD based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Norfold, VA based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B25 - O & M Emissions - Transit beyond OCS area and within 25-NM of Rhode Island

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Helicopter Emissions (tons/year) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours/year) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Vessel Emissions (tons/year) = Activity Hours (hours/year) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B25 - O & M Emissions - Transit beyond OCS area and within 25-NM of Rhode Island

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	Hours for transit within 25-mile of RI	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Shinnecock, NY						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of New Bedford, MA based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Providence, RI based						**492**	**0.00**	**0.02**	**0.19**	**1.42**	**8.45**	**0.26**	**0.25**	**0.06**	**0.00**	**0.19**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	17.8	350	0.00	0.02	0.12	1.10	5.51	0.17	0.16	0.01	0.00	0.08
Crew Transport Vessel	Crew	1	1491	37	32.2	29	0.00	0.00	0.01	0.10	0.41	0.01	0.01	0.00	0.00	0.01
Feeder Barge: Monco 335	Barge	2	5966	1119	14.2	113	0.00	0.01	0.06	0.22	2.53	0.08	0.08	0.06	0.00	0.10
Port of New London, CT based						**334**	**0.00**	**0.02**	**0.13**	**0.96**	**5.73**	**0.18**	**0.17**	**0.04**	**0.00**	**0.13**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	12.1	237	0.00	0.01	0.08	0.75	3.74	0.11	0.11	0.00	0.00	0.05
Crew Transport Vessel	Crew	1	1491	37	21.8	20	0.00	0.00	0.01	0.07	0.28	0.01	0.01	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	9.7	77	0.00	0.00	0.04	0.15	1.72	0.05	0.05	0.04	0.00	0.07
Port of Paulsboro Marine Terminal, NJ based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sparrows Point, MD based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Norfold, VA based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B26 - O & M Emissions - Transit beyond OCS area and within 25-NM of New York

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Helicopter Emissions (tons/year) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours/year) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Vessel Emissions (tons/year) = Activity Hours (hours/year) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B26 - O & M Emissions - Transit beyond OCS area and within 25-NM of New York

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	Hours for transit within 25-mile of RI	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Shinnecock, NY						**1109**	**0.01**	**0.05**	**0.40**	**3.82**	**15.72**	**0.53**	**0.51**	**0.01**	**0.00**	**0.23**
Crew Transport Vessel	Crew	1	1491	37	1232.0	1109	0.01	0.05	0.40	3.82	15.72	0.53	0.51	0.01	0.00	0.23
Port of New Bedford, MA based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Providence, RI based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of New London, CT based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Paulsboro Marine Terminal, NJ based						**863**	**0.01**	**0.04**	**0.34**	**2.49**	**14.82**	**0.46**	**0.44**	**0.11**	**0.00**	**0.33**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	31.2	613	0.00	0.03	0.22	1.93	9.66	0.29	0.28	0.01	0.00	0.14
Crew Transport Vessel	Crew	1	1491	37	56.5	51	0.00	0.00	0.02	0.17	0.72	0.02	0.02	0.00	0.00	0.01
Feeder Barge: Monco 335	Barge	2	5966	1119	25.0	199	0.00	0.01	0.10	0.38	4.44	0.14	0.13	0.10	0.00	0.18
Sparrows Point, MD based						**357**	**0.00**	**0.02**	**0.14**	**1.03**	**6.13**	**0.19**	**0.18**	**0.05**	**0.00**	**0.13**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	12.9	254	0.00	0.01	0.09	0.80	4.00	0.12	0.12	0.00	0.00	0.06
Crew Transport Vessel	Crew	1	1491	37	23.4	21	0.00	0.00	0.01	0.07	0.30	0.01	0.01	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	10.3	82	0.00	0.00	0.04	0.16	1.84	0.06	0.05	0.04	0.00	0.07
Port of Norfold, VA based						**353**	**0.00**	**0.02**	**0.14**	**1.02**	**6.06**	**0.19**	**0.18**	**0.04**	**0.00**	**0.13**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	12.8	251	0.00	0.01	0.09	0.79	3.95	0.12	0.12	0.00	0.00	0.06
Crew Transport Vessel	Crew	1	1491	37	23.1	21	0.00	0.00	0.01	0.07	0.29	0.01	0.01	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	10.2	81	0.00	0.00	0.04	0.15	1.82	0.06	0.05	0.04	0.00	0.07

