REGION 1
BOSTON, MA 02109

November 15, 2024

FACT SHEET

Outer Continental Shelf Preconstruction Air Permit
SouthCoast Wind Farm Project
SouthCoast Wind Energy, LLC

Offshore Renewable Wind Energy Development
Renewable Energy Lease Area OCS-A-0521
EPA Draft Permit Number: OCS-R1-09

Acronyms and Abbreviation List

APPS	Act to Prevent Pollution from Ships
AQRV	Air Quality Related Values
BACT	Best Available Control Technology
BOEM	Bureau of Ocean Energy Management
CAA	Clean Air Act
CA SIP	California State Implementation Plan
CERC	Continuous Emission Reduction Credit
C.F.R.	Code of Federal Regulations
CH_4	Methane
CI-ICE	Compression Ignition Internal Combustion Engine
CO	Carbon Monoxide
COA	Corresponding Onshore Area
CO_2	Carbon Dioxide
CO_2e	Carbon dioxide equivalent
CZMA	Coastal Zone Management Act
DEIS	Draft Environmental Impact Statement
DERC	Discrete Emission Reduction Credit
DPS	Dynamic Positioning System
EAB	Environmental Appeals Board
ECA	**Emission Control Area**
EGRID	Environmental Protection Agency's Emissions and Generation Resource Integrated Database
EIAPP	Engine International Air Pollution Prevention
EPA	United States Environmental Protection Agency
EJ	Environmental Justice
ERC	Emission Reduction Credit
ESA	Endangered Species Act
EU	Emission Unit
EUG	Emission Unit Group
FWS	U.S. Fish and Wildlife Service
GCOP	Good Combustion and Operating Practices
GHG	Greenhouse Gas
g/kW-hr	Grams per kilowatt-hour
H_2SO_4	Sulfuric acid
HAP	Hazardous Air Pollutant
HC	Hydrocarbon
HV GIS	High Voltage Gas Insulated Switchgear
IAPP	International Air Pollution Prevention
ISO NE	ISO New England
KV	Kilovolt
KW	Kilowatt
LAER	Lowest Achievable Emission Rate
LV GIS	Low Voltage Gas Insulated Switchgear
MassDEP	Massachusetts Department of Environmental Protection
MV GIS	Medium Voltage Gas Insulated Switchgear
MW	Megawatt
NHPA	National Historical Preservation Act
NM	Nautical Mile
NMFS	National Marine Fisheries Service
NMHC	Non-Methane hydrocarbons
NNSR	Nonattainment New Source Review
NSR	New Source Review
N_2O	Nitrous oxide
NO_2	Nitrogen dioxide
NO_X	Nitrogen oxides
OCS	Outer Continental Shelf
OECLA	Offshore Export Cable Laying Activities
OSCLA	Outer Continental Shelf Lands Act
OSP	Offshore Substation Platform
Pb	Lead
PM	Particulate Matter
PM_{10}	Particulate Matter with an Aerodynamic Diameter <= 10 Microns
$PM_{2.5}$	Particulate Matter with an Aerodynamic Diameter <= 2.5 Microns
PSD	Prevention of Significant Deterioration
PTE	Potential to Emit
RICE	Reciprocating Internal Combustion Engine
RPM	Revolutions Per Minute
SCW	SouthCoast Wind Energy, LLC
SER	Significant Emission Rate
SF_6	Sulfur Hexafluoride
SIC	Standard Industrial Code
SIL	Significant Impact Levels
SO_2	Sulfur Dioxide
SOVs	Service Operation Vehicles
SSB	State Seaward Boundary
TPY	Tons Per Year
U.S.C.	United States Code
VOC	Volatile Organic Compound
WDA	Wind Development Area
WTG	Wind Turbine Generator

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I. General Information

Applicant's name and address:	SouthCoast Wind Energy, LLC 3 Center Plaza, 205 Boston, MA 02108
Location of regulated activities:	Outer Continental Shelf (OCS) Lease Area OCS-A 0521 is in federal waters, approximately 26 nautical miles (NM) south of Martha's Vineyard, Massachusetts. See Section II.A for more information.
Draft OCS permit number:	OCS-R1-09
EPA contact:	Andre D. Turner

On November 23, 2022, SouthCoast Wind Energy, LLC (the applicant) submitted to EPA Region 1 (EPA) an initial application requesting a Clean Air Act (CAA or the Act) preconstruction permit under Section 328 of the CAA for the construction and operation of their SouthCoast Offshore Windfarm (SCW or the Project). On January 13, 2023, EPA received a revised OCS air permit application, which replaced the initial application. EPA also received supplemental information thereafter. EPA determined the application to be administratively complete on April 07, 2023. Throughout the permitting process, several revised applications were submitted to address project updates and regulatory requirements. The most recent revised application was submitted to the EPA on October 21, 2024.

After reviewing the application and additional information, the EPA prepared this Fact Sheet and a draft OCS preconstruction air permit as required by 40 C.F.R. parts 55 and 124. All CAA permitting requirements applicable to the windfarm are contained within EPA Permit No. OCS-R1-09. Since the decommissioning phase of the wind farm will occur well into the future, the EPA is currently unable to determine the specific permitting requirements for the decommissioning phase. Therefore, EPA is not permitting that phase at this time.

The EPA's draft permit is based on the information and analysis provided by the applicant and the EPA's own technical expertise. This Fact Sheet documents the information and analysis the EPA used to support the OCS draft permit decisions. It includes a description of the proposed wind farm, the applicable regulations, and an analysis demonstrating how the applicant will comply with the requirements contained in the permit.

The EPA has made the permit application materials and any supplemental information provided by the applicant available to the public as part of the administrative record for this Fact Sheet and the draft CAA permit. The permit application and supplemental information for the draft permit is available on EPA Region 1's web site: https://www.epa.gov/caa-permitting/caa-permitting-epas-new-england-region.

II. Project Description

The SouthCoast Wind Project includes up to 147 wind turbine generators (WTGs), submarine cables (inter-array cables) between the WTGs, and two (2) Offshore Substation Platforms (OSPs). Once operational, the Project will have an anticipated maximum production capacity up to 2,400 megawatts (MW) of renewable energy.

A. Project Location

The Project will be located within federal waters on the OCS within the Bureau of Ocean Energy Management (BOEM) Renewable Energy Lease Area OCS-A 0521. The lease area itself is approximately 127,388 acres. The Wind Development Area (WDA) for the Project will be located approximately 26 nautical miles (NM)[1] south of Martha's Vineyard, Massachusetts.[2] The WDA is a continuous lease area extending from the inner OCS (those waters within 25 NM of the State Seaward Boundary (SSB)) to the outer OCS (those waters beyond 25 NM of the SSB). Electric export cables (direct current) are proposed to make landfall at Brayton Point in Somerset, Massachusetts and Falmouth, Massachusetts, and connect the wind farm to the existing electric transmission system via the ISO New England Inc (ISO-NE) grid. See Figure 1.

Figure 1: Location of SouthCoast Offshore Wind Farm Project

B. Construction Emissions from SouthCoast Wind Project

Offshore construction will include activities involving scour protection, foundation, and offshore cable installation, followed by OSP and WTG installation and commissioning. Table 1 contains the Project's

[1] All miles referenced in this Fact Sheet are nautical miles (NM). One NM is equal to 1.15077 statute miles. EPA performs jurisdictional and OCS air emissions determinations based on NM.

[2] Note that the closest point in Massachusetts to the SCW WTGs is 23.3 miles (37 kilometers) from Nantucket shoreline. The distance is measured from the nearest WTG position.

potential emissions during the construction phase (annualized), as contained in SCW's revised application provided to the EPA on October 21, 2024. Note that the estimates during the construction period represent the annualized worst-case potential to emit (PTE).[3]

Table 1: Estimated Construction OCS Emissions (tons per year (TPY)) for the SCW Project

CO_2e	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	Lead	VOC	HAPs
331,386	702	4,214	102	96	111	0.012	188	8.7

For purposes of EPA's CAA OCS permit, construction emissions from the windfarm are estimated to begin once any equipment or any activity that by itself meets the definition of an OCS source is located within the WDA. At that point, the EPA considers the WDA to be an OCS Facility and to meet the definition of an OCS source, as defined in CAA section 328 and 40 C.F.R. part 55, for the purposes of calculating potential emissions. Emissions from vessels servicing or associated with any part of the OCS Facility are included in the potential emissions while at the OCS Facility or traveling to and from any part of the OCS Facility when within 25 NM of the source's centroid.[4]

C. Operation and Maintenance Emissions from SouthCoast Wind Project

The operations and maintenance (O&M) phase of the windfarm will begin when the first WTG is completed and begins to produce commercial power. Note that individual WTGs could be producing commercial power before the construction of the entire OCS Facility is completed. Thus, the O&M and Construction phases could then run concurrently. Table 2 contains the Project's maximum potential emissions during the O&M phase (post-operational phase start date), as contained in SCW's revised emissions estimates provided to the EPA on October 21, 2024. Note that the estimates during the O&M phase represent the annualized worst-case potential to emit and assume the facility is operating at the maximum production capacity.[5]

Table 2: Estimated Operations and Maintenance Emissions (TPY) for the SCW Project

CO_2e	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	Lead	VOC	HAPs
59,506	110	515	16	15	23	0.002	33	2

Electricity produced by the WTGs will displace electricity generated by fossil fuel power plants and therefore, significantly reduce emissions associated with the existing ISO NE electric grid. Once operational, emissions from vessels, equipment, and generators are estimated from routine inspections and preventive maintenance. Corrective maintenance may occur periodically, and more significant repairs are expected to be rare.

[3] See *October 21, 2024,* emission spreadsheet in the docket for this permit action. SCW has indicated the worst-case potential to emit occurs on fifth year of construction (Year 5).

[4] EPA utilizes the centroid of the Wind Development Area to estimate PTE within 25 nautical miles of the source's centroid. See Vineyard Wind 1 Fact Sheet: pg. 11-14 (2019-06-28) located at https://www.epa.gov/caa-permitting/outer-continental-shelf-wind-energy-database for more information on this concept.

[5] See *October 21, 2024,* emission spreadsheet in the docket for this permit action.

III. Applicability of 40 C.F.R. Part 55 – OCS Air Regulations

A. OCS Statutory and Regulatory Authority

Section 328(a) of the CAA requires that the EPA establish air pollution control requirements for equipment, activities, or facilities located on the OCS that meet the definition of an OCS source. Sources located within 25 NM of a state's[6] seaward boundary also need to comply with several onshore requirements. To comply with this statutory mandate, on September 4, 1992, the EPA promulgated 40 C.F.R. part 55, which established the requirements to control air pollution from OCS sources to attain and maintain federal and state ambient air quality standards.[7]

The Energy Policy Act of 2005 (*See* Title III (Oil and Gas), Subtitle G – Miscellaneous, Section 388) amended section 8 of the Outer Continental Shelf Lands Act (OCSLA) to allow the EPA and the Department of the Interior to authorize activities on the OCS that "produce or support production, transportation, or transmission of energy from sources other than oil and gas." Section 4(a)(1) of OCSLA was recently amended to expand the scope of "exploring, developing or producing resources" in the OCS to include "non-mineral energy resources" such as offshore wind. *See* William M. (Mac) Thornberry National Defense Authorization Act for Fiscal Year 2021, H.R. 6395, 116th Cong. § 9503 (2021). BOEM reviews construction and operation plans from offshore wind energy developers and approves, approves with modifications, or disapproves those plans. EPA issues a CAA OCS permit to establish air pollution control requirements for such sources when the definition of "OCS source" is met, as defined in CAA § 328 and 40 C.F.R. part 55.[8]

Under CAA § 328(a)(4)(C) and 40 C.F.R. § 55.2, an OCS source includes any equipment, activity, or facility which:

(1) Emits or has the potential to emit any air pollutant,

(2) Is regulated or authorized under the OCSLA (43 U.S.C. § 1331 *et seq.*); and

(3) Is located on the OCS or in or on waters above the OCS.

Furthermore, 40 C.F.R. § 55.2 establishes that for a vessel to be considered an OCS source, the vessel must also be:

(1) Permanently or temporarily attached to the seabed and erected thereon and used for the purpose of exploring, developing, or producing resources therefrom, within the meaning of section 4(a)(1) of OCSLA (43 U.S.C. §1331 *et seq.*); or

[6] The term "state," when used to reference one of the 50 states within the United States, includes states that are officially named commonwealths, e.g., the Commonwealth of Massachusetts.
[7] Refer to the Notice of Proposed Rulemaking, December 5, 1991 (56 Fed. Reg. 63,774), and the preamble to the final rule promulgated September 4, 1992 (57 Fed. Reg. 40,792) for further background and information on the OCS regulations.
[8] A copy of the Construction and Operation Plan may be found at https://www.boem.gov/renewable-energy/state-activities/southcoast-wind-formerly-mayflower-wind

(2) Physically attached to an OCS facility, in which case only the stationary sources [sic] aspects of the vessels will be regulated.

Finally, under 40 C.F.R. § 55.2, the term "Outer Continental Shelf" has the meaning provided by section 2 of the OCSLA (43 U.S.C. § 1331 *et seq.*), which defines the "Outer Continental Shelf" as "all submerged lands lying seaward and outside of the area of lands beneath navigable waters as defined in section 1301 of this title, and of which the subsoil and seabed appertain to the United States and are subject to its jurisdiction and control."

Once an activity, facility, or equipment (which may include a vessel) is considered an OCS source, then the emission sources of that OCS source become subject to the requirements of 40 C.F.R. part 55, which include, but are not limited to: (1) obtaining an OCS air permit, as required by 40 C.F.R. § 55.6; (2) complying with the applicable federal regulations and requirements specified at 40 C.F.R. § 55.13; (3) for an OCS source within 25 NM of a state's seaward boundary, complying with the state or local air emissions requirements of the corresponding onshore area (COA) specified at 40 C.F.R. § 55.14; (4) monitoring, reporting, inspection, and enforcement requirements specified at 40 C.F.R. §§ 55.8 and 55.9; and (5) permit fees as specified under 40 C.F.R. § 55.10.

B. Procedural Requirements for OCS Permitting

Regulations developed pursuant to OCS statutory requirements under section 328 of the CAA are codified at 40 C.F.R. part 55. The OCS regulations create procedures that require an applicant seeking to construct and operate an OCS source to identify the federal regulations and the state and local regulations from the COA that may apply to the source, and to seek to have those regulations apply, as a matter of federal law, to the OCS source. Once the EPA has received a complete permit application, the EPA[9] then follows the applicable procedural requirements for federal permitting in those regulations which follow the requirements in 40 C.F.R. part 124, and then finalizes the OCS permit in accordance with those federal requirements.[10]

For sources located within the inner OCS, the OCS regulations first require the applicant to submit a Notice of Intent (NOI) to the nearest EPA regional office. *See* 40 C.F.R. § 55.4. The NOI provides emissions information regarding the OCS source, including information necessary to determine the applicability of onshore requirements and the source's impact in onshore areas. *See* 40 C.F.R. § 55.5. SCW submitted to the EPA an NOI for the windfarm on May 31, 2022. Information provided in the NOI for this windfarm indicated that Massachusetts is the nearest onshore area (NOA). The EPA did not receive a request from another state to be designated the COA for this project, thus Massachusetts is designated as the COA for this project. *See* 40 C.F.R. § 55.5(b)(1).

