

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 (NO_x)
- Volatile organic compounds (VOCs)
- Carbon monoxide (CO)
- Particulate matter smaller than 10 microns (PM₁₀)
- Particulate matter smaller than 2.5 microns (PM_{2.5}, a subset of PM₁₀)
- Sulfur dioxide (SO₂)
- Lead (Pb)
- Black carbon

Greenhouse gas emissions including nitric oxide (N₂O), methane (CH₄), carbon dioxide (CO₂), and total greenhouse gases expressed as carbon dioxide equivalent (CO₂e).

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
<i>Emission Sources</i>		
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:

$$\begin{aligned} \text{Vessel Emissions (tons)} = & \text{[Main Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission} \\ & \text{Factor (g/kW -hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)]} \\ & + \text{[Auxiliary Engine Power Rating (kW) x Loading Factor x Activity Hours (hours) x Emission} \\ & \text{Factor (g/kW hour) x (1 lb /454 g) x (1 ton / 2000 lb) x (# of Sources)]} \end{aligned}$$

² *Ibid.*

The equation for offshore emergency generator:

$$\text{Generator Emissions (tons)} = \frac{\text{Engine Power Rating (kW)} \times \text{Activity Hours (hours)} \times \text{Emission Factor (g/kW-hour)}}{(1 \text{ lb} / 454 \text{ g}) \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})}$$

The equation for helicopter use emissions:

$$\text{Helicopter Emissions (tons)} = \text{Activity Hours (hours)} \times \text{Emission Factor (lb/hour)} \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

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.