Table B27 - O & M Emissions - Transit beyond OCS area and within 25-NM of Connecticut

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Helicopter Emissions (tons/year) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours/year) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Vessel Emissions (tons/year) = Activity Hours (hours/year) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B27 - O & M Emissions - Transit beyond OCS area and within 25-NM of Connecticut

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	Hours for transit within 25-mile of RI	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Shinnecock, NY						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of New Bedford, MA based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Providence, RI based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of New London, CT based						**196**	**0.00**	**0.01**	**0.08**	**0.56**	**3.36**	**0.10**	**0.10**	**0.02**	**0.00**	**0.07**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	7.1	139	0.00	0.01	0.05	0.44	2.19	0.07	0.06	0.00	0.00	0.03
Crew Transport Vessel	Crew	1	1491	37	12.8	12	0.00	0.00	0.00	0.04	0.16	0.01	0.01	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	5.7	45	0.00	0.00	0.02	0.09	1.01	0.03	0.03	0.02	0.00	0.04
Port of Paulsboro Marine Terminal, NJ based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sparrows Point, MD based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Norfold, VA based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B28 - O & M Emissions - Transit beyond OCS area and within 25-NM of New Jersey

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Helicopter Emissions (tons/year) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours/year) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Vessel Emissions (tons/year) = Activity Hours (hours/year) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B28 - O & M Emissions - Transit beyond OCS area and within 25-NM of New Jersey

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	Hours for transit within 25-mile of NJ	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Shinnecock, NY						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of New Bedford, MA based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Providence, RI based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of New London, CT based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Paulsboro Marine Terminal, NJ based						**2915**	**0.02**	**0.14**	**1.14**	**8.40**	**50.08**	**1.55**	**1.48**	**0.37**	**0.00**	**1.10**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	105.5	2072	0.01	0.10	0.74	6.53	32.63	0.99	0.96	0.04	0.00	0.46
Crew Transport Vessel	Crew	1	1491	37	190.9	172	0.00	0.01	0.06	0.59	2.44	0.08	0.08	0.00	0.00	0.04
Feeder Barge: Monco 335	Barge	2	5966	1119	84.4	671	0.00	0.03	0.34	1.27	15.01	0.48	0.45	0.33	0.00	0.60
Sparrows Point, MD based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Norfold, VA based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table B29 - O & M Emissions - Transit beyond OCS area and in Other Water Offshore

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Helicopter Emissions (tons/year) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours/year) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Vessel Emissions (tons/year) = Activity Hours (hours/year) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B29 - O & M Emissions - Transit beyond OCS area and in Other Water Offshore