The federal requirements that apply to an OCS source are provided in 40 C.F.R. § 55.13. The EPA also reviews the state and local air requirements of the COA to determine which requirements should be

[9] The authority to "take all actions required to implement the Outer Continental Shelf (OCS) rules promulgated at 40 CFR part 55" has been delegated to the Director of the Air and Radiation Division in EPA Region 1. See Docket for Delegation of Authority.

[10] *See* 40 C.F.R. § 55.6(a)(3).

applicable on the OCS and revises 40 C.F.R. part 55 to incorporate by reference those state and local air control requirements that are applicable to an OCS source. *See id.* § 55.12. Once the EPA completes its rulemaking to revise 40 C.F.R. part 55, the state and local air regulations incorporated into 40 C.F.R. part 55 become federal law and apply to any OCS source associated with that COA.

Under this "consistency update" process, the EPA must incorporate applicable state and local rules into 40 C.F.R. part 55 as they exist onshore. This limits the EPA's flexibility in deciding which requirements will be incorporated into 40 C.F.R. part 55 and prevents the EPA from making substantive changes to the requirements it incorporates. As a result, the EPA may be incorporating rules into part 55 that do not conform to certain requirements of the CAA or are not consistent with the EPA's state implementation plan (SIP) guidance.[11] The EPA includes all state or local air requirements of the COA except any that are not rationally related to the attainment or maintenance of federal or state ambient air quality standards or part C of Title I of the Act, that are designed expressly to prevent exploration and development of the OCS, that are not applicable to an OCS source, that are arbitrary or capricious, that are administrative or procedural rules, or that regulate toxics which are not rationally related to the attainment and maintenance of federal and state ambient air quality standards.[12]

On November 23, 2021, the EPA published a Notice of Proposed Rulemaking (NPRM) proposing to incorporate various Massachusetts air pollution control requirements into 40 C.F.R. part 55[13] in response to a NOI submittal for Sunrise Wind, LLC. (NOI submitted on September 9, 2021). EPA also received an NOI on November 5, 2021, from Revolution Wind, LLC, an NOI on January 28, 2022, from Park City Wind, LLC (for the NEW 1 and NEW 2 projects) and an NOI on May 31, 2022, from Mayflower Wind Energy, LLC, which later changed its name to SouthCoast Wind Energy, LLC.[14] Massachusetts was also designated as the COA for all projects. Upon the designations, EPA conducted a consistency review in accordance with regulations at 40 C.F.R. § 55.12 and determined any recent changes to the Massachusetts regulations since the NPRM were non-substantive as they relate to OCS sources, and that it was not necessary to propose an additional consistency update at that time.[15]

EPA published a final rulemaking notice for the consistency update to Part 55 on November 15, 2022. *See* 87 Fed. Reg. 68,364 (Nov. 15, 2022). EPA's November 15, 2022, Federal Register notice satisfies EPA's obligation under § 55.12 to conduct a consistency review for the subsequent NOIs received from

[11] Inclusion of a state rule in 40 C.F.R. part 55 does not imply that a state rule meets the requirements of the CAA for SIP approval, nor does it imply that the rule will be approved by the EPA for inclusion in the SIP.
[12] *See* 40 C.F.R. §§ 55.12(d), 55.14(c).
[13] 86 Fed. Reg. 66,509–66,512.
[14] On February 1, 2023, Mayflower Wind Energy LLC notified EPA of a name change to SouthCoast Wind Energy, LLC.
[15] Since EPA's November 23, 2021, NPRM, Massachusetts revised the regulations at 310 CMR 7.00 (Statutory Authority; Legend; Preamble; Definitions) and 310 CMR 7.40 (Low Emission Vehicle Program), effective December 30, 2021. EPA previously determined that the regulations at 310 CMR 7.40 (Low Emission Vehicle Program) were not applicable to OCS sources and did not propose to incorporate this section of 310 CMR 7.00 into part 55 as part of the November 23, 2021, NPRM. Although EPA's NPRM proposed to incorporate by reference the definitions located at 310 CMR 7.00 (Statutory Authority; Legend; Preamble; Definitions), MassDEP's most recent revisions to 310 CMR 7.00 (Statutory Authority; Legend; Preamble; Definitions) were related to the amendments to the regulations at 310 CMR 7.40 (Low Emission Vehicle Program). EPA has reviewed the recent amendments to the Massachusetts regulations at 310 CMR 7.00 (Statutory Authority; Legend; Preamble; Definitions) and determined that these changes are non-substantive as they relate to OCS sources.

Sunrise Wind, LLC, Revolution Wind, LLC, Park City Wind, LLC ((for the NEW 1 and NEW 2 projects)), and SouthCoast Wind Energy, LLC.

The Massachusetts regulations that the EPA incorporated into part 55 in this action are the applicable provisions of (1) 310 CMR 4.00: Timely Action Schedule and Fee Provisions; (2) 310 CMR 6.00: Ambient Air Quality Standards for the Commonwealth of Massachusetts; and (3) 310 CMR 7.00: Air Pollution Control, as amended through March 5, 2021. EPA's final rule did not affect the provisions of 310 CMR 8.00 that were previously incorporated by reference into part 55 through EPA's prior consistency update on November 13, 2018. *See* 83 Fed. Reg. 56,259 (Nov. 13, 2018).

EPA has received subsequent NOIs for projects and conducted periodic reviews of Massachusetts regulations to ensure all applicable requirements for OCS sources as they relate to attainment and maintenance of federal or state ambient air quality standards and the requirements of part C of title I of the CAA are incorporated by reference into the Massachusetts section of Appendix A in 40 CFR part 55. These evaluations have not led to additional requirements incorporated by reference into Appendix A, because either a Massachusetts regulation did not change or because any changes to a previously incorporated regulation were not applicable to the attainment and maintenance of federal or state ambient air quality standards for OCS sources.

However, through EPA's implementation of the OCS air permitting program, EPA became aware that 310 CMR 4.03: Annual Compliance Assurance Fee and 310 CMR 7.12: U Source Registration are unnecessarily incorporated into Appendix A of 40 CFR part 55.

On September 11, 2024, the EPA published a Notice of Proposed Rulemaking (NPRM) proposing to remove these previously approved regulations (see 89 FR 73617) incorporated into Appendix A of 40 CFR part 55 since our last amendment on November 15, 2022. Based on a review of Part 55 1) 310 CMR 4.03: Annual Compliance Assurance Fee is duplicative of existing federal rules and 2) 310 CMR 7.12: U Source Registration is no longer determined to be rationally related to the attainment and maintenance of Federal or State ambient air quality standards or to the requirements of part C of title I of the Act. Further, these changes are proposed to ensure consistency of the OCS permitting program in accordance with part 55 requirements.

The applicant's next step is to submit an air permit application that provides the information to show that it will comply with all applicable federal requirements in 40 C.F.R. part 55, including those state and local requirements incorporated by reference into 40 C.F.R. part 55 as explained previously, and any other federal requirements that may apply to the source. The EPA reviews the application and proposes either to approve or deny the application. If the EPA decides to propose approval of the application, the EPA drafts a draft air permit and a fact sheet that documents its proposed permit decision. The EPA then provides a notice and comment period of at least 30 days on the draft permit and may also hold a public hearing if there is a significant degree of public interest and/or if a hearing might clarify issues involved in the permit decision. Following the comment period, the EPA responds to all significant comments raised during the public comment period, or during any hearing, and issues the final air permit decision.

C. Scope of the "OCS Source" Under 40 C.F.R. Part 55

The CAA permitting analysis for an offshore windfarm located in federal waters must begin with a determination of the scope of the "OCS source" because the boundaries of the source determine what activities are attributed to the source for purposes of quantifying its "potential emissions" and determining what CAA programs apply.[16] These "potential emissions" must also include the emissions from vessels "servicing or associated with an OCS source" as that is required under CAA section 328 and EPA's implementing regulations at 40 C.F.R. part 55. Once the scope of the OCS source is identified, EPA must then determine if and how CAA programs such as the New Source Review (NSR) preconstruction permitting and Title V operating permit programs[17], may apply to the source. NSR and title V permitting will generally apply if the OCS source's emissions exceed the applicability thresholds included in those programs.

For purposes of CAA permitting, all stationary equipment and activities within the proposed windfarm, including all wind turbines, are part of a single "OCS source" because all such equipment and activities are integral components of a single industrial operation that emits or has the potential to emit any air pollutant, is regulated or authorized under the OCSLA, and is located on the OCS or in or on waters above the OCS. The OCS source comprises all offshore WTGs and their foundations, each OSP and its foundation, the inter-array cables, and vessels when they meet the definition of an OCS source in 40 C.F.R. § 55.2. Thus, emissions from any vessel "servicing or associated with" any component of the OCS source (including any WTG or OSP) while at the source and while en route to or from the source within 25 NM of the source's centroid must be included in the OCS source's potential to emit, consistent with the definition of "potential emissions" in 40 C.F.R. § 55.2.

EPA uses the term "OCS Facility," which means the entire wind development area[18] once the first OCS source is established in the wind development area. The first OCS source is established once any equipment or activity that meets the definition of an OCS source is located within the wind development area. The term "OCS Facility" is used to differentiate from the term "OCS source" when that latter term is used in the permit to refer to individual pieces of equipment or vessels that meet the definition of "OCS source" and are subject to control technology requirements.[19]

D. Scope of the Stationary Source Under New Source Review Regulations

[16] The OCS regulations themselves do not constitute a permitting program but, instead, make existing federal and state air pollution control requirements applicable to OCS sources. 40 C.F.R. § 55.1.

[17] Applicability of Prevention of Significant Deterioration (PSD) and Nonattainment NSR (NNSR) permit programs is discussed in Section V and VI of this Fact Sheet.

[18] See Figure 1.

[19] Per 40 C.F.R. § 55.2, OCS source means any equipment, activity, or facility which: (1) Emits or has the potential to emit any air pollutant; (2) Is regulated or authorized under the Outer Continental Shelf Lands Act ("OCSLA") (43 U.S.C. § 1331 *et seq.*); and (3) Is located on the OCS or in or on waters above the OCS. This definition shall include vessels only when they are: (1) Permanently or temporarily attached to the seabed and erected thereon and used for the purpose of exploring, developing or producing resources therefrom, within the meaning of section 4(a)(1) of OCSLA (43 U.S.C. § 1331 *et seq.*); or (2) Physically attached to an OCS facility, in which case only the stationary sources aspects of the vessels will be regulated.

The EPA must apply the NSR program regulations to determine the emission units that are considered part of the major stationary source for purposes of applying these requirements. This approach of using the definition within the specific CAA program is articulated well in an EAB Decision *In re Shell Offshore, Inc., Kulluk Drilling Unit and Frontier Discoverer Drilling Unit*, 13 E.A.D. 357, 380 (EAB 2007). The EAB stated in that decision:

> We find that the Region correctly concluded that, once it determines an emissions source located on the OCS is properly classified as an "OCS source," then that emissions source becomes subject to the requirements of 40 C.F.R. part 55. Further, the permitting programs and other requirements to which the OCS source is subject through part 55, including the PSD permitting program, then apply to the OCS source based on the regulations that define the scope of those programs. Specifically, simply because EPA has identified an OCS source as regulated under the CAA, and subject to the requirements of part 55, does not mean it can avoid the next necessary step of determining the scope of the "stationary source" for PSD purposes.

In accordance with these requirements of the applicable regulations, the EPA must determine whether NSR regulations apply to the windfarm based on the regulations that define the scope of the source under this CAA permitting program.

For the NSR preconstruction permitting programs, which include Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NNSR), the EPA regulations define "stationary source" as "any building, structure, facility, or installation which emits or may emit a regulated NSR pollutant."[20] Those regulations, in turn, define the term "building, structure, facility, or installation" to mean "all of the pollutant-emitting activities which [1] belong to the same industrial grouping, [2] are located on one or more contiguous or adjacent properties, and [3] are under the control of the same person (or persons under common control)," with "same industrial grouping" referring to the same Major Group, two-digit Standard Industrial Code (SIC) code. For the Title V permit operating program, "major source" is similarly defined in relevant part as a stationary source or group of stationary sources that meet these same three criteria. [21,22]

State and local permitting authorities have EPA-approved NSR permitting regulations that contain identical or similar definitions for the terms "stationary source" and "major source." Under the EPA-approved Massachusetts NNSR regulations at 310 CMR 7.00, Appendix A (incorporated by reference into the federal rules at 40 C.F.R. § 55.14), "stationary source" is defined as follows:

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[20] 40 C.F.R. §§ 52.21(b)(5), 51.165(a)(1)(i), 51.166(b)(5); *see* 42 U.S.C. § 7602(z) (defining "stationary source" as "any source of an air pollutant" except those emissions resulting directly from certain mobile sources or engines).

[21] 40 C.F.R. §§ 70.2, 71.2; *see* 42 U.S.C. § 7661(2) (defining major source for Title V permitting as "any stationary source (or any group of stationary sources located within a contiguous area and under common control)" that is either a major source as defined in CAA section 112 or a major stationary source as defined in CAA section 302 or part D of subchapter I (NNSR)). The EPA was also clear in promulgating its regulatory definitions of "major source" that the language and application of the Title V definitions were intended to be consistent with the language and application of the PSD definitions contained in 40 C.F.R. § 52.21. 61 Fed. Reg. 34,210 (July 1, 1996).

[22] SCW did not apply for a Title V operating permit as part of its OCS air permit application. However, EPA anticipates the scope of the stationary source analysis will be similar for the Title V operating permit program.

Stationary source means any building, structure, facility, or installation which emits, or which may emit any air pollutant subject to regulation under the Act.

(a) A stationary source may consist of one or more emissions units and:

1. may be a land-based point or area source; or
2. may be in, or on, the OCS or other submerged lands beneath navigable waters (lakes, rivers, and coastal waters adjacent to Outer Continental Shelf lands); or
3. may be any internal combustion engine, or engine combination, greater than 175 horsepower (hp) used for any stationary application; or
4. may be any internal combustion engine regulated under Sec. 111 (New Source Performance Standards (NSPS)) of the Act, regardless of size; or
5. may be any internal combustion engine of less than 175 horsepower (hp) not actually controlled to meet a regulation under Sec. 213 (Nonroad Engines and Vehicles) of the Act.

(b) A stationary source does not include:

1. emissions resulting directly from an internal combustion engine for transportation purposes; or
2. tailpipe emissions from any source regulated under title II of the Act or any emissions from in-transit, non-OCS marine vessels.

The Massachusetts NNSR regulations at 310 CMR 7.00, Appendix A define "building, structure, facility, or installation" as follows:

> [A]ll of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control). Any marine vessel is a part of a facility while docked at the facility. Any marine vessel is a part of an Outer Continental Shelf (OCS) source while docked at and within 25 NM en route to and from the OCS source. Pollutant-emitting activities shall be considered as part of the same industrial grouping if they belong to the same Major Group (*i.e.*, which have the same two-digit code) as described in the *Standard Industrial Classification Manual*, 1987.

The Massachusetts Title V operating permit program regulations at 310 CMR 7.00, Appendix C define a "major source" as follows:

> For the purpose of defining "major source," a stationary source or group of stationary sources shall be considered part of a single industrial grouping if all the pollutant emitting activities at such source or group of sources on contiguous or adjacent properties belong to the same Major Group (*i.e.*, all have the same two-digit code) as described in the Standard Industrial Classification Manual, 1987.