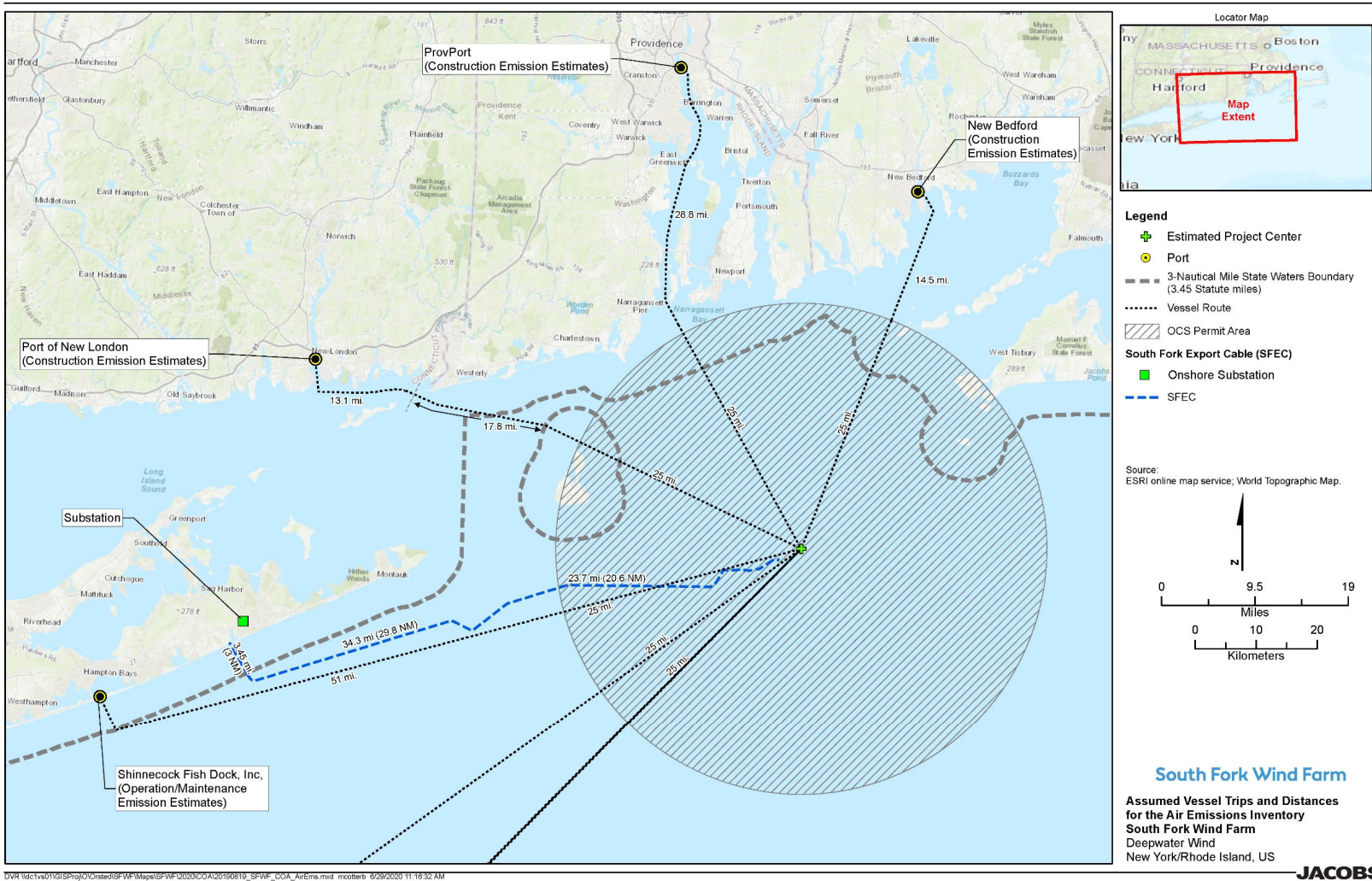


Figure 1: Distances from South Fork Wind Farm Centroid to Close Proximity Ports considered for the Air Emissions Inventory