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	Hours for transit in Other Water Offshore	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Shinnecock, NY						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of New Bedford, MA based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Providence, RI based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of New London, CT based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Paulsboro Marine Terminal, NJ based						**1122**	**0.01**	**0.05**	**0.44**	**3.23**	**19.28**	**0.60**	**0.57**	**0.14**	**0.00**	**0.42**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	40.6	797	0.00	0.04	0.28	2.52	12.56	0.38	0.37	0.01	0.00	0.18
Crew Transport Vessel	Crew	1	1491	37	73.5	66	0.00	0.00	0.02	0.23	0.94	0.03	0.03	0.00	0.00	0.01
Feeder Barge: Monco 335	Barge	2	5966	1119	32.5	258	0.00	0.01	0.13	0.49	5.78	0.18	0.17	0.13	0.00	0.23
Sparrows Point, MD based						**3260**	**0.02**	**0.16**	**1.28**	**9.39**	**56.01**	**1.73**	**1.66**	**0.41**	**0.00**	**1.23**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	118.0	2317	0.01	0.11	0.82	7.31	36.50	1.11	1.07	0.04	0.00	0.51
Crew Transport Vessel	Crew	1	1491	37	213.5	192	0.00	0.01	0.07	0.66	2.72	0.09	0.09	0.00	0.00	0.04
Feeder Barge: Monco 335	Barge	2	5966	1119	94.4	751	0.01	0.04	0.38	1.43	16.79	0.53	0.50	0.37	0.00	0.67
Port of Norfold, VA based						**3279**	**0.02**	**0.16**	**1.29**	**9.45**	**56.34**	**1.74**	**1.67**	**0.42**	**0.00**	**1.24**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	118.7	2331	0.01	0.11	0.83	7.35	36.71	1.11	1.08	0.04	0.00	0.52
Crew Transport Vessel	Crew	1	1491	37	214.7	193	0.00	0.01	0.07	0.67	2.74	0.09	0.09	0.00	0.00	0.04
Feeder Barge: Monco 335	Barge	2	5966	1119	95.0	755	0.01	0.04	0.39	1.43	16.89	0.54	0.50	0.37	0.00	0.68

Table B30 - O & M Emissions - Transit beyond OCS area and within 25 NM of Maryland

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Helicopter Emissions (tons/year) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours/year) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Vessel Emissions (tons/year) = Activity Hours (hours/year) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B30 - O & M Emissions - Transit beyond OCS area and within 25 NM of Maryland

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	Hours for transit within 25-mile of MD	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Shinnecock, NY						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of New Bedford, MA based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Providence, RI based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of New London, CT based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Paulsboro Marine Terminal, NJ based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sparrows Point, MD based						**1995**	**0.01**	**0.10**	**0.78**	**5.75**	**34.28**	**1.06**	**1.02**	**0.25**	**0.00**	**0.75**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	72.2	1418	0.01	0.07	0.50	4.47	22.34	0.68	0.66	0.03	0.00	0.32
Crew Transport Vessel	Crew	1	1491	37	130.6	118	0.00	0.01	0.04	0.40	1.67	0.06	0.05	0.00	0.00	0.02
Feeder Barge: Monco 335	Barge	2	5966	1119	57.8	459	0.00	0.02	0.24	0.87	10.27	0.33	0.31	0.23	0.00	0.41
Port of Norfold, VA based						**521**	**0.00**	**0.03**	**0.20**	**1.50**	**8.94**	**0.28**	**0.27**	**0.07**	**0.00**	**0.20**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	18.8	370	0.00	0.02	0.13	1.17	5.83	0.18	0.17	0.01	0.00	0.08
Crew Transport Vessel	Crew	1	1491	37	34.1	31	0.00	0.00	0.01	0.11	0.43	0.01	0.01	0.00	0.00	0.01
Feeder Barge: Monco 335	Barge	2	5966	1119	15.1	120	0.00	0.01	0.06	0.23	2.68	0.09	0.08	0.06	0.00	0.11

Table B31 - O & M Emissions - Transit beyond OCS area and within 25 NM of Virginia