Additionally, in 2019, EPA issued guidance[23] to provide its interpretation of the term "adjacent" as that term is used in NSR and Title V source determinations. In that guidance, EPA provided an interpretation of "adjacent" based solely on physical proximity for the purpose of determining whether separate activities are located on adjacent properties. The guidance indicated that EPA would no longer consider "functional interrelatedness" in determining whether activities are located on adjacent properties. EPA has applied the regulatory definitions and interpretive statements to determine the scope of the stationary source for the windfarms under the applicable NSR and Title V regulations – i.e., for purposes of determining whether the pollutant-emitting activities, equipment, or facilities for these projects: [1] belong to the same industrial grouping, [2] are located on one or more contiguous or adjacent properties, and [3] are under common control.[24]

EPA has precedent within OCS CAA permitting in finding two or more projects to be a single stationary source for the NSR and Title V programs. On January 18, 2022, EPA issued an OCS air permit to South Fork Wind, LLC for the construction and operation of a 132 MW wind farm in lease area OCS-A 0517, and on September 28, 2023, EPA issued an OCS air permit to Revolution Wind, LLC for the construction and operation of an offshore wind farm with a capacity of up to 880 MW in lease area OCS-A-0486. The South Fork Wind project lease area and the Revolution Wind project lease area are in close physical proximity to the Sunrise Wind, LLC project lease area. However, Sunrise Wind LLC was not located on contiguous or adjacent lease areas to Revolution Wind LLC or South Fork Wind LLC. In addition, the South Fork Wind project and the Revolution Wind project are both owned and operated by Ørsted North America, Inc. and Eversource Investment, LLC. In EPA's permitting decision for Revolution Wind, EPA found that the South Fork Wind project and the Revolution Wind project were a single stationary source for purposes of CAA permitting. In addition, on April 15, 2024, EPA issued an OCS air permit to Park City Wind, LLC for the construction and operation of the New England Wind 1, and 2 project. In that permitting decision, EPA found that Park City Wind, LLC and the previously permitted Vineyard Wind 1, LLC facility qualify as a single stationary source under the criteria in the EPA's NSR and Title V regulations described above.

[23] *See* the memo "Interpreting 'Adjacent' for New Source Review and Title V Source Determinations in All Industries Other Than Oil and Gas" at https://www.epa.gov/sites/production/files/2019-12/documents/adjacent_guidance.pdf

[24] *See* Fact Sheets for Vineyard Wind 1, LCC, South Fork Wind, LLC, and Revolution Wind, LLC, which are available online at https://www.epa.gov/caa-permitting/epa-issued-caa-permits-region-1.

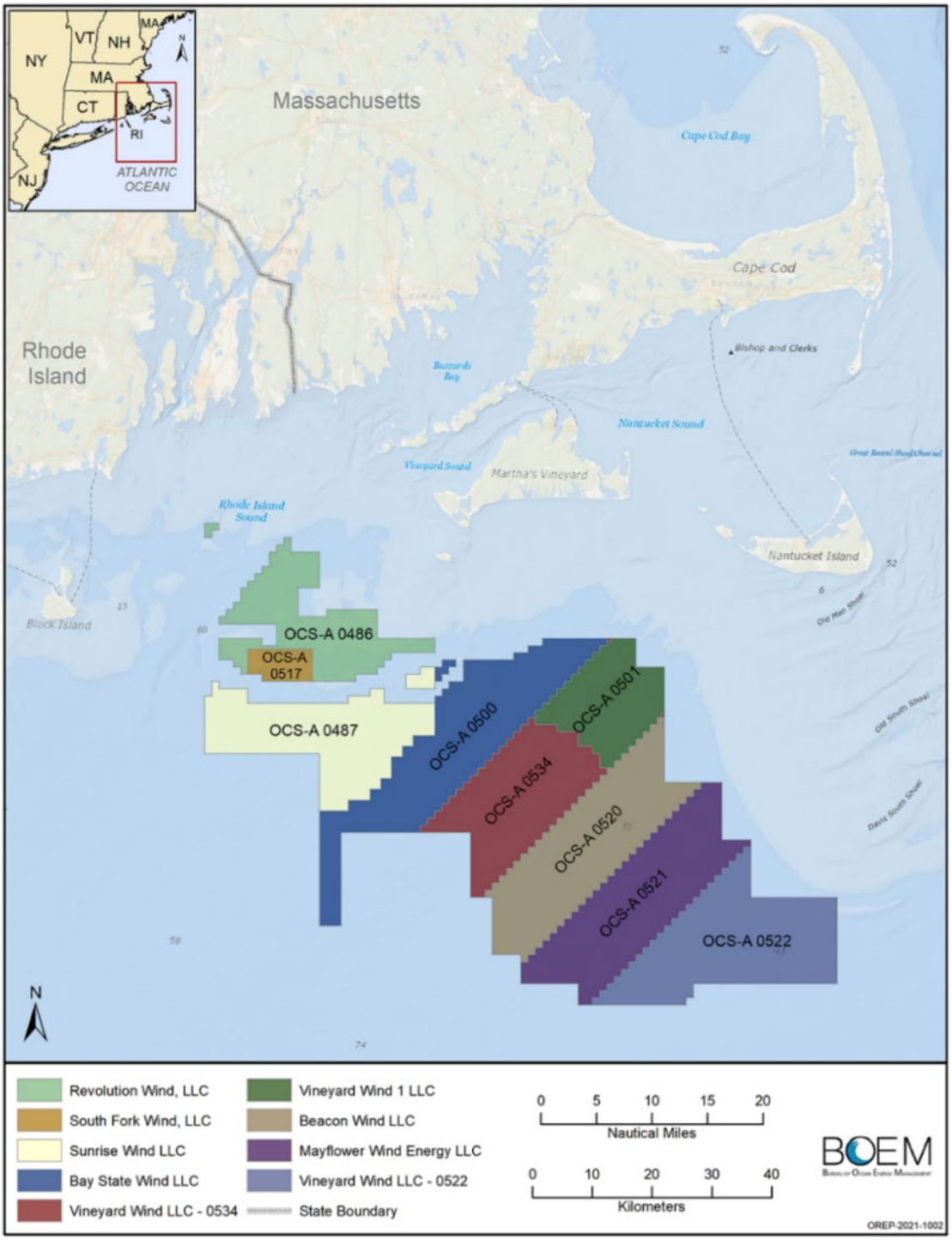

Figure 2: Map of Massachusetts/Rhode Island OCS Lease Area, SouthCoast Wind Energy, LLC (formerly Mayflower Wind Energy).

SouthCoast Wind Energy, LLC is located within Lease Area No. OCS-A-0521. Currently, the only adjacent lease areas to SCW are OCS-A-0520 and OCS-A-0522, which are unpermitted. *See* Figure 2. Therefore, SCW is not located on property contiguous or adjacent to another facility

and no further analysis is necessary. Based on this, EPA has determined that SCW is a new major stationary source under the NSR and Title V permit programs.

The potential emissions of the single stationary source is used to determine applicability of the relevant permit program requirements under 40 C.F.R. part 55. Part 55.2 defines potential emissions as follows:

> *Potential emissions* means the maximum emissions of a pollutant from an OCS source operating at its design capacity. Any physical or operational limitation on the capacity of a source to emit a pollutant, including air pollution control equipment and restrictions on hours of operation or on the type or amount of material combusted, stored, or processed, shall be treated as a limit on the design capacity of the source if the limitation is federally enforceable. Pursuant to section 328 of the Act, emissions from vessels servicing or associated with an OCS source shall be considered direct emissions from such a source while at the source, and while enroute to or from the source when within 25 miles of the source and shall be included in the "potential to emit" for an OCS source. This definition does not alter or affect the use of this term for any other purposes under § 55.13 or § 55.14 of this part, except that vessel emissions must be included in the "potential to emit" as used in §§ 55.13 and 55.14 of this part.

Once the facility meets the definition of an OCS source, emissions from vessels servicing or associated with any part of the facility are included in the OCS source's potential emissions while at the source and when traveling to and from any part of the OCS source when within 25 NM of the source's centroid. Although emissions from vessels servicing or associated with the OCS source contribute to the total potential emissions within 25 NM of the source's centroid, they are not regulated as part of the OCS source in the draft permit unless that vessel is meeting the criteria of the definition of an OCS source and the propulsion engine would be used to supply power for purposes of performing a given stationary source function (e.g., to lift, support, and orient the components of each WTG during installation). However, these emissions from vessels within 25 NM of the source's centroid are included when making the following determinations regarding the equipment and activities that are OCS sources:

1. Applicability of CAA programs and COA requirements, including NNSR and PSD Permitting;
2. When calculating the number of NO_X and VOC offsets required due to emissions during operation; and
3. When determining the impact of emissions on ambient air and Class I and Class II areas.

Jack-up vessels, support vessels, or other vessels may contain emissions equipment that would otherwise meet the definition of "nonroad engine," as defined in section 216(10) of the CAA. However, based on the specific requirements of CAA section 328, emissions from these otherwise nonroad engines on subject vessels are considered direct emissions from the OCS source they are associated with for the purposes of calculating potential emissions of that OCS source. Similarly, all engines on vessels that meet the definition of an OCS source and are

"operating as OCS sources," are regulated as stationary sources and are subject to the applicable requirements of 40 C.F.R. part 55, including control technology requirements.

E. Inner vs. Outer OCS Requirements

Regulations developed pursuant to the OCS statutory requirements under section 328 of the CAA are codified at 40 C.F.R. part 55. Under part 55, the air pollution control requirements that apply to an OCS source differ based on whether the source is located within 25 NM of the state seaward boundary (SSB) or beyond 25 NM of the SSB. *See* 40 C.F.R. 55.3(b) and (c). OCS sources located within 25 NM of the SSB (i.e., in the inner OCS) are subject to the federal requirements set forth in 40 CFR part 55, including section 55.13, and the Federal, State, and local requirements of the COA set forth in section 55.14. OCS sources located beyond 25 NM of the SSB (i.e., in the outer OCS) are subject only to federal requirements set forth in 40 C.F.R. part 55 at section 55.13.

Because one portion of the SCW project will be located in the inner OCS while another portion of the SCW project will be located in the outer OCS, the portion of the project located in the inner OCS is subject to both federal and COA requirements, while the portion of the project located in the outer OCS is subject only to federal requirements.

SCW Inner OCS Requirements

Under 40 C.F.R. part 55, OCS sources located within 25 NM of a SSB (i.e., in the inner OCS) are subject to the same requirements as stationary sources located onshore in the COA, which in this case is Massachusetts. Massachusetts is in the Ozone Transport Region (OTR) and, as such, is treated as a moderate Nonattainment area for ozone. As shown in Figure 3 below, a portion of the SCW project lease area is within 25 NM of Massachusetts's SSB and, thus, is subject to NNSR and PSD requirements that apply to onshore stationary sources in Massachusetts. Therefore, offsets for NOx and VOC (ozone precursors) will be required for operational emissions within the inner OCS. Figure 3 shows the 41 out of 149 WTG and OSP locations that fall within the inner OCS.

SCW Outer OCS Requirements

The portion of the SCW project lease area that is located beyond 25 NM from the Massachusetts's SSB (i.e., in the outer OCS) is subject to only federal requirements identified in 40 C.F.R. part 55, including § 55.13.

EPA has evaluated the applicability of all permitting programs in both the inner and outer OCS, including those of the COA (for portions of a project located in the inner OCS), based on the total PTE of the source.

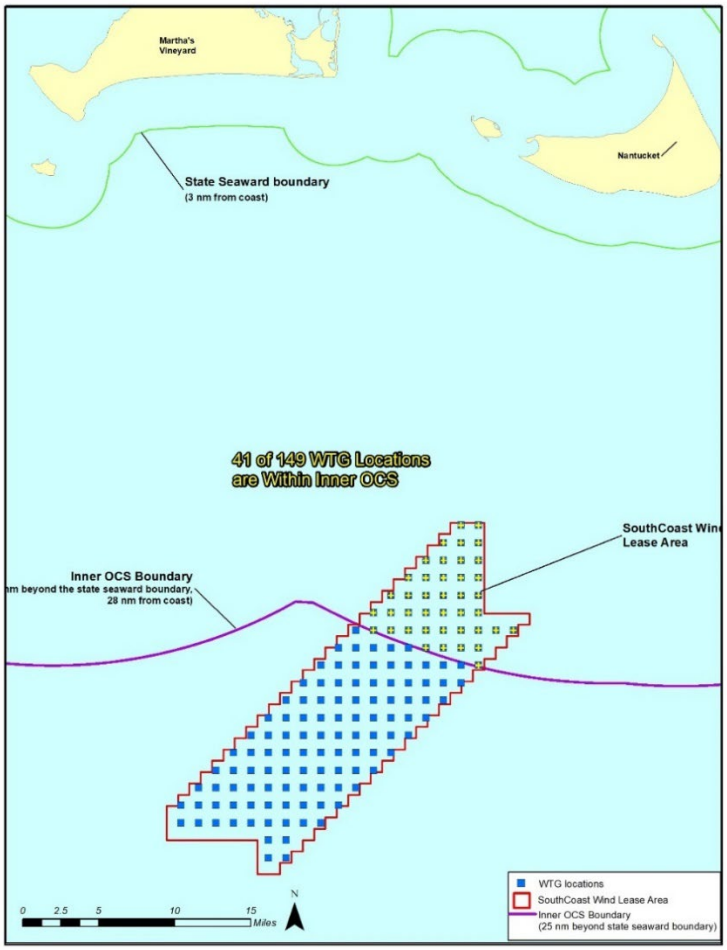

Figure 2: Map of the SCW inner and outer OCS Wind Lease Area

F. Wind Turbine Generators and Offshore Converter Station

As described below, WTGs and OSP(s) will be installed on the seabed within the wind development area.[25]

The OCS Facility is made up of many WTGs spread out over a wide area of the ocean. Each WTG is firmly fixed to a foundation piece on the seafloor, with a tower that extends up into the air where the blades can make use of higher wind speeds. Each WTG sends its power through cables down the tower and under the seabed to an offshore substation (i.e., an OSP). The OSP is an offshore platform containing the electrical components necessary to collect the power generated by the WTGs (via the inter-array cable), transform it to direct current at a higher voltage and transmit this power to onshore electricity infrastructure (via the export cables). The purpose of the conversion to direct current is to reduce the potential electrical losses and maximize the transmission of electricity onshore.

[25] See Figure 1, depicted as the Wind Lease Area.

As mentioned earlier, the SCW project will consist of up to 147 WTGs and 2 OSPs. The WTGs and OSPs will be oriented in an east-west, north-south grid pattern with one NM spacing between positions and will be supported by monopile, piled jacket or suction-bucket jacket foundations. The general process for installation of the windfarm involves the installation of the foundations to the sea floor and preparation of the structures for the WTGs and the OSP. Work vessels supply all the WTG components and install them on the foundations.

1. Generator Engines

According to SCW's permit application, a pile driving hammer will be used during foundation installation. The Project will also include air compressor engines as part of an offshore noise abatement system during pile driving.

During the commissioning of the WTGs, power will be provided by sixty (60) 150-kW temporary generators that will run continuously for up to 40 days each. These temporary generators will be removed once commissioning is complete. SCW is requesting in its permit application approval for the ability to construct and operate generator engines for use on the WTGs.

SCW plans to construct and operate two OSP(s) to support the Project's maximum production design capacity. One 2 million volt-amp (MVA) generator (operating at 1400 kW) will run continuously for up to 6 months on the OSP(s) during the commissioning phase. This temporary generator will be removed once commissioning is complete.

During operations and maintenance, each OSP will include one permanently installed 1680 kW back-up generator. The back-up generators will remain on the OSP(s) for emergency use and for infrequent use to provide power during maintenance activities in the operations phase. The back-up generators will be routinely operated for testing purposes for approximately 4 hours per month, although operation of up to 500 hours per year has been assumed for purposes of potential emissions. The back-up generators are separate from the generators that will be used during the commissioning of the OSPs.