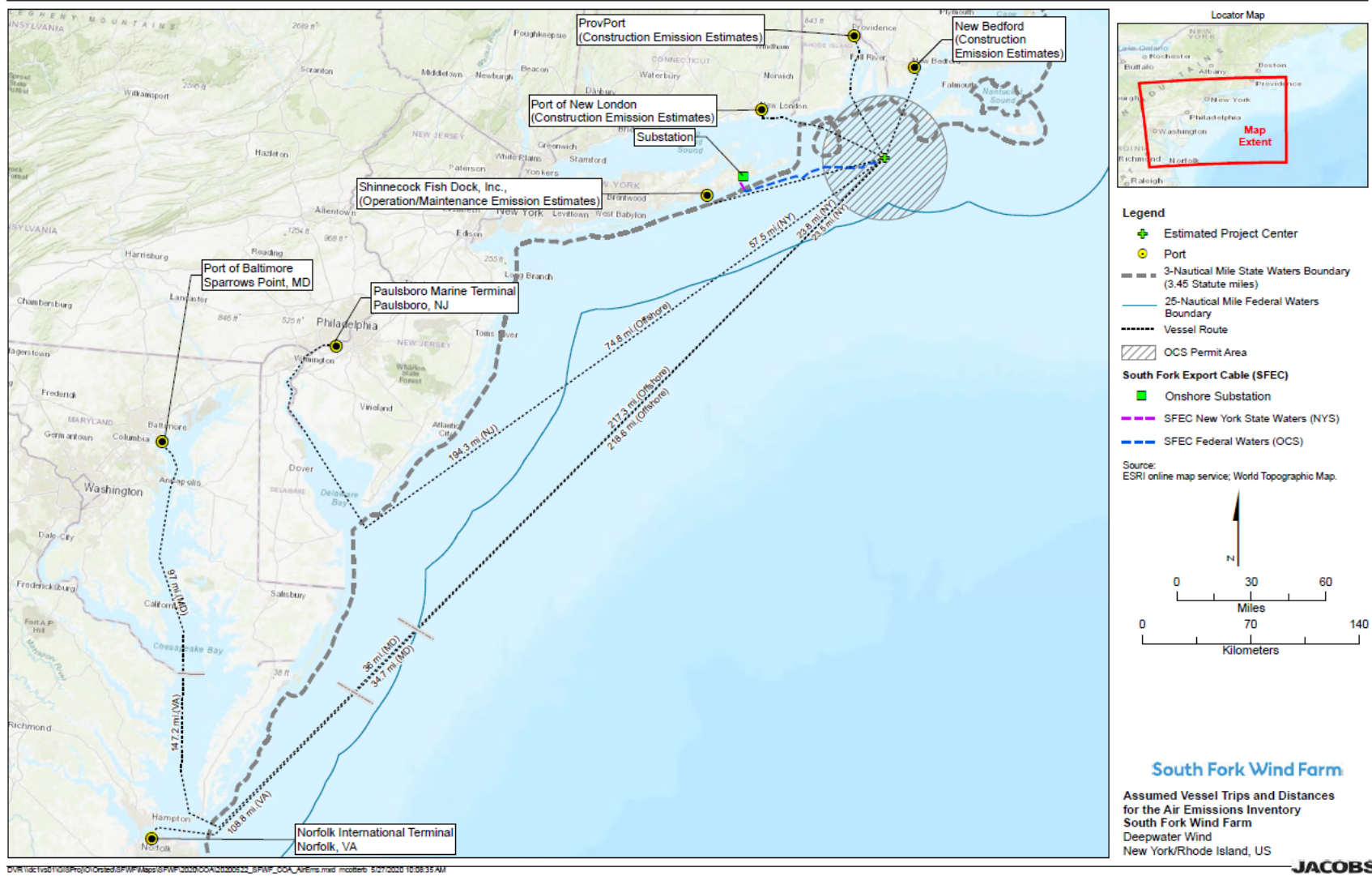


Figure 2: Distances from South Fork Wind Farm Centroid to Far Proximity Ports considered for the Air Emissions Inventory

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)	14.5 mi (23.3 km)	Conformity
Within OCS Boundary and in MA State water	5.7 mi (9.2 km)	Conformity
OCS Air Permit Boundary to Providence (all in RI water)	28.8 mi (46.3 km)	Conformity
Within OCS Air Permit Boundary and in RI State water	4.04 mi (6.5 km)	Conformity
OCS Air Permit Boundary to New London (in RI and CT 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
Within OCS Air Permit Boundary and in RI State water		
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.

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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

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)	Construction						Decommissioning					
					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

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)	Construction						Decommissioning					
					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

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)	Construction						Decommissioning					
					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

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

Table with columns for Equipment/Engine, Vessel Type, No. of Each Type, Main/Auxiliary Engine Rating (HP/KW), Average Speed (Knots), Hours for transit, and various trip percentages. Includes rows for Floating/Jack-up Crane Barge, Towing Tug, Material Barge, etc.

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

Table with columns for Equipment/Engine, Vessel Type, No. of Each Type, Main/Auxiliary Engine Rating (HP/KW), Average Speed (Knots), Hours for transit, and various trip percentages. Includes rows for Floating/Jack-up Crane Barge, Towing Tug, Material Barge, etc.

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

Table with columns for Equipment/Engine, Vessel Type, No. of Each Type, Main/Auxiliary Engine Rating (HP/KW), Average Speed (Knots), Hours for transit, and various trip percentages. Includes rows for Floating/Jack-up Crane Barge, Towing Tug, Material Barge, etc.

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

Table with columns for Equipment/Engine, Vessel Type, No. of Each Type, Main/Auxiliary Engine Rating (HP/KW), Average Speed (Knots), Hours for transit, and various trip percentages. Includes rows for Transportation Barge, Fuel Bunkering Vessel, Towing Tug, etc.

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

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

Table 1d: Data table for Paulsboro Marine Terminal, NJ. Columns include equipment type, engine ratings, speeds, hours of use, and percentages of trips for various locations and states.

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

Table 1e: Data table for Sparrows Point, MD. Columns include equipment type, engine ratings, speeds, hours of use, and percentages of trips for various locations and states.

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

Table 1f: Data table for Port of Forfold, VA. Columns include equipment type, engine ratings, speeds, hours of use, and percentages of trips for various locations and states.

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

Table 1g: Data table for Cable Installation. Columns include equipment type, engine ratings, speeds, hours of use, and percentages of trips for various locations and states.