1, Emission Factors from BOEM Tool

category	Engine	Type	Units	Emission Factors										
				CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
FACILITY	Main	Anchor Handling Tugs	g_per_kW-hr	6.36E+02	4.00E-03	3.10E-02	2.54E-01	2.16E+00	9.26E+00	3.44E-01	3.30E-01	7.87E-02	4.03E-05	2.39E-01
FACILITY	Main	Barge	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	1.36E+01	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.31E-01	2.30E+00	9.15E+00	3.10E-01	3.00E-01	6.24E-03	4.65E-05	1.37E-01
FACILITY	Main	Jackup	g_per_kW-hr	6.47E+02	4.00E-03	3.10E-02	2.29E-01	2.30E+00	1.00E+01	3.08E-01	2.98E-01	1.27E-02	4.51E-05	1.44E-01
FACILITY	Main	Research/Survey	g_per_kW-hr	6.38E+02	4.00E-03	3.10E-02	2.51E-01	2.25E+00	9.86E+00	3.39E-01	3.26E-01	6.57E-02	4.15E-05	2.21E-01
FACILITY	Main	Tug	g_per_kW-hr	6.44E+02	4.00E-03	3.10E-02	2.43E-01	2.29E+00	9.52E+00	3.27E-01	3.16E-01	3.33E-02	4.48E-05	1.77E-01
FACILITY	Main	Cable Laying	g_per_kW-hr	6.35E+02	4.00E-03	3.10E-02	2.52E-01	2.20E+00	9.49E+00	3.41E-01	3.27E-01	8.51E-02	3.88E-05	2.46E-01
FACILITY	Main	Dredging	g_per_kW-hr	6.31E+02	4.00E-03	3.10E-02	2.63E-01	2.13E+00	9.60E+00	3.57E-01	3.41E-01	1.12E-01	3.70E-05	2.85E-01
FACILITY	Main	Shuttle Tanker	g_per_kW-hr	5.89E+02	4.00E-03	3.10E-02	3.23E-01	1.40E+00	9.05E+00	4.50E-01	4.20E-01	3.62E-01	1.18E-05	6.30E-01
FACILITY	Main	Supply Ship	g_per_kW-hr	6.45E+02	4.00E-03	3.10E-02	2.38E-01	2.29E+00	9.44E+00	3.20E-01	3.09E-01	2.77E-02	4.45E-05	1.67E-01
FACILITY	Main	Ice Breaker	g_per_kW-hr	6.11E+02	4.00E-03	3.10E-02	2.90E-01	1.78E+00	9.92E+00	3.99E-01	3.77E-01	2.30E-01	2.48E-05	4.48E-01
FACILITY	Auxiliary	Anchor Handling Tugs	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.88E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Barge	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.26E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Crew	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Jackup	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.15E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Research/Survey	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.02E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Tug	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Cable Laying	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.89E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Dredging	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.85E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Shuttle Tanker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	9.80E+00	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Supply Ship	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	0.00E+00	1.04E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Auxiliary	Ice Breaker	g_per_kW-hr	6.48E+02	4.00E-03	3.10E-02	2.39E-01	2.48E+00	1.01E+01	3.20E-01	3.10E-01	6.00E-03	4.80E-05	1.40E-01
FACILITY	Helicopter	Single	LB_per_HR	9.57E+02	3.00E-02	3.00E-02	8.62E-03	1.89E+00	2.32E+00	6.80E-02	6.63E-02	3.00E-01	0.00E+00	1.63E+00

2, Engine Loading Factor: BOEM Tool default loading factors are used.

Propulsion Engine	Auxiliary Engine	Maneuvering
0.82	1	0.2

3, Emission calculation:

Helicopter Emissions (tons/year) = Engine Power Rating (kW) x Loading Factor x Activity Hours (hours/year) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Vessel Emissions (tons/year) = Activity Hours (hours/year) x Emission Factor (lb/hour) x (1 ton / 2000 lb) x (# of Sources)

Table B31 - O & M Emissions - Transit beyond OCS area and within 25 NM of Virginia