The generator engine emissions on the OSP(s) and the WTG(s) are subject to the OCS air permit and regulated as a stationary source.

2. Gas-Insulated Switchgear (GIS)

Sulfur hexafluoride (SF_6) is used as an electrical and thermal insulating gas in electrical equipment, specifically used in the switchgears located in the bases of the WTGs and OSPs. SF_6 is a greenhouse gas (GHG), having a global warming potential (GWP) of 23,500 times that of carbon dioxide (CO_2). SF_6 has the highest GWP of all greenhouse gases addressed by the Intergovernmental Panel on Climate Change (IPCC) inventory protocols.

G. Vessels

According to the Permittee's application, offshore construction for the windfarm is anticipated to be completed in the following general sequence:[26]

1. Foundation and Scour Protection Installation
2. Offshore Cable Installation
3. OSP Installation and Commissioning
4. WTG Installation and Commissioning

Construction of the Project will require the use of an array of vessels. During construction, heavy lift vessels, tugboats, barges, platform supply vessels, and jack-up vessels will be used to transport the WTG, monopile, and OSP components to the lease area. Installation of the WTGs, monopiles, and OSPs is expected to be performed using a combination of jack-up vessels, dynamic positioning system (DPS) crane vessels and semi-submersible vessels. It is anticipated that scour protection will be installed around the WTG and OSP foundations using a specialized rock-dumping vessel. Crew transfer vessels (CTVs) and Service operation vessels (SOVs) will be used to support the installation of the windfarm components. To reduce noise impacts from the construction, pile driving will be accompanied by noise mitigation measures, likely in the form of a bubble curtain, that would utilize air compressor engines.

CTVs and helicopters are expected to be used to transport personnel to and from the WDA. Additional geophysical survey work will be conducted to ensure adequate understanding of seabed conditions around the offshore cable system and scour protection, which will require the use of survey vessels.

WTG installation will be followed by the commissioning period where the WTGs will be prepared for operation and energized. The WTG commissioning and testing phase will be conducted in parallel with the WTG installation phase.[27] SOVs or CTVs may be used to transport crew to and from the WTGs during commissioning activities.

Once operational, the applicant expects to use SOVs to execute daily O&M activities. Typically, an SOV is equipped with DPS, a large open deck, appropriate lifting and winch capacity and workspace for O&M workers. The SOV would remain offshore for several days/weeks at a time. Workers would then access the WTGs and OSPs to perform routine O&M activities via a gangway directly from the SOV, a CTV, and/or a smaller daughter craft that resides on the SOV. Daughter craft and/or CTVs would be used to transfer crew to and from shore.

Although less likely, if an SOV or similar accommodation vessel is not used, several CTVs and helicopters would be used to frequently transport crew to and from the WDA for inspections, routine maintenance, and minor repairs. CTVs are purpose-built to support offshore wind energy projects and are designed to transport personnel, parts, and equipment safely and quickly.

[26] More detailed information on the construction process can be found in permit application, which is accessible in the permit docket for this action.

[27] The definition of 'commissioning' is not standardized but covers the activities after a given wind turbine has been constructed but before it begins to produce commercial power. Commissioning tests will usually involve standard electrical tests for the electrical infrastructure as well as the turbine, and inspection of routine civil engineering quality records. *See* https://www.wind-energy-the-facts.org/commissioning-operation-and-maintenance.html

In addition, other larger support vessels (e.g., jack-up vessels) may be used infrequently during O&M to perform some routine maintenance activities, periodic corrective maintenance, and significant repairs.

SCW described the following vessels with air pollutant emitting equipment in the permit application.

Table 3: Description of Vessels and Equipment for WTG and OSP Installation Activities included in the Potential to Emit

Vessel Type	Description of Vessel Type
Anchor handling tug supply vessels	General support during offshore export cable installation and maintenance.
Cable (laying) installation vessels	Lay and bury export and inter-array cables in the seafloor.
Crew transfer/service vessels	Transport crew and equipment to/from the Project site.
Dredging vessels	Used in certain areas prior to cable laying to remove the upper portions of sand waves.
Heavy lift crane vessels	Lift, support, and orient substructures during installation. Lift, support, and orient the components of WTGs and OSPs during installation. Can also be used for major repairs during O&M.
Heavy transport vessels	Transport WTG and OSP components from overseas to the construction or operations staging area.
Jack-up vessels	Extends legs to the sea floor to lift vessel out of the water for stability during transfer/installation/major replacement of foundation and/or WTG components, vessel type could also be used for accommodation vessel.
Multi-purpose support vessels	Clear the seabed floor of debris prior to laying export and inter-array cables general support. Install bubble curtains for noise mitigation. General support during various construction and O&M activities.
Scour protection installation vessels	Deposit a layer of stone around the WTG substructures to prevent the removal of sediment by hydrodynamic forces. Also used in scour protection repair during O&M.
Survey vessels	Used to perform site characterization surveys and pre/post installation and operational inspections and surveys.
Tugboats	Transport equipment and barges to the Lease Area, if required. General support during various construction and O&M activities.
Pile driving hammer	Drives the monopile foundations and pin piles for the WTGs and OSPs into the seafloor.
Air compressors	Supply compressed air to noise mitigation devices.
Temporary diesel generators	Temporarily supply power to a WTG prior to the WTG commissioning into the integrated power system to the OSPs and grid. Supply power to the temporary vessel equipment, if needed. Periodic testing of back-up power during O&M.

Vessel Type	Description of Vessel Type
Back-up generators	Generator on each OSP to be used in the event of a power outage. Only routinely operated for monthly testing.
Helicopters and Airplanes	Transport crew and equipment to the Lease Area. Emergency support. Will be used sparingly.

Some of the vessels used as part of the construction and O&M activities listed above may not meet the definition of an OCS source. CAA Section 328 defines an OCS source as "any equipment, activity, or facility which: (1) emits or has the potential to emit any air pollutant; (2) is regulated or authorized under the Outer Continental Shelf Lands Act (OCSLA) (43 U.S.C. § 1331 et seq.); and (3) is located on the OCS or in or on waters above the OCS." 42 U.S.C. § 7627(a)(4)(C). Such activities "include, but are not limited to, platform and drill ship exploration, construction, development, production, processing, and transportation." *Id.* The OCS regulations, at 40 C.F.R. § 55.2, define an OCS source by first incorporating the statutory language referenced previously and then adding that vessels are considered OCS sources only when they meet either of the following criteria: (1) the vessel is "[p]ermanently or temporarily attached to the seabed and erected thereon and used for the purpose of exploring, developing or producing resources therefrom, within the meaning of section 4(a)(1) of OCSLA (43 U.S.C. § 1331 et seq.);"[28] or (2) the vessel is "[p]hysically attached to an OCS source, in which case only the stationary source aspects of the vessels will be regulated." Thus, for a vessel to be considered an OCS source, it must meet the three statutory criteria of the OCS source definition and one of the two additional criteria in the portion of the regulatory OCS source definition that specifically applies to vessels.

Since all OCS sources are stationary, the EPA considers engines on a vessel to be stationary sources when the engines are operating while the vessel meets the definition of an OCS source.

Moreover, the regulatory definition of OCS source in 40 C.F.R. § 55.2 provides that, for vessels physically attached to an OCS facility, "only the stationary sources [sic] aspects of the vessels will be regulated." For these types of OCS source-vessels, the "stationary source aspects" of the vessel attached to an OCS source are regulated by the permit. In other words, the engines on the vessels will be subject to specific permit conditions, and their operation's emissions when at an OCS source *and its* to-and-fro vessels emissions within 25 NM of the source's centroid will count as direct emissions from the OCS source for determining the PTE of the source. If emissions from engines that comprise the emission units on the vessels were excluded from regulation as stationary sources, Congress's specific grant of authority to EPA in the 1990 CAA amendments to regulate OCS sources would be rendered meaningless. Given that an engine is a stationary source when located on an OCS source for purposes

[28] 40 C.F.R. § 55.2 references section (4)(a)(1) of OCSLA, which states in relevant part that laws of the United States are "extended to the subsoil and seabed of the outer Continental Shelf and to all artificial islands, and all installations and other devices permanently or temporarily attached to the seabed, which may be erected thereon for the purpose of exploring for, developing, or producing resources, including non-mineral energy resources, therefrom." 43 U.S.C. § 1333(a)(1).

of Section 111 of the CAA[29], it is only logical to determine that these same engines are stationary sources for purposes of other CAA programs, including the PSD permit program.

The following subsections describe important categories of vessels in the construction and operations of windfarms and how these vessels' operations relate to the definition of an OCS source since, for OCS sources, the stationary source aspects of those vessels will be subject to permitting requirements.

1. Jack-up vessels or jack-up barges

A jack-up vessel meets the definition of an OCS source because it will be performing an activity (i.e., constructing a WTG or an OSP) that meets all of the following criteria:

a) The diesel-fired or gasoline-fired generating sets on the vessel will emit air pollutants.
b) BOEM will approve, disapprove, or approve with modifications a construction and operation plan that allows the jack-up vessel to construct the WTGs and OSP(s) thus demonstrating the windfarm is authorized under the OCSLA (43 U.S.C. § 1331 *et seq.*); and
c) The jack-up vessel will be located on the OCS or in or on waters above the OCS.

Since the jack-up vessel is a vessel, it must meet one of the two criteria for a vessel to be considered an OCS source and thus be included as part of the OCS source that is covered in this permit. The EPA considers a jack-up vessel to meet the definition of an OCS source once three of the jack-up vessel's legs have attached to the seafloor, because the jack-up unit has become stationary at this point and is no longer operating as a vessel or a barge. Once that occurs, the jack-up vessel is "erected" on the seabed since the vessel will not be using its engines to maneuver itself at that time and it is in a position according to a plan to conduct OCS activities, i.e., to participate in the exploration, production, or development of resources from the seabed.

From that point forward, the jack-up vessel's activity and emissions equipment involve developing or producing resources from the seabed by erecting a WTG on the seabed that will convert wind energy into electricity or an OSP to convey this electricity to shore. Once a jack-up vessel becomes an OCS source, all emission units on the jack-up vessel (including the construction equipment) are subject to the applicable terms and conditions of the permit. At the conclusion of the jack-up vessel's construction activities at a given location in the WDA, the construction equipment ceases to operate, and the jack-up legs are raised from the seafloor. The jack-up vessel's stationary source activities thereon remain regulated as part of the OCS source, and subject to the terms and conditions of the

[29] CAA section 328(a)(4)(D) defines the term "new OCS source" to mean "an OCS source which is a new source within the meaning of section [111(a)] of [the CAA]." Inherent in the definition of "new source" under Section 111 is that the source to be regulated is a stationary source. *See* Section 111(a)(2) of the CAA.

permit, until the point in time when fewer than three jack-up legs are attached to the seafloor[30,31]. Once the jack-up vessel is no longer attached to the seabed and no longer erected thereon for the purpose of exploration, production, or development of resources from the seabed, it returns to its status as a vessel and is no longer subject to the stationary source requirements of part 55. However, the jack-up barge and its associated emission units are still always included in the potential emissions calculations for the Project when such vessel is within 25 NM of the source's centroid. The jack-up vessel is only subject to the specific emissions limits during the time it meets the definition of an OCS source (is attached to the seabed, erected thereon, and used for the purpose of producing, exploring, or developing resources from the seabed) and thus is regulated as a stationary source under part 55.

2. Cable-laying vessels

According to the application, the offshore cable-laying vessel (CLV) will move along the pre-determined route within the established corridor towards the OSP. Cable laying and burial may occur simultaneously using a lay and bury tool, or the cable may be laid on the seabed and then trenched post-lay. Alternatively, a trench may be pre-cut prior to cable installation.

[30] See Vineyard Wind 1 Fact Sheet (pdf): pg 20-23 (2019-06-28) which can be located at https://www.epa.gov/caa-permitting/outer-continental-shelf-wind-energy-database and page 12 of EPA's Response to Comments on the Cape Wind Energy Project, available at https://www.epa.gov/sites/default/files/2015-08/documents/cape-wind-final-response2comments-2011jan7.pdf.

[31] The Environmental Appeals Board (EAB) has issued decisions interpreting the OCS source definitions in CAA Section 328 and the 40 C.F.R. part 55 regulations that may provide guidance when determining if a vessel meets the definition of an OCS source. In one decision, the EAB recognized that "attachment" for purposes of being an OCS source is not ordinarily "so broad" to mean "any physical connection." In re Shell Gulf of Mex., Inc., 15 E.A.D. 193, 199 (E.A.B. 2011) ("Shell 2011"). However, in another case, the EAB affirmed EPA Region 10's determination that a drill ship satisfies the requirement of being "attached to" the seabed when one of its anchors is deployed. In re Shell Gulf of Mex., Inc., 15 E.A.D. 470, 488 (E.A.B. 2012) ("Shell 2012"). Therefore, vessels operating in the WDA that deploy an anchor that connects to the seabed are similarly attached to the seabed and may be an OCS source if the vessel or other equipment also meet the two other criteria in the definition of "OCS source" contained in 40 C.F.R. part 55 and CAA section 328. In Shell 2011, EPA Region 10 determined an icebreaker vessel is not "attached" to a drill ship when the icebreaker is setting or receiving the drill ship's anchors. Shell 2011 at 194. In making this determination, EPA Region 10 defined the purpose of "attachment" as to "prevent or minimize relative movement" between the vessel and the seabed. Id. at 199. Region 10 determined that the icebreaker is not "attached" to the drill ship sufficient to constitute being an OCS source because the icebreaker's anchor cable is "repeatedly connected and disconnected" from one of the drill ship's anchors and is "not intended in any way to restrict the location of" the icebreaker. Id. at 200. In finding Region 10's definition of "attachment" to be reasonable, the EAB also noted the anchor cable is "played out" as the icebreaker travels away from the drill ship, meaning the anchor cable is not intended to restrict the location of the icebreaker. Id. The EAB compared the intermittent connection of the icebreaker vessel to the drill ship to a vessel at dockside, noting that "attachment" in the context of an OCS source is more like the latter. Id. at 200. In the Shell 2012 EAB decision, the EAB found reasonable EPA Region 10's definition of "erected thereon" as "intended to reflect the process by which a vessel becomes attached to the seabed and used thereafter for the purpose of exploring, developing, or producing resources from the seabed." Shell 2012 at 491. EPA supported this definition by looking to the customary meaning of the verb "to erect," which is defined as "to construct" or "to build," and thus reasoned that attachment to the seabed must occur "at the location where OCS activity is reasonably expected to occur." Id. The phrase "erected thereon" for the purposes of an OCS source definition requires a secure, stationary activity. For example, when a drillship is "erected" on the seabed, it remains stationary while it conducts its OCS activity, and is at the location where the OCS activity (e.g., exploratory drilling) is expected to occur.

EPA has previously determined that cable-laying vessels that utilize pull-ahead anchors or DPS are not erected on the seabed for the purpose of exploring for, developing, or producing resources therefrom are not considered part of the OCS source.[32] The emissions from these vessels are, however, included in the PTE of the OCS source when located at or traveling within 25 NM of the source's centroid.[33]

3. Crew transfer vessels

At least one CTV will be needed daily during both the construction and operational phases. During the O&M phase, typically only crew transfer vessels and/or support vessels/inflatable boats will be used, unless a major repair is needed. For major repairs to heavy components, jack-up or crane barges may be required. CTVs will be subject to permit requirements when they meet the definition of an OCS source.