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 of the where the supply port is. ***-Total yearly hour use will be slightly different depending on the location of port used.

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 Carbor	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 Carbor	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 Carbor	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 Carbor	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	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	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	0.1	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	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	0.2	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	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	0.2	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	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 Carbor	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 Carbor	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	
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	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	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	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	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	
Total emissions						2399	0.0	0.1	0.9	7.9	35.3	1.2	1.2	0.1	0.0	0.7	
						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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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	
Total emissions						2389	0.0	0.1	0.9	7.8	35.1	1.2	1.2	0.1	0.0	0.7	
						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

(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info

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

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 - maneuvering 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 - maneuvering 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 - maneuvering 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 - maneuvering 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 - maneuvering 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 - maneuvering 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)	Auxiliary 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)	Auxiliary 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)	Auxiliary 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)	Auxiliary 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	
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 breakdown to SFWF and SFEC based 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 breakdown to SFWF and SFEC based 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	

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 breakdown to SFWF and SFEC based 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	

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	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 breakdown to SFWF and SFEC based 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	

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	
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 broken down to SFWF and SFEC based 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	
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 broken down to SFWF and SFEC based 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 Carbor	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 Carbor	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 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
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 broken down to SFWF and SFEC based on info)						SFWF	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

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 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 broken down to SFWF and SFEC based on info)						SFWF	1104	0.0	0.1	0.4	3.6	16.2	0.6	0.5	0.1	0.0
						SFEC	552	0.0	0.0	1.8	8.1	0.3	0.3	0.0	0.0	

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 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	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
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 vessel transit emissions are broken down to SFWF and SFEC based on info)

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 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	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
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 vessel transit emissions are broken down to SFWF and SFEC based on info)

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 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
						SFEC	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 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
						SFEC	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:

$$\text{Vessel Emissions (ton)} = \text{Engine Power Rating (kW)} \times \text{Loading Factor} \times \text{Activity Hours (hours)} \times \text{Emission Factor (g/kW-hour)} \times (1 \text{ lb} / 454 \text{ g}) \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

$$\text{Helicopter Emissions (ton)} = \text{Activity Hours (hours)} \times \text{Emission Factor (lb/hour)} \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

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)	Auxiliary 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)	Auxiliary 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)	Auxiliary 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
Total emissions						0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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
						SFWF	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

(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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
Total emissions						2905	0.0	0.1	1.1	9.5	42.7	1.5	1.4	0.2	0.0	0.8
						SFWF	1936	0.0	0.1	0.7	6.3	1.0	0.9	0.1	0.0	0.5
						SFEC	968	0.0	0.0	0.4	3.2	0.5	0.5	0.1	0.0	0.3

(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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	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)	Auxiliary 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	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:

$$\text{Vessel Emissions (ton)} = \text{Engine Power Rating (kW)} \times \text{Loading Factor} \times \text{Activity Hours (hours)} \times \text{Emission Factor (g/kW-hour)} \times (1 \text{ lb} / 454 \text{ g}) \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

$$\text{Helicopter Emissions (ton)} = \text{Activity Hours (hours)} \times \text{Emission Factor (lb/hour)} \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

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
Total emissions						0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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
Total emissions						0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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
Total emissions						0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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:

$$\text{Vessel Emissions (ton)} = \text{Engine Power Rating (kW)} \times \text{Loading Factor} \times \text{Activity Hours (hours)} \times \text{Emission Factor (g/kW-hour)} \times (1 \text{ lb} / 454 \text{ g}) \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

$$\text{Helicopter Emissions (ton)} = \text{Activity Hours (hours)} \times \text{Emission Factor (lb/hour)} \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

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)	Auxiliary 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)	Auxiliary 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)	Auxiliary 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
Total emissions						0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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	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
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