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of Each Type of Vessel	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	Hours for transit within 25-mile of VA	CO2	CH4	N2O	Black Carbon	CO	NOX	PM10	PM2.5	SO2	Lead	VOC
Shinnecock, NY						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of New Bedford, MA based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Providence, RI based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of New London, CT based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Port of Paulsboro Marine Terminal, NJ based						**0**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew Transport Vessel	Crew	1	1491	37	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Feeder Barge: Monco 335	Barge	2	5966	1119	0.0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sparrows Point, MD based						**2208**	**0.01**	**0.11**	**0.87**	**6.36**	**37.94**	**1.17**	**1.12**	**0.28**	**0.00**	**0.83**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	79.9	1569	0.01	0.08	0.56	4.95	24.72	0.75	0.73	0.03	0.00	0.35
Crew Transport Vessel	Crew	1	1491	37	144.6	130	0.00	0.01	0.05	0.45	1.85	0.06	0.06	0.00	0.00	0.03
Feeder Barge: Monco 335	Barge	2	5966	1119	64.0	508	0.00	0.03	0.26	0.97	11.37	0.36	0.34	0.25	0.00	0.46
Port of Norfold, VA based						**1632**	**0.01**	**0.08**	**0.64**	**4.70**	**28.04**	**0.87**	**0.83**	**0.21**	**0.00**	**0.62**
Floating/Jack-up Crane Barge	Jackup	1	29828	3057	59.1	1160	0.01	0.06	0.41	3.66	18.27	0.55	0.54	0.02	0.00	0.26
Crew Transport Vessel	Crew	1	1491	37	106.9	96	0.00	0.00	0.03	0.33	1.36	0.05	0.04	0.00	0.00	0.02
Feeder Barge: Monco 335	Barge	2	5966	1119	47.3	376	0.00	0.02	0.19	0.71	8.40	0.27	0.25	0.19	0.00	0.34

Table B32 - O & M Emissions -Onshore Substation in New York

South Fork Wind Farm Project - Onshore O & M

1 Emission Factors - Non-road CI Engine (g/kW-hr)

Emission Factor ID	Engine Rated	CO2*	CO	NOX	PM10 (as PM)	PM2.5 (as P	SO2*	VOC*	HAPs*	Data Source
Nonroad 1	130 ≤ kW < 560	699.504	3.5	4	0.2	0.2	1.25	1.50	2.71E-02	(a)
Nonroad 2	kW > 900 (Tier 2	699.504	3.5	6.4	0.2	0.2	1.25	1.50	2.71E-02	

Note:

(a) EPA Federal Nonroad Compression-Ignition Engines: Exhaust Emission Standards (EPA-420-B-16-022, March 2016)

* Emission factor are from AP-42 section 3.3

AP-42	CO2		SO2		VOC		HAPs		
	(lb/hp-hr)	(g/kW-hr)	(lb/hp-hr)	(g/kW-hr)	(lb/hp-hr)	(g/kW-hr)	(lb/MMB	(lb/hp-hr)	(g/kW-hr)
Section 3.3	1.15	700	2.05E-03	1	2.47E-03	2	6.37E-03	4.46E-05	2.71E-02

HAP is the sum of available emissions factors for HAPs listed in Clean Air Act

Emissions (tons) = Engine Power Rating (kW) x Loading Factor (%) x Activity Hours (hours) x Emission Factor (g/kW-hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)

Type of Equipment/Emission Source Description (list others as needed)	No. of Each Type of Equipment	Engine Size on Equipment (specify units)	Equipment Size		Fuel Type	Emission Factor used	Engine Use	Vent/Stack Height (feet)	Vent/Stack Diameter (inches)	Total Hours/Day Engine Use	Utilization Percentage (%)	Total Hours/Year Engine Use	Work Task	Work Task Duration in Federal Waters (days)	Work Task Duration in State Waters (days) NYC	Work Task Duration in Other State Waters	Load Factor	Auxiliary Engine Power Adjustment	Emissions (tons)										
			HP	kW															CO2	CH4	N2O	Black Carbon	CO	NOx	PM10	PM2.5	SO2	Lead	VOC	HAP
Pick up trucks for Onshore substation	1	Main Engine	200	149	Petrol	Nonroad 1	General Power	10	4" - 6"	3	50	390	General construction	0	260	0	1		45				0.2	0.3	0.0	0.0	0.1		0.1	0.0
																		total	45				0.2	0.3	0.0	0	0.0799		0.0963	0.0017

Type of Equipment/Emission Source Description (list others as needed)	Emissions (tons)											
	CO2	CH4	N2O	Black Carbon	CO	NOx	PM10	PM2.5	SO2	Lead	VOC	HAP
Pick up trucks for Onshore substation	44.849				0.224	0.256	0.013	0.013	0.080		0.096	0.002
total	45				0.22	0.26	0.01	0.013	0.0799		0.096	0.002

SFWF Decommissioning Phase Emission Worktabs