4. Support and other vessels

In addition to jack-up vessels, other types of vessels may meet the definition of an OCS source at some point during the construction or operations phase of the Project.

These vessels may meet the definition of an OCS source if they will be performing an activity (i.e., supporting the construction or operations of a WTG or OSP) that meets all three of the following criteria:

1. The gasoline or diesel-powered engines on the vessels will emit air pollutants.
2. BOEM will approve, disapprove, or approve with modifications a construction and operation plan that allows vessels to support the construction of the WTGs and OSP(s) and authorizes a right-of-way for the cable, thus demonstrating the windfarm is authorized under the OCSLA (43 U.S.C. § 1331 *et seq.*); and
3. The vessels will be operating on the OCS or in waters above the OCS.

As stated earlier in this section, the definition of an OCS source in 40 C.F.R. part 55 has further criteria that must be met before a vessel can be considered an OCS source. Servicing fleet vessels used in the windfarm may temporarily attach to a structure that is part of the OCS source, another vessel that meets the definition of an OCS source, or to the seabed itself and be erected thereon (the seabed) and used for the purpose of exploring, developing, or producing resources therefrom. The criteria within the definition of an OCS source for when a vessel becomes an OCS source depends on how a vessel is, in essence, remaining stationary on the OCS (i.e., how it attaches itself to an existing OCS facility or to

[32] *See* EPA's June 24, 2021, Fact Sheet and January 18, 2022, Response to Comments for the South Fork Wind, LLC's OCS air permit, *available at* https://www.epa.gov/caa-permitting/south-fork-wind-llcs-south-fork-windfarm-outer-continental-shelf-air-permit.

[33] As explained previously, "OCS Facility," means the entire wind development area once the first OCS source is established in the wind development area. The first OCS source is established once any equipment or activity that meets the definition of an OCS source is located within the wind development area. EPA has included this term in the permit, "OCS Facility" to differentiate from the term "OCS source" when that term is used in the permit to refer to individual pieces of equipment or vessels that meet the definition of "OCS source".

the seabed) and, in the case of attachment to the seabed, whether the vessel is also erected thereon and used for the purpose of exploring, developing, or producing resources therefrom. For service fleet vessels attached to an OCS facility, only the stationary source activity occurring on the vessel will be regulated by permit conditions. The EPA has determined that all air emission units on a service fleet vessel, while that vessel meets the definition of an OCS source, constitute a stationary source activity because the vessel will be stationary and the reason for the vessel to be on the waters above the OCS is to assist in the construction of a stationary source, i.e., a WTG or an OSP.

For service fleet vessels that do not attach to an OCS facility, but temporarily or permanently attach to the seabed, the service fleet vessel will be considered an OCS source when it is erected on the seabed and is used for the purpose of exploring, developing, or producing resources from the seabed.[34] Like the jack-up vessels, the criteria "erected thereon" is met when in the WDA the service fleet vessel attaches itself to the seabed and is in a location where it can reasonably be expected to conduct OCS activities; thus becoming stationary and used thereafter for the purpose of exploring, developing, or producing resources from the seabed like constructing a WTG or an OSP. From that point forward, the service fleet vessel's operations and emissions are related to developing or producing resources from the seabed by erecting a WTG or the OSP on the seabed that will convert wind energy into electricity.

[34] Per Section 328 of the CAA, emissions from any vessel servicing or associated with an OCS source, including emissions while at the OCS source or en route to or from the OCS source within 25 miles of the OCS source, shall be considered direct emissions from the OCS source. Therefore, emission from the service fleet vessel are still subject to the permit's NNSR offset requirements during the operational phase of the project and once the service fleet vessel is no longer meeting the criteria for an OCS source.

IV. Prevention of Significant Deterioration

As discussed above, the EPA must determine whether PSD regulations apply to the SCW project based on the regulations that determine the applicability of this CAA permitting program. PSD permitting requirements apply to the pollutants subject to a NAAQS for which an area is classified as attainment or unclassifiable, and to other pollutants regulated under the CAA. This program does not apply to hazardous air pollutants, or pollutants for which an area is classified as nonattainment with the NAAQS.[35]

A. Major Source Applicability

The PSD program, as set forth in 40 C.F.R. § 52.21 ("PSD regulations"), is incorporated by reference into the OCS Air Regulations at 40 C.F.R. § 55.13(d)(1) for OCS sources located within 25 NM of a state's seaward boundary if the requirements of 40 C.F.R. § 52.21 are in effect in the COA. The EPA has determined that the requirements of sections 160 through 165 of the Clean Air Act (the authority for the PSD program) are not met in Massachusetts law or regulations; therefore, the provisions of 40 C.F.R. § 52.21, except paragraph (a)(1)[36], are incorporated and made a part of the applicable state implementation plan for the Commonwealth of Massachusetts. *See* 40 C.F.R. § 52.1165. Therefore, the provisions within 40 C.F.R. § 52.21 are in effect in the COA.[37]

The PSD program applies to the construction of any new major sources of criteria pollutants or major modifications to existing sources in an area designated as being in attainment with, or unclassifiable with, the ambient air quality standards in relation to pollutants. A source is major for PSD purposes if it has the potential to emit a "regulated NSR pollutants"[38] in amounts equal or greater to the specified major source threshold (100 or 250 tons per year)[39] and is "subject to regulation."[40] A proposed new major source is required to conduct PSD permitting for each pollutant that will be emitted from the source in significant amounts.[41] Once a source is classified as major for one regulated NSR pollutant, it may have several additional pollutants subject to PSD permitting if those pollutants exceed the associated significant emission rate (SER). Also note that regulated NSR pollutants (and their precursors) for which an area is in nonattainment are not subject to PSD review even if the project emission increase and net emission increase is significant. Instead, they are subject to major NNSR permitting.

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[35] 40 C.F.R. 52.21(b)(50)(iv); 40 C.F.R. 52.21(i)(2).

[36] Paragraph (a)(1) contains the requirements for when a PSD program is disapproved. In this case, MA (COA) has been delegated the federal PSD program, therefore it is unnecessary for EPA to incorporate the provisions of paragraph (a)(1).

[37] The Commonwealth of Massachusetts has taken delegation of EPA's PSD permitting program at 40 C.F.R. § 52.21 by virtue of an agreement for delegation signed by then-Regional Administrator Curtis Spalding on April 11, 2011. See https://www.epa.gov/sites/default/files/2015-08/documents/epa-massdep-psd-delegation-agreement.pdf

[38] 40 C.F.R. § 52.21(b)(50);

[39] 100 TPY for the 28 sources categories "named in 40 C.F.R. § 52.21(b)(1)(i)(a); Any other stationary source, i.e., one that is not on a list of named source categories, is also considered a major stationary source if it emits or has a PTE of 250 TPY.

[40] As defined in 40 C.F.R. § 52.21(b)(49);

[41] As defined in 40 C.F.R. § 52.21(b)(23).

Since the facility is considered "new," its emissions increase from the project must be evaluated for PSD applicability based on exceedances to the applicable major source threshold levels. The windfarm does not belong to a named source category; therefore, a PTE of 250 TPY of a "regulated NSR pollutant" will be the threshold for determining PSD applicability.

For the portion of SCW that is located in the outer OCS, the only preconstruction permitting requirements that apply are the federal PSD requirements in 40 CFR 52.21. The SCW project does not emit ozone directly, but NOx and VOCs, which are precursors to ozone formation, are considered in the PSD review process for portions of the Project located in the outer OCS, as Massachusetts' NNSR program for ozone would not extend to the outer OCS. Under PSD, if a source is major for either NOx or VOCs, it is treated as a major source for ozone.

1. Emission Increase Calculation (Potential to Emit)

Since SCW involves the construction of new emission units, the procedures outlined in 40 C.F.R. 52.21 (a)(2)(iv)(d) for assessing whether a significant emissions increase has occurred are used. For a new emission unit, the baseline actual emissions (BAE) shall equal zero; and thereafter, for all other purposes, the significant emissions will end up equaling the unit's PTE. The emissions increase from this project are calculated on a pollutant-by-pollutant basis for each regulated NSR pollutant.

For assessing the emission increases from the SCW project, emissions from the equipment or activities considered an OCS source and all emissions from vessels servicing or associated with an OCS source while at the source and while enroute to or from the source when within 25 NM of the source's centroid, are included. This includes emissions from vessels, regardless of whether the vessel itself meets the definition of an OCS source, when the vessels are at or going to or from an OCS source and are traveling within 25 NM of the source's centroid. Thus, emissions from vessels servicing or associated with an OCS source that are within 25 NM of the source's centroid are considered in determining the PTE or "potential emissions" of the OCS source for purposes of applying the PSD regulations.

As shown in Table 4, the Project is a new major PSD major source because emissions for at least one "regulated NSR pollutant" (i.e., NO_2 measured as NO_x and CO) exceed the major source applicability threshold of 250 TPY. For major PSD sources, once a "regulated NSR pollutant" is emitted at levels at or above the major source applicability threshold other "regulated NSR pollutant[s]" that are emitted at levels above the significant emission rate thresholds are subject to review. The emissions increase from this project are calculated on a pollutant-by-pollutant basis for each regulated NSR pollutant.

Table 4: Worst Case Annual Construction Emissions Compared with PSD Major Source Thresholds

NSR Regulated Pollutant	Potential to Emit (TPY)	PSD Major Source Threshold (TPY)	PSD Triggered? (Y/N)
NO_x (1)	4,214	250	**Y**
CO	702	250	**Y**

(1) Nitrogen dioxide (NO2) is the compound regulated as a criteria pollutant under PSD; however, for applicability purposes significant emissions rate is based on the sum of all oxides of nitrogen, i.e., NO_X.

As shown in Table 5, a significant emissions increase (per the definition of significant at 40 C.F.R. § 52.21(b)(23)) of at least one regulated NSR pollutant has occurred. The applicant has considered fugitive emissions[42] in the significant emission increase of the SCW Project[43].

Table 5: Significant Emission Increase from the SouthCoast Wind Project

SCW - Project Emission Increase	Regulated NSR Pollutant (TPY)								
	NO_x (2), (3)	**CO**	**PM** (1)	**PM_{10}**	**$PM_{2.5}$**	**SO_2**	**GHG (As CO_2e)**	**VOC** (2)	**Pb**
BAE	0	0	0	0	0	0	0	0	0
PTE	4,214	702	102	102	96	111	331,386	188	0.012
Δ (PTE-BAE)	+4,214	+702	+102(1)	+102	+96	+111	+331,386	+188	+0.012

(1) PM emissions were not submitted as part of the application. Since smaller particles are considered a subset of the larger sized particles, PM_{10} emissions are a subset of the larger PM particles. Therefore, for permitting purposes, PM emissions are assumed to be at least equivalent to PM_{10}, and will be treated as PSD pollutant as PM emissions are above the PM SER as shown in Table 6 below.

(2) NO_x and VOC emissions are considered only for assessing PSD applicability to the outer OCS. For the inner OCS, VOC and NO_x emissions are subject to the NNSR requirements.

(3) Nitrogen dioxide (NO_2) is the compound regulated as a criteria pollutant under PSD; however, for applicability purposes, the significant emissions rate is based on the sum of all oxides of nitrogen, i.e., NO_X.

As shown in Table 4 and Table 5, PSD review is required for NO_2 (measured as NO_x), CO, PM, PM_{10}, $PM_{2.5}$, SO_2, and GHG (as CO_2 equivalents) in all areas of the Project. NO_x and VOC are additionally required for PSD review in the outer OCS as ozone precursors. GHG is subject to regulation if the stationary source is a new major stationary source for a regulated NSR pollutant that is not GHGs and will emit or will have the potential to emit 75,000 TPY CO_2e or more, which is the case for SCW.[44]

Table 6: Worst Case Annual Emissions Compared with PSD SER Thresholds

NSR Regulated Pollutant	Project Emission Increase (TPY)	Significant Emission Rate (TPY)	PSD Triggered? (Y/N)
PM	102	25	**Y**
PM_{10}	102	15	**Y**
$PM_{2.5}$	96	10	**Y**
CO (1)	702	250	**Y**
SO_2	111	40	**Y**
NO_x (1),(2), (3)	4,214	250	**Y**
VOC (2)	188	40	**Y**
GHG (as CO_2e)	331,386	75,000	**Y**
Lead	0.012	0.6	**N**

[42] For purposes of assessing whether a major modification has occurred, exclusion of the fugitives still results the non-fugitive NSR pollutants associated with the project exceeding the respective PSD SER.

[43] See permit application for SCW for fugitive emission sources from the SCW project.

[44] 40 CFR 52.21(b)(49)(iv)(*a*)

(1) SCW project is a new major PSD source for at least one "regulated NSR pollutant" (i.e., NO_2 and CO) because emissions exceeds the major source applicability threshold of 250 TPY.
(2) For the outer OCS, NO_x and VOC emissions are considered only for assessing PSD applicability. For the inner OCS, NO_x and VOC emissions are subject to the NNSR and PSD requirements.
(3) Nitrogen dioxide (NO_2) is the compound regulated as a criteria pollutant under PSD; however, for applicability purposes, the significant emissions rate is based on the sum of all oxides of nitrogen, i.e., NO_X.

2. Emission Netting (Contemporaneous Netting)

SCW is a new major source, and therefore a Step 2 contemporaneous netting analysis is not applicable.

3. Summary

The Project is considered a new major source. Based on the emission levels for the project, as shown in Table 4 and Table 5, NO_x , CO, PM, PM_{10}, $PM_{2.5}$, SO_2, and GHG are the NSR regulated pollutants that will be emitted by SCW in quantities exceeding the respective PSD SER in the inner OCS.

For the portion of the SCW project located in the outer OCS, the PSD permitting requirements that apply are the federal PSD requirements in 40 CFR 52.21. Thus, SCW is required to apply BACT for NO_x, CO, PM, PM_{10}, $PM_{2.5}$, SO_2, VOC, and GHG. The SCW project does not emit ozone directly, however, NOx and VOCs, which are precursors to ozone formation, are considered in the PSD review process. Under PSD, if a source is major for either NO_x or VOCs, it is treated as a major source for ozone. Therefore, the SCW project must apply BACT for NO_x and VOC emissions in the outer OCS. For the portion of the SCW project located in the inner OCS, ozone (and therefore its precursors NO_x and VOC) is subject to NNSR and is therefore not explored further in this section.[45] *See* Section V for details on the applicable NNSR requirements.

B. Best Available Control Technology (BACT)

PSD permits must contain an emissions limitation based on application of the Best Available Control Technology (BACT) for each regulated NSR pollutant emitted in significant amounts. 40 C.F.R. 52.21(j). BACT is defined in the applicable permitting regulations at 40 C.F.R. § 52.21(b)(12), in relevant part, as

> an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each pollutant subject to regulation under the Act which would be emitted from any proposed major stationary source or major modification which the Administrator, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event, shall application of best available control technology result

[45] Nantucket, Massachusetts is the NOA. Massachusetts is part of the Ozone Transport Region (OTR), and areas within the OTR are treated, at a minimum, as moderate Nonattainment areas for ozone, the ozone precursors NO_x and VOC are subject to the state's NNSR program requirements. See Section V.

> in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR part 60, 61, or 63. If the Administrator determines that technological or economic limitations on the application of measurement technology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof, may be prescribed instead to satisfy the requirement for the application of best available control technology.

The CAA contains a similar BACT definition, although the 1990 CAA amendments added "clean fuels" after "fuel cleaning or treatment" in the above definition. *See* CAA § 169(3).