(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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
Total emissions						0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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
Total emissions						0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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:

$$\text{Vessel Emissions (ton)} = \text{Engine Power Rating (kW)} \times \text{Loading Factor} \times \text{Activity Hours (hours)} \times \text{Emission Factor (g/kW-hour)} \times (1 \text{ lb} / 454 \text{ g}) \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

$$\text{Helicopter Emissions (ton)} = \text{Activity Hours (hours)} \times \text{Emission Factor (lb/hour)} \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

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
Total emissions						0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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	0.0
						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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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	
Total emissions						3778	0.0	0.2	1.4	12.4	55.6	1.9	1.8	0.2	0.0	1.1	
						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

(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info

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	0.1	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	0.1	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:

$$\text{Vessel Emissions (ton)} = \text{Engine Power Rating (kW)} \times \text{Loading Factor} \times \text{Activity Hours (hours)} \times \text{Emission Factor (g/kW-hour)} \times (1 \text{ lb} / 454 \text{ g}) \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

$$\text{Helicopter Emissions (ton)} = \text{Activity Hours (hours)} \times \text{Emission Factor (lb/hour)} \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

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)	Auxiliary 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
Total emissions						0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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
						SFWF	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

(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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
Total emissions						0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
						SFWF	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

(Cable vessel transit emissions are brokendown to SFWF and SFEC basd on info

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:

$$\text{Vessel Emissions (ton)} = \text{Engine Power Rating (kW)} \times \text{Loading Factor} \times \text{Activity Hours (hours)} \times \text{Emission Factor (g/kW-hour)} \times (1 \text{ lb} / 454 \text{ g}) \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

$$\text{Helicopter Emissions (ton)} = \text{Activity Hours (hours)} \times \text{Emission Factor (lb/hour)} \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

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)	Auxiliary 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
Total emissions						0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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)	Auxiliary 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
Total emissions						0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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 vessel transit emissions are brokendown to SFWF and SFEC basd on info

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 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:

$$\text{Vessel Emissions (ton)} = \text{Engine Power Rating (kW)} \times \text{Loading Factor} \times \text{Activity Hours (hours)} \times \text{Emission Factor (g/kW-hour)} \times (1 \text{ lb} / 454 \text{ g}) \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

$$\text{Helicopter Emissions (ton)} = \text{Activity Hours (hours)} \times \text{Emission Factor (lb/hour)} \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

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

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 Carbon	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

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

SFWF Operations and Maintenance Phase Emission Worktabs

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 Norfolk, 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 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:

$$\text{Generator Emissions (ton/year)} = \text{Engine Power Rating (kW)} \times \text{Activity Hours (hours/year)} \times \text{Emission Factor (g/kW-hour)} \times (1 \text{ lb} / 454 \text{ g}) \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

Type of Equipment/Emission Source Description (list others as needed)	Vessel Type in BOEM Tool for Emission factor selection	No. of equipmen t	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 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:

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

$$\text{Vessel Emissions (tons/year)} = \text{Activity Hours (hours/year)} \times \text{Emission Factor (lb/hour)} \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

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 Norfolk, 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:

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

$$\text{Vessel Emissions (tons/year)} = \text{Activity Hours (hours/year)} \times \text{Emission Factor (lb/hour)} \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

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 Norfolk, 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:

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

$$\text{Vessel Emissions (tons/year)} = \text{Activity Hours (hours/year)} \times \text{Emission Factor (lb/hour)} \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

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 Norfolk, 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:

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

$$\text{Vessel Emissions (tons/year)} = \text{Activity Hours (hours/year)} \times \text{Emission Factor (lb/hour)} \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

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 Norfolk, 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:

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

$$\text{Vessel Emissions (tons/year)} = \text{Activity Hours (hours/year)} \times \text{Emission Factor (lb/hour)} \times (1 \text{ ton} / 2000 \text{ lb}) \times (\# \text{ of Sources})$$

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 Norfolk, 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 Norfolk, 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:

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

$$\text{Vessel Emissions (tons/year)} = \text{Activity Hours (hours/year)} \times \text{Emission Factor (lb/hour)} \times (1 \text{ ton}/2000 \text{ lb}) \times (\# \text{ of Sources})$$

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 Norfolk, 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 Norfolk, 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 PM)	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
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