Therefore, the permitting authority must establish a numeric emissions limitation that reflects the maximum degree of reduction achievable for each pollutant subject to BACT through the application of the selected technology or technique. However, if the permitting authority determines that technical or economic limitations on the application of a measurement methodology would make a numerical emission standard infeasible for one or more pollutants, it may establish design, equipment, work practices, or operational standards to satisfy the BACT requirements.

1. Methodology

The EPA's longstanding approach to implementing BACT is to use a "top-down" BACT analysis to demonstrate that the BACT requirement is satisfied for each emission unit that emits a regulated NSR pollutant subject to PSD review. This methodology is outlined in EPA guidance and has been applied in EPA permitting decisions and review of those decisions by the EPA Environmental Appeals Board (EAB).[46, 47]

Step 1 – Identify All Control Technologies

Available control technologies are identified for each emission unit in question. The following methods are used to identify a comprehensive list of potential technologies:

1. Researching the Reasonability Available Control Technology (RACT)/Best Achievable Control Technology (BACT)/Lowest Achievable Emission Rate (LAER) Clearinghouse (RBLC) database;[48]
2. Researching the CARB (California Air Resource Board) and South Coast Air Quality Management District (SCAQMD) database;
3. Surveying air pollution control equipment vendors;
4. Surveying available literature; and

[46] *See* EPA's "Guidance for Determining BACT Under PSD" at https://www.epa.gov/sites/production/files/2015-07/documents/bactupsd.pdf and New Source Review Workshop Manual: Prevention of Significant Deterioration and Nonattainment Area Permitting (draft Oct. 1990) at https://www.epa.gov/sites/production/files/2015-07/documents/1990wman.pdf

[47] *See, e.g.*, *In re: Prairie State Generating Co.*, 13 E.A.D. 1, 12 (EAB 2006).

[48] The RBLC permit database was designed to help permit applicants and reviewers make pollution prevention and control technology decisions for stationary air pollution sources, and includes data submitted by several U.S. territories and all 50 States on over 200 different air pollutants and 1,000 industrial processes. *See* https://cfpub.epa.gov/rblc/index.cfm?action=Search.BasicSearch&lang=en.

5. Reviewing previously issued permits.

Step 2 – Eliminate technically infeasible options.

After the identification of control options, an analysis is conducted to eliminate technically infeasible options. A control option is eliminated from consideration if there are process-specific conditions that prohibit the implementation of the control technology or if the highest control efficiency of the option would result in an emission level that is higher than any applicable regulatory limits.

Step 3 – Rank remaining control technologies.

Once technically infeasible options are removed from consideration, the remaining options are ranked based on their control effectiveness. If there is only one remaining option or if all the remaining technologies could achieve equivalent control efficiencies, ranking based on control efficiency is not needed.

Step 4 – Evaluate most effective controls and document results.

Beginning with the most efficient control option in the ranking, detailed economic, energy, and environmental impact evaluations are performed. If a control option is determined to be economically feasible without adverse energy or environmental impacts, it is not necessary to evaluate the remaining options with lower control efficiencies. The economic evaluation centers on the cost effectiveness of the control option.

Step 5 – Select BACT

In the final step, one pollutant-specific control option is proposed as BACT for each emission unit under review based on evaluations from the previous step.

2. BACT Analysis for the SCW Project

BACT is required for each pollutant which exceeds an applicable PSD significant emissions rate (SER). *See* 40 C.F.R. § 52.21(b)(23), (j). Emissions from the SCW project include NO_x, CO, PM, PM_{10}, $PM_{2.5}$, SO_2, and GHG, all of which are NSR regulated pollutants subject to PSD requirements. For the outer OCS, the SCW project must apply BACT for NO_x, CO, PM, PM_{10}, $PM_{2.5}$, SO_2, VOC, and GHG emissions.

Since the source has been determined to be major, all applicable pollutant emissions at the source, including fugitive, are subject to subsequent NSR review steps (e.g., BACT review and air quality impacts) according to NSR program requirements.

a. Emission Unit Applicability

The SCW project is required to apply BACT to all the emission units proposed as part of the OCS source. The Project's emission sources will primarily be compression-ignition internal combustion engines (CI-

ICE). These include engines on vessels while operating as OCS source(s) and engines on the WTGs and OSPs. Emission units that can be evaluated in a similar way under BACT are separated into emission unit groups (EUG) within the analysis below.

EUG 1 – OCS Generator Engine(s) Installed on the WTG(s) and OSP(s)

Table 7: EUG 1 - OCS Generator Engine(s) Installed on the OSP(s) and/or WTG(s)

EU ID	Description	Type of Equipment	Engine Count	Engine Rating, kW	Hours per Engine[1]
Construction Equipment – Project 1					
SCW-1	OCS Installation & Commissioning	Generator on OSP	1	1400	4320
SCW-2—SCW-61	OCS Installation & Commissioning	Generator on WTG	60	150	960
Construction Equipment – Project 2					
SCW-62	OCS Installation & Commissioning	Generator on OSP	1	1400	4320
SCW-63—SCW-123	OCS Installation & Commissioning	Generator on WTG	60	150	723
Operating Equipment					
SCW-124, 125	Operations & Maintenance	Emergency Generator on OSP	2	1,680	500

[1] Note that this represents the total hours of operation per engine per year.

EUG 2 – Marine Engines on Vessels Operating as OCS Source(s)

A marine vessel typically has two (2) kinds of engines: 1) Propulsion engines, also referred to as main engines, which supply power to move the vessel but could also be used to supply power for purposes of performing a given stationary source function (e.g., to lift, support, and orient the components of each WTG during installation), and 2) Auxiliary engines, which supply power for non-propulsion (e.g., electrical) loads. Note that while vessels servicing or associated with an OCS Facility, when either at the Facility or enroute to or from the OCS Facility (within 25 NM of the source's centroid) are included in the OCS Facility's potential to emit, as required by section 328(a)(4)(C) of the Clean Air Act, no control technology requirements, e.g., BACT, are placed on those vessels unless and until the vessels themselves meet the definition of an OCS source. The permit will impose control technology requirements, on only vessels that meet the definition of an OCS source.[49]

At the time of publication of this fact sheet, the applicant has stated that has not finalized contracts for all of the vessels that are expected to become OCS sources. Therefore, the specific vessels anticipated

[49] Note that the definition of an OCS source includes vessels only when they are: (1) Permanently or temporarily attached to the seabed and erected thereon and used for the purpose of exploring, developing or producing resources therefrom, within the meaning of section 4(a)(1) of OCSLA (43 U.S.C. § 1331 et seq.); or (2) Physically attached to an OCS Facility, in which case only the stationary sources aspects of the vessels will be regulated.

to be utilized in the project are largely unknown. However, the applicant has included the various vessel types associated with each activity and the anticipated engines' horsepower ratings. Vessel availability is constrained by the limited number of vessels capable of conducting the work, the availability of those vessels at a given time, and the limitations imposed by the Jones Act.[50] In addition, the procurement of the vessels, which are indicated to change on short notice, require contracts within short timeframes due to the specific nature of the OCS project. EPA is considering these facts in this top-down BACT analysis.

Table 8: EUG 2 - Marine Engines on Vessels Operating as Potential OCS Source(s)

Vessel Type	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	Potential OCS Source	Contracted
Construction				
Foundation Installation - Pin Pile and Jacket				
Heavy Lift Crane Installation Vessel Type 1	89,600	5,400	**Yes**	No
Heavy Lift Crane Installation Vessel Type 3	34,560	3,020	**Yes**	No
Multipurpose Support Vessel Type 1	671	209	**Yes**	No
Multipurpose Support Vessel Type 2	3,840	2,870	**Yes**	No
Crew Transfer Vessel	2,352	874	**Yes**	No
Tugboat Type 1	5,420	846	**Yes**	No
Tugboat Type 1	5,420	846	**Yes**	No
Tugboat Type 1	5,420	846	**Yes**	No
Tugboat Type 1	5,420	846	**Yes**	No
Inter-Array Cable - Survey/Seafloor Prep, and Cable Lay & Burial				
Crew Transfer Vessel	2,352	874	**Yes**	No

[50] Generally, the Jones Act is a U.S. law that requires vessels that ship merchandise and passengers between two U.S. points to be U.S. built and registered (flagged), as well as owned and crewed by U.S. citizens or residents. *See generally*, Charlie Papavizas, *Jones Act Considerations for the Development of Offshore Windfarms*, 20 BENEDICT'S MAR. BULL. [1] (First Quarter 2022) (available at https://www.winston.com/images/content/2/6/v2/262961/First-Quarter-2022-Benedict-s-Maritime-Bulletin-Papavizas.pdf). 46 U.S.C. § 55102(b), part of the Merchant Marine Act of 1920, also known as the Jones Act, precludes a vessel from providing "any part of the transportation of merchandise by water, or by land and water, between points in the United States to which the coastwise laws apply, either directly or via a foreign port, unless the vessel —(1) is wholly owned by citizens of the United States for purposes of engaging in the coastwise trade; and (2) has been issued a certificate of documentation with a coastwise endorsement under chapter 121 or is exempt from documentation but would otherwise be eligible for such a certificate and endorsement." Also part of the Jones Act, 46 U.S.C. § 55103(a) precludes a vessel from transporting passengers between ports or places in the United States to which the coastwise laws apply, either directly or via a foreign port, unless the vessel--(1) is wholly owned by citizens of the United States for purposes of engaging in the coastwise trade; and (2) has been issued a certificate of documentation with a coastwise endorsement under chapter 121 or is exempt from documentation but would otherwise be eligible for such a certificate and endorsement.

Multipurpose Support Vessel Type 2	3,840	2,870	**Yes**	No
Multipurpose Support Vessel Type 3	7,670	874	**Yes**	No
Offshore Substation Platform Installation & Commissioning				
Crew Transfer Vessel	2,352	874	**Yes**	No
Heavy Lift Transport Vessel Type 1	12,640	11,000	**Yes**	No
DP Accommodation Vessel	21,180	3,020	**Yes**	No
Heavy Lift Crane Installation Vessel Type 1	89,600	5,400	**Yes**	No
Multipurpose Support Vessel Type 1	671	209	**Yes**	No
Multipurpose Support Vessel Type 1	671	209	**Yes**	No
Multipurpose Support Vessel Type 2 (noise mitigation vessel)	3,840	2,870	**Yes**	No
Tugboat Type 1	5,420	846	**Yes**	No
Tugboat Type 1	5,420	846	**Yes**	No
Tugboat Type 1	5,420	846	**Yes**	No
Wind Turbine Generator Installation & Commissioning				
Crew Transfer Vessel	2,352	874	**Yes**	No
Crew Transfer Vessel	2,352	874	**Yes**	No
Crew Transfer Vessel	2,352	874	**Yes**	No
Jack-Up Vessel	18,120	895	**Yes**	No
Multipurpose Support Vessel Type 2	3,840	2,870	**Yes**	No
Multipurpose Support Vessel Type 2	3,840	2,870	**Yes**	No
Service Operations Vessel Type	4,900	6,640	**Yes**	No
Tugboat Type 2	2,908	110	**Yes**	No
Tugboat Type 2	2,908	110	**Yes**	No
Tugboat Type 2	2,908	110	**Yes**	No
Tugboat Type 2	2,908	110	**Yes**	No
Operations				
Daily Inspection				
Service Operations Vessel Type	4,900	6,640	**Yes**	No
Crew Transfer Vessel	2,352	874	**Yes**	No
Major Repair				
Jack-Up Vessel	18,120	895	**Yes**	No

Crew Transfer Vessel	2,352	874	**Yes**	No
Service Operations Vessel Type	4,900	6,640	**Yes**	No
Multipurpose Support Vessel Type 2	3,840	2,870	**Yes**	No
Tugboat Type 2	2,908	110	**Yes**	No
Tugboat Type 2	2,908	110	**Yes**	No

EUG 3 –HV and MV GIS on the OSP

Other units at this facility that are subject to a top-down BACT analysis are the high voltage (HV) GIS (362 kV) and the medium voltage (MV) GIS (66 kV) located on the OSPs because they have the potential to emit SF_6, which is a GHG. The applicant has stated in its permit application that the WTGs, which are equipped with LV switchgears, will not utilize SF_6 and not have any potential emissions. Therefore, only the HV and MV GIS located on the OSPs are required to apply BACT. *See Table 9.*

Table 9: EUG 3 – Medium and High Voltage GIS on the OSPs

EU ID	Description	Type	Count (# GIS)	Name Plate Capacity
HV-GIS	HV GIS (362 kV or higher) on each OSP	SF_6	1 per OSP	7,092 lbs per OSP*
MV-GIS	MV GIS (66 kV) on each OSP	SF_6	2 per OSP	9,253 lbs per OSP*

Note: Based on the best available information, there will be two 66 kV switchgears and one 362 kV switchgear on each OSP.
(*) Name plate capacity provided by the manufacturer guarantee.

Step 1 – Identify All Available Control Technologies

The first step in the top down BACT process is to identify all "available" control options. To satisfy the statutory requirements of BACT, the applicant must focus on technologies that have been demonstrated to achieve the highest levels of control for the pollutant in question, regardless of the source type in which the demonstration has occurred.

EUG 1—OCS Generator Engine(s) Installed on the OSP(s) and WTG(s)

A RACT/BACT/LAER Clearinghouse (RBLC) search was completed for the last 10 years of determinations using the following process types: 1.) 17.110 – Large ICEs (> 500 HP) - Fuel Oil (ASTM #1, 2, includes kerosene, aviation, diesel fuel); 2.) 17.120 – Large ICEs (> 500 hp) other liquid fuel and liquid fuel mixtures. 3.) 17.210 – Small ICEs (< 500 HP) - Fuel Oil (ASTM #1, 2, includes kerosene, aviation, diesel fuel); 4.) 17.220 – Small ICEs (< 500 hp) burning other liquid fuel and liquid fuel mixtures. The resulting determinations were divided into four searches. These results are summarized within the permit application and can be found within the RBLC database after performing a search using the criteria mentioned above. Other BACT options from previously issued OCS wind energy air permit

determinations (South Fork Wind, Vineyard Wind 1, Revolution Wind, Sunrise Wind, New England Wind 1, New England Wind 2, Empire Wind, and Coastal Virginia Offshore Wind) were also considered.

The applicable air pollution control technologies or techniques (including lower-emitting processes and practices) that have the potential for practical application to the emissions unit are listed in the table below.

Table 10: Options of Control Technologies or Techniques for EUG 1

Control Technology	Pollutant(s)	Note(s)
Good Combustion Practices	NO_x, PM, PM_{10}, $PM_{2.5}$, CO, VOC[51] GHG	The RBLC included a requirement for the permittee to develop a GCOP Plan. The plan shall be incorporated into the plant standard operating procedures (SOP) and shall be made available for inspection. The plan was specifically to include, but not be limited to: 1) A list of combustion optimization practices and a means of verifying the practices have occurred. 2) A list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred. 3) A list of the design choices determined to be BACT and verification that designs were implemented in the final construction.
Visible Emissions (Opacity) limit	PM, PM_{10}, $PM_{2.5}$,	On a case-by-case basis, visible emissions may be used as an indicator of good operating practices related to particulate emissions where direct source monitoring is not feasible. Given that many of the OCS sources associated with this project are vessels, traditional source monitoring is challenging. Therefore, visible emissions testing may serve as a more practical approach to support compliance with PM standards.
Most stringent Emissions Standards required under40 C.F.R. part 60 NSPS IIII [1]	NO_x, PM, PM_{10}, $PM_{2.5}$, CO, VOC [52]	Tier 2 and Tier 3 certified engines are designed to incorporate pre-combustion controls such as fuel injection timing, exhaust gas recirculation, and other engine-based technologies to meet emissions standards. In addition to the pre-combustion controls, Tier 4 certified engines may be equipped with an integrated Selective Catalytic Reduction (SCR), Diesel Particulate Filter (DPF), and/or Diesel Oxidation Catalyst (DOC).
Use of Ultra-Low Sulfur Diesel	SO_2, $PM_{2.5}$	SO_2 emissions are proportional to the amount of sulfur in the fuel. The use of ULSD (15 ppm) will reduce condensable PM and SO_2 emissions.

Notes: [1] Per 40 CFR § 60.4201(f)(2)), The Environmental Protection Agency (EPA) recognizes in its NSPS that for some engines (i.e., displacement < 30 L/cylinder) an owner of a stationary source in a marine environment can certify its engine based on the marine engine requirements at 40 CFR part 1042 (including Appendix I) rather than the nonroad engine requirements at 40 CFR part 1039 (including Appendix I). See Section VII.A for more details about the NSPS IIII requirements.

[51] Only applies to the outer OCS.

[52] Only applies to the outer OCS.

EUG 2—Marine Engines on Vessels when operating as an OCS Source(s)

A RBLC search was completed for the last 10 years of determinations. Note that the RBLC only contained permit information from facilities with an air permit for oil production in the eastern Gulf of Mexico since that is the only part of the Gulf where EPA has OCS permitting jurisdiction (RBLC ID: FL 0350, FL 0347, FL 0338, FL 0348). The western and central Gulf of Mexico are under BOEM jurisdiction and are not subject to CAA OCS permitting requirements. EPA also reviewed the previous OCS Permits Determinations issued to South Fork Wind, Vineyard Wind 1, Revolution Wind, Sunrise Wind, New England Wind 1, New England Wind 2, Empire Wind, and Coastal Virginia Offshore Wind.

The applicable air pollution control technologies or techniques (including lower-emitting processes and practices) that have the potential for practical application to the emissions unit are listed in the table below.

Table 11: Options of Control Technologies or Techniques for EUG 2

Control Technology	Pollutant(s)	Note(s)
Good Combustion Practices	NO_x, PM, PM_{10}, $PM_{2.5}$, CO, SO_2, VOC[53] and GHG	The RBLC included a requirement for the permittee to develop a GCOP Plan. The plan shall be incorporated into the plant SOPs and shall be made available for inspection. The plan was specifically to include, but not be limited to 1) a list of combustion optimization practices to minimize emissions of pollutants and a means of verifying the practices have occurred; 2) a list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred; and 3) a list of the design choices determined to be BACT and verification that designs were implemented in the final construction.
Visible Emissions (Opacity) limit	PM, PM_{10}, $PM_{2.5}$,	On a case-by-case basis, visible emissions may be used as an indicator of good operating practices related to particulate emissions where direct source monitoring is not feasible. Given that many of the OCS sources associated with this project are vessels, traditional source monitoring is challenging. Therefore, visible emissions testing may serve as a more practical approach to support compliance with PM standards.
Most Stringent Emission Standards required under 40 C.F.R. part 60 NSPS IIII [1]	NO_x, PM, PM_{10}, $PM_{2.5}$, CO, VOC[54]	Tier 2 and Tier 3 certified engines are designed to incorporate pre-combustion controls such as fuel injection timing, exhaust gas recirculation, and other engine-based technologies to meet emissions

[53] Only applies to the outer OCS.
[54] Only applies to the outer OCS.

Control Technology		Pollutant(s)	Note(s)
Most Stringent Emission Standards at 40 C.F.R. part 1042		NO_x, PM, PM_{10}, $PM_{2.5}$, CO, VOC[55]	standards. In addition to the pre-combustion controls, Tier 4 certified engines may be equipped with an integrated SCR, DPF, and/or DOC.
Add-on air pollution control devices	Selective Catalytic Reduction (SCR)	NO_x	Add-on air pollution control devices. SCR is identified as a potential option for control of NOx emissions from the engines. SCR is a post combustion NOx control that is placed in the exhaust stream. The SCR reduces NOx emissions by injecting ammonia (NH_3) or urea into the exhaust stream.
	Diesel Particulate Filter (DPF)	PM, PM_{10}, $PM_{2.5}$	Add-on air pollution control devices. One or more DPFs or DOCs may be installed (retrofitted) on a Tier 2 or Tier 3 engine to further reduce emissions.
	Diesel Oxidation Catalyst (DOC) or Catalytic Diesel Particular Filter (CDPF)	PM, PM_{10}, $PM_{2.5}$, CO	
	Electrostatic Precipitators	PM, PM_{10}, $PM_{2.5}$	Add-on air pollution control devices. The technology that is the basis of the 2006 NSPS IIII development of the PM standards for non-emergency stationary CI ICE with a displacement of greater than or equal to 30 liters per cylinder. No other feasible technologies were identified for the control of PM from these engines in the development of the standards within NSPS IIII, and an Electrostatic Precipitators was selected as the best demonstrated technology (BDT) for PM for engines with a displacement greater than or equal to 30 liters per cylinder. The technology was deemed available at that time and capable of reducing PM emissions by 60 percent or more from stationary CI ICE.[1]
Use of Ultra-Low Sulfur Diesel (15 ppm) when possible, for Engines with a displacement greater than or equal to 30 L/cylinder		SO_2, $PM_{2.5}$	SO_2 emissions are proportional to the amount of sulfur in the fuel. The use of ULSD (15 ppm) will reduce condensable PM and SO_2 emissions. This also includes prioritizing the use of ULSD in C3 engines in lieu of Emission Control Area (ECA) Marine Fuel (1000 ppm) when possible. [3]
Use of Ultra-Low Sulfur Diesel (15 ppm) for Engines with a displacement less than 30 L/cylinder		SO_2, $PM_{2.5}$	SO_2 emissions are proportional to the amount of sulfur in the fuel. The use of ULSD (15 ppm) will reduce condensable PM and SO_2 emissions.

[1] Per 40 C.F.R. § 60.4201(f)(2)), the EPA recognizes in its NSPS IIII for engines with a displacement less than 30 L/cylinder, an owner of a stationary source in a marine environment can certify its engine based on the marine engine requirements at 40 C.F.R. part 1042 (including appendix I) as a means of demonstrating compliance with NSPS IIII. However, for engines that have a displacement greater than or equal to 30 L/cylinder, subpart IIII does not contain the same compliance provision.

[55] Only applies to the outer OCS.

Specifically, engines that have a displacement greater than or equal to 30 L/cylinder are subject to emission standards for NOx and PM as contained in 40 C.F.R. § 60.4204(c) in Subpart IIII.[56]

[3] Engines with a displacement greater than 30 L/cylinder that are not able to use ULSD meeting the 15-ppm sulfur content limit will use fuel with a sulfur content less than 1,000 ppm in accordance with the MARPOL Annex VI requirements and NSPS Subpart IIII.

EUG 3— HV and MV GIS on the OSP

The applicable air pollution control technologies or techniques (including lower-emitting processes and practices) that have the potential for practical application to EUG 3 include consideration of regulatory requirements since the Massachusetts Department of Environmental Protection (MassDEP) implements regulations under 310 CMR 7.72 to assist in GHG emission reduction goals by reducing SF_6 emissions from GIS through the imposition of declining annual aggregate emission limits and other measures. These declining annual aggregate emission limits and other measures include: 1.) Per 310 CMR 7.72 (4)(a), any newly manufactured GIS that is placed under the ownership, lease, operation, or control of any GIS owner on or after January 1, 2015, must be represented by the manufacturer to have a 1.0% maximum annual leak rate; 2.) Per 310 CMR 7.72 (4)(b), any GIS owner that places GIS under ownership, lease, operation, or control on or after January 1, 2015, shall comply with any manufacturer-recommended maintenance procedures or industry best practices that have the effect of reducing leakage of SF_6; and 3.) Annual reporting requirements contained in 310 CMR 7.72 (6), including but not limited to, the number of pounds of SF_6 emitted from GIS equipment owned, leased, operated, or controlled by the federal reporting GIS owner and located in Massachusetts during the year, using the equation specified in 40 C.F.R. § 98.303.

In addition to the identified BACT from regulatory requirements mentioned previously, the following options, which have been considered in prior OCS wind energy permit reviews, are also considered in this BACT analysis, depending on the voltage of the switchgear.

- For MV switchgears, SF_6-free and alternative gas-insulated equipment is considered for BACT.
- For HV switchgears, SF_6-free and alternative gas-insulated equipment is considered for BACT.

For situations where SF_6-free and alternative gas-insulated equipment cannot be used, the following options are considered in this BACT analysis:

- Applicant has proposed a maximum annual leak rate not to exceed 0.1%, which is more stringent than the requirement contained in 310 CMR 7.72 (4)(a).

- Operating a Sealed System with leak detection and alarms and to complete any repairs of detected SF_6 leaks from switchgears within 5 days of discovery is considered for BACT.

- Equip with leak detection systems and alarms.

[56] Noting that for a similar sized engine (i.e., >= 30 L/cylinder), the NOx emission limit within 40 C.F.R. part 1042 is equivalent to the NOx emission limit contained in 40 C.F.R. § 60.4204(c). However, for a similar sized engine (i.e., >= 30 L/cylinder), no PM emission limit exists within part 1042.

- Equip with low-pressure alarms and a low-pressure lockout where the alarms are triggered when 10% of the SF_6 (by weight) has escaped.

Step 2: Eliminate Technically Infeasible Option(s)

Below is a summary of the reasons for eliminating from further consideration, or justification for not eliminating from further consideration, each of the air pollution control options listed above for Step 1 of the top down BACT analysis for this project. For more details on technical feasibility, please refer to the permit application and support documents in the docket. In general, the EPA considers a technology technically feasible if: 1) it has been demonstrated and operated on the same type of source, or 2) it is "*available*" and "*applicable*." Therefore, technical feasibility for "demonstrated and operated" or "available and applicable" control technologies is included in the analysis for the different BACT options listed in Step 1 of the top down BACT analysis.

EUG 1 - OCS Generator Engine(s) Installed on the OSP(s) and WTG(s)

For EUG 1, all the control technologies identified in Step 1 are all considered technically feasible to continue to be considered as BACT except for the most stringent emissions standards required under 40 C.F.R. part 60 NSPS IIII when NSPS IIII references the nonroad engine standards at 40 C.F.R. part 1039 instead of the marine engine standards at 40 C.F.R. part 1042. OCS Generator Engine(s) installed on the OCS-DC and WTG that are certified to the highest applicable EPA Tier Marine Engine Standards at 40 C.F.R. part 1042 or EPA Nonroad Engine Standards at 40 C.F.R. part 1039 are equipped with an integrated SCR, DPF, and/or DOC are considered a demonstrated and operated control technology because the Tier Certified emission standards consider the reduction in pollution from the integrated technologies in the design. However, as stated in SCW's application, "the anticipated generator supplier has stated that due to technical feasibility concerns with non-road engine standards in 40 CFR part 1039, the ICE will be certified to the appropriate standard within 40 CFR part 1042 for marine engines as allowed by 40 CFR 60.4202(g) due to their permanent location on a marine offshore installation. Non-road engines are not designed to withstand operation in a marine environment for extended periods. Marine engines are designed with redundant features which provide for the necessary robustness in the unmanned marine environment. In order to ensure operation is possible in the case of emergency, certain features of marine engines, including override features and redundant sensors are required." Therefore, the Nonroad Engine Standards at 40 C.F.R. part 1039 are not considered technically feasible. The Marine Engine Standards at 40 C.F.R. part 1042 are considered technically feasible for SCW-124 and SCW-125.

For SCW-1 through SCW-123, generators located on the OSP(s) and WTG(s) will not be permanently installed. The generator engines will be used during OSP and WTG commissioning and will only be in place on the OSPs and WTGs for each individual turbine during commissioning. As these generator engines (SCW-1 through SCW-123) will not be permanently located offshore in a marine environment, they do not need to have the same long-term resiliency in the marine environment as provided by a marine CI engine. Due to these factors, it was considered feasible for SCW-1 through SCW-123 to meet the most stringent emission standards required under 40 C.F.R. part 60 NSPS IIII, which in this case are the nonroad engine standards at 40 C.F.R. part 1039.

EUG 2 - Marine Engines on Vessels when operating as an OCS Source(s)

For marine engines on vessels operating as an OCS source where the availability of the specific vessel at the time of the application is unknown, the EPA is not eliminating the use of the Most Stringent Emission Standards as technically infeasible because the "applicability" of technology-based federal standards, like NSPS, to marine engines is technically viable based on chemical, physical, and engineering principles. However, EPA is considering the inherent limitation on the number of specialized vessels that are currently available to the offshore wind industry in the permit conditions being proposed for this project. The number of specialized vessels available to the offshore wind industry is limited for various reasons including:

- The specific vessel capabilities required to perform the work.
- Limitations imposed by the Jones Act.[57]
- Inability to delay the project's construction timeline. As described in the permit application, slowing down, delaying, or extending the project's schedule to wait for a vessel with a higher tiered engine(s) could prevent the project from being built because many of the larger, more specialized, vessels are in limited supply.[58]

Considering the limited supply of vessels able to perform the work, it would be technically infeasible to require all the emission units contained in in EUG 2 to comply with the most stringent emission standards. Instead of eliminating the option that would require the permittee to use vessels to meet the most stringent emission standards altogether, EPA is considering that in some circumstances it would be necessary to allow use of another vessel based on the limited availability of specific vessel at the time the activity is needed to be conducted (in other words, at time of deployment). With this consideration, EPA is retaining for some pollutants the use of the cleanest vessels with an option that would allow for flexibility in complying with the applicable BACT requirement based on vessel availability. For example, if a vessel meeting the most stringent emission standard for that pollutant is not available at the time of deployment, a vessel with an engine meeting the next most stringent emission standard for that pollutant can be used.

The EPA is, however, proposing to determine that the replacement and/or retrofit of the engines (e.g., add on control technology: SCR, diesel particulate filters, diesel oxidation catalyst, catalytic diesel particulate filter and OSPs) on the marine vessels is technically infeasible for this project for the following reasons. The vessels that will be utilized during construction will be leased, chartered, or rented by the developer and will be owned by third-party entities. Since the developer does not own the vessels, the permit applicant does not have the ability to replace engines or retrofit a vessel to add pollution controls. The vessels could be U.S.-flagged or foreign-flagged vessels. While EPA acknowledges that procuring vessels to conduct the work on the project is the responsibility of the developer, even if a retrofit by the owner could be made a condition of procurement, extensive lead time is necessary for retrofitting an engine with after-treatment control technologies. The replacement or retrofit of specific third-party vessel engines would prevent the developer from being able to substitute vessels on short notice due to schedule changes or other construction issues. Therefore, the

[57] *Supra* note 49.

[58] *See* *https://www.energy.gov/sites/default/files/2022-08/offshore_wind_market_report_2022.pdf*.

EPA finds that the replacement and/or retrofit of the third-party engines on the marine vessels is technically infeasible for this project.

Regarding the sole use of ULSD (at 15 ppm sulfur content) on marine engines with a displacement ≥ 30 L/cylinder - in comparison to ECA marine residual and distillate fuel (at 1000 ppm sulfur content) – ULSD reduces condensable PM and SO_2 emissions. However, for marine engines with a displacement ≥ 30 L/cylinder, it is problematic to require ULSD as the only fuel due to technical feasibility concerns[59]. Specifically, low viscosity fuel, i.e., ULSD, could have potentially harmful effects on some marine engines[60]. For example, ULSD's lack of lubricity can promote sticking and seizing of fuel pumps, requiring the use of fuel additives that can increase emissions. According to DNV GL (2014)[61], "due to explosion risks related to the use of highly volatile fuels on board ships," the IMO, per SOLAS requirements, has banned the use of fuels with a flashpoint lower than 60°C on vessels. In addition, the use of fuel with a flashpoint lower than 60°C is often not allowed by insurers. Numerous studies and safety data sheets indicate that ULSD often has a flashpoint lower than 60°C. Consequently, the slightly lower flashpoint limits applicable to automotive diesel (above 55°C in the European Union, minimum 52°C in the US) preclude the supply of automotive ULSD fuel to the marine market (Wright and Wilson 2012[62]). ULSD that meets the low-volatility safety requirements for larger marine engines is not widely available. Therefore, vessels can only use ULSD as permitted by SOLAS requirements and to the extent that ULSD is available.

EUG 3 - HV and MV GIS on the OSP(s)

For medium voltage switchgears, the EPA is proposing to eliminate the consideration of SF_6-free equipment because the applicability of the technology to this project is unknown, and the technology has not been demonstrated and operated on the same type of source. The applicant has provided specific justification for why SF_6-free equipment on the MV switchgears are not technically feasible for the SCW Project due to the required configurations for the OSP(s). For example, although Siemens 8VM11 is a 72.5 kV HVAC SF6-free MV switchgear, it is not suited for use on the OSP(s) because it is not available in a bus configuration. Furthermore, General Electric's SF_6-free medium-voltage switchgear line, the F35g4, is only presently available in a 50 Hz International Electrotechnical Commission (IEC) configuration (for use in the European Union and Asian markets) and is therefore not compatible with the 60 Hz electrical standard here in the United States. Beyond those switchgear options referenced by EPA, the Siemens 8VN15 is also not technically feasible for this project due to increased size (~25%) and weight (~50%) as compared to the SF_6 switchgear currently being planned for the OSP(s).

[59] See the permit application within the docket for the permit action.
[60] American Bureau of Shipping. 2015b. Fuel switching advisory 2015. https://ww2.eagle.org/content/dam/eagle/advisories-anddebriefs/ABS_Fuel_Switching_Advisory_15076.pdf
[61] Sulphur limits 2015 — Guidelines to ensure compliance. https://datospdf.com/download/guidelines-to-ensure-compliance-_5a449ffeb7d7bc422b7af31f.pdf\

[62] Flashpoint of marine distillate oil fuels issues and implications associated with the harmonization of the minimum flashpoint requirement for marine distillate oil fuels with that of other users. https://www.dendanskemaritimefond.dk/wp-content/uploads/2016/02/Item-7e- Flashpoint-of-Marine-Distillate-Oil-Fuels-for-DSA-by-LR-FOBASV6.pdf

For high voltage switchgears, the EPA is proposing to eliminate the consideration of SF_6-free equipment too because the applicability of the technology to this project is unknown, and the technology has not been demonstrated and operated on the same type of source. At the present time, there is no alternative to SF_6 for HVDC switchgear. Siemens remains the market leader for HVDC switchgear, but it does not currently have any SF_6-free options, and the switchgear, g3 from GE3, is for High-Voltage Alternating Current (HVAC) transmission only.[63]

Due to the considerations presented above, SF_6-free equipment and SF_6-alternative gas-insulated equipment for HV and MV switchgears are not considered further in the BACT analysis as they are technically infeasible for this project and thus have been eliminated.[64]

Step 3 – Rank Control Technologies by Control Effectiveness

EUG 1 - OCS Generator Engine(s) Installed on the OSP(s) and WTG(s)

For EUG 1, the most effective control techniques in the ranking (Step 3) are a GCOP Plan, visible emissions (opacity) limit, engines certified to the most stringent emission standards under 40 C.F.R. part 60, NSPS IIII (the highest applicable EPA Tier 4 Marine Engine at 40 C.F.R. parts 1039 or 1042), and ULSD. The facility will be required to incorporate the GCOP Plan into the facility SOPs and shall make the GCOP Plan available for inspection. The plan should include, but not be limited to, i.) A list of combustion optimization practices to minimize pollutants and a means of verifying the practices have occurred; ii.) A list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred; and iii.) A list of the design choices determined to be BACT and verification that designs were implemented in the final construction. A description of the most stringent emissions standards under 40 C.F.R. part 60, NSPS IIII is provided for each engine and regulated NSR pollutant below. In general, Category 1 (C1) and Category 2 (C2) engines are those with a displacement less than <30 L/cyl while Category 3 (C3) engines are those with a displacement ≥ 30 L/cyl. For SCW, all EUG 1 engines are C1 or C2 engines and considered new units under NSPS IIII.

Carbon Monoxide (CO)

***SCW-1,* SCW-62**

- The applicant has identified SCW-1 and SCW-62 to have a maximum power rating of 1400 kW. The Tier 4 emission standards for C1 and C2 engines are applicable to emission units with a maximum power rating (kW) between 1,400 ≤ kW < 2,000. For C1 and C2 engines, the Tier 4 CO emission standard of 5.00 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

[63] Siemens remains the market leader for HVDC switchgear, it currently does not have any SF6-free options for this type of application. The g3 switchgear from GE3, is for High-Voltage Alternating Current (HVAC) transmission only and is therefore not compatible with the Project, which proposes to use direct current transmission. See *Assessment of the Use of Sulfur Hexafluoride (SF6) Gas Insulated Switchgears (GIS) within the Offshore Wind Sector* https://www.epa.gov/system/files/documents/2023-12/ocs-sf6.pdf

[64] See July 24, 2024, Application in docket EPA-R01-OAR-2024-0393 for more details.

- For engines with a power rating (kW) greater than 900 kW, the CO emission standard (Tier 4) of 3.5 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

Therefore, the CO emissions standards within 40 C.F.R. part 1039 that would apply to the SCW-1 and SCW-62 are more stringent than the CO emissions standards within 40 C.F.R. part 1042.

SCW-2 – SCW-61, SCW-63—SCW-123

- The applicant has identified SCW-2 – SCW-61 and SCW-63—SCW-123 to have a maximum power rating of 150 kW. The emission standard for C1 and C2 engines (Tier 3) ranges based on the specific displacement (L/cylinder) and power density (kW/L) of the engine. Therefore, for C1 and C2 engines, the Tier 3 CO emission standard range of 5.0 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) between 130 ≤ kW < 225, the CO emission standard (Tier 4) of 3.5 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

Therefore, the CO emissions standards within 40 C.F.R. part 1039 that would apply to the SCW-2 – SCW-61 and SCW-63—SCW-123 are more stringent than the CO emissions standards within 40 C.F.R. part 1042.

SCW-124, SCW-125

- The applicant has identified SCW-124 and SCW-125 to have a maximum power rating of 1680 kW. The Tier 4 emission standards for C1 and C2 engines are applicable to emission units with a maximum power rating between 1,400 ≤ kW < 2,000. For C1 and C2 engines, the Tier 4 CO emission standard of 5.00 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

Therefore, the CO emissions standards within 40 C.F.R. part 1042 are the most stringent limits that would apply to the SCW-124 and SCW-125.

Nitrogen Oxides (NO_x)

***SCW-1,* SCW-62**

- The applicant has identified SCW-1 and SCW-62 to have a maximum power rating of 1400 kW. The Tier 4 emission standards for C1 and C2 engines are applicable to emission units with a maximum power rating between 1,400 ≤ kW < 2,000. For C1 and C2 engines, the Tier 4 NO_X emission standard of 1.8 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) greater than 900 kW, the Tier 4 NO_x emission standard of 0.67[65] (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

Therefore, the NO_X emissions standards within 40 C.F.R. part 1039 that would apply to the SCW-1 and SCW-62 are more stringent than the NO_X emissions standards within 40 C.F.R. part 1042.

SCW-2 – SCW-61, SCW-63—SCW-123

- The Tier 4 emission standards for C1 and C2 engines are applicable to emission units with a maximum power rating greater than or equal to 600 kW. The applicant has identified SCW-2 – SCW-61 and SCW-63—SCW-123 to have a maximum power rating of 150 kW. The emission standard for C1 and C2 engines (Tier 3) ranges based on the specific displacement (L/cylinder) and power density (kW/L) of the engine. Therefore, for C1 engines, the Tier 3 NOx + HC emission standard range of 5.4–5.8 (g/kW-hr) and C2 engines, the Tier 3 NOx + HC emission standard range of 6.2–11.0 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) between 130 ≤ kW < 225, the NO_X emission standard (Tier 4) of 0.40 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

Therefore, the NO_X emissions standards within 40 C.F.R. part 1039 that would apply to the SCW-2 – SCW-61 and SCW-63—SCW-123 are more stringent than the NO_X emissions standards within 40 C.F.R. part 1042.

SCW-124, SCW-125

The applicant has identified SCW-124 and SCW-125 to have a maximum power rating of 1680 kW. The Tier 4 emission standards for C1 and C2 engines are applicable to emission units with a maximum power rating between 1,400 ≤ kW < 2,000. For C1 and C2 engines, the Tier 4 NO_x standard of 1.8 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

Therefore, the NO_X emissions standards within 40 C.F.R. part 1042 are the most stringent limits that would apply to the SCW-124 and SCW-125.

Particulate Matter (PM)

***SCW-1,* SCW-62**

[65] Note that the NOx standard for generator sets is 0.67 g/kW-hr.

- The applicant has identified SCW-1 and SCW-62 to have a maximum power rating of 1400 kW. The Tier 4 emission standards for C1 and C2 engines are applicable to emission units with a maximum power rating between 1,400 ≤ kW < 2,000. For C1 and C2 engines, the Tier 4 PM emission standard of 0.04 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) greater than 900 kW, the PM emission standard (Tier 4) of 0.03[66] (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

Therefore, the PM emissions standards within 40 C.F.R. part 1039 that would apply to the SCW-1 and SCW-62 are more stringent than the PM emissions standards within 40 C.F.R. part 1042.

SCW-2 – SCW-61, SCW-63—SCW-123

- The applicant has identified SCW-2 – SCW-61 and SCW-63—SCW-123 to have a maximum power rating of 150 kW. The emission standard for C1 and C2 engines (Tier 3) ranges based on the specific displacement (L/cylinder) and power density (kW/L) of the engine. Therefore, for C1 engines, the Tier 3 PM emission standard range of 0.10-0.15 (g/kW-hr) and for C2 engines, the Tier 3 PM emission standard range of 0.14 – 0.34 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) between 130 ≤ kW < 225, the PM emission standard (Tier 4) of 0.02 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

Therefore, the PM emissions standards within 40 C.F.R. part 1039 that would apply to the SCW-2 – SCW-61 and SCW-63—SCW-123 are more stringent than the PM emissions standards within 40 C.F.R. part 1042.

SCW-124, SCW-125

- The applicant has identified SCW-124 and SCW-125 to have a maximum power rating of 1680 kW. The Tier 4 emission standards for C1 and C2 engines are applicable to emission units with a maximum power rating between 1,400 ≤ kW < 2,000. For C1 and C2 engines, the Tier 4 PM emission standard of 0.04 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

Therefore, the PM emissions standards within 40 C.F.R. part 1042 are the most stringent limits that would apply to the SCW-124 and SCW-125.

[66] Note that the PM standard for generator sets is 0.03 g/kW-hr.

Nitrogen Oxides (NO_x)

SCW-1, SCW-62

- The applicant has identified SCW-1 and SCW-62 to have a maximum power rating of 1400 kW. The Tier 4 emission standards for C1 and C2 engines are applicable to emission units with a maximum power rating (kW) between 1,400 ≤ kW < 2,000. The NO_X emission standard for C1 and C2 engines (Tier 4) ranges based on the specific power of the engine. For C1 and C2 engines, the Tier 4 NO_X emission standard of 1.8 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) greater than 900 kW, The NOx standard for generator sets is 0.67 g/kW-hr and represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

Therefore, the NO_X emissions standards within 40 C.F.R. part 1039 are the most stringent limits that would apply to the SCW-1 and SCW-62.

SCW-2 – SCW-61, SCW-63—SCW-123

- The Tier 4 emission standards for C1 and C2 engines are only applicable to emission units with a maximum power rating greater than or equal to 600 kW. The applicant has identified SCW-2 – SCW-61, SCW-63—SCW-123 to have a maximum power rating of 150 kW. The emission standard for C1 and C2 engines (Tier 3) ranges based on the specific displacement (L/cylinder) and power density (kW/L) of the engine. Therefore, for C1 engines, the Tier 3 NOx + HC emission standard range of 5.4–5.8 (g/kW-hr) and C2 engines, the Tier 3 NOx + HC emission standard range of 6.2–11.0 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) between 130 ≤ kW < 225, the NO_x emission standard (Tier 4) of 0.40 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

Therefore, the NOx emissions standards within 40 C.F.R. part 1039 that would apply to the SCW-2 – SCW-61 and SCW-63—SCW-123 are more stringent than the NO_x emissions standards within 40 C.F.R. part 1042.

SCW-124, SCW-125

- The applicant has identified SCW-124 and SCW-125 to have a maximum power rating of 1680 kW. The Tier 4 emission standards for C1 and C2 engines are applicable to emission units with a maximum power rating between 1,400 ≤ kW < 2,000. For C1 and C2 engines, the Tier 4 NO_x standard of 1.8 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

Therefore, the NO_X emissions standards within 40 C.F.R. part 1042 are the most stringent limits that would apply to the SCW-124 and SCW-125.

VOC (HC or NMHC) ***(only in the outer OCS)***

SCW-1, SCW-62

- The applicant has identified SCW-1 and SCW-62 to have a maximum power rating of 1400 kW. The Tier 4 emission standards for C1 and C2 engines are applicable to emission units with a maximum power rating (kW) between 1,400 ≤ kW < 2,000. For C1 and C2, the Tier 4 HC+NO_x emission standard of 0.19[67] (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) greater than 900 kW, the NMHC emission standard (Tier 4) of 0.19 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

Therefore, the VOC (HC) emissions standards within 40 C.F.R. part 1039 are equivalent to the limits in 40 C.F.R. part 1042 that would apply to the SCW-1 and SCW-62.

SCW-2 – SCW-61, SCW-63—SCW-123

- The Tier 4 emission standards for C1 and C2 engines are only applicable to emission units with a maximum power rating greater than or equal to 600 kW. The applicant has identified SCW-2 – SCW-61, SCW-63—SCW-123 to have a maximum power rating of 150 kW. The emission standard for C1 and C2 engines (Tier 3) ranges based on the specific displacement (L/cylinder) and power density (kW/L) of the engine. Therefore, for C1 engines, the Tier 3 NO_x + HC emission standard range of 5.4–5.8 (g/kW-hr) and C2 engines, the Tier 3 NO_x + HC emission standard range of 6.2–11.0 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) between 130 ≤ kW < 225, the NMHC emission standard (Tier 4) of 0.19 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

Therefore, the emissions standards within 40 C.F.R. part 1039 are more stringent than the limits in 40 C.F.R. part 1042 that would apply to the SCW-2 – SCW-61 and SCW-63—SCW-123.

SCW-124, SCW-125

[67] Note that the HC standard for generator sets is 0.19 g/kW-hr.

- The applicant has identified SCW-124 and SCW-125 to have a maximum power rating of 1680 kW. The Tier 4 emission standards for C1 and C2 engines are applicable to emission units with a maximum power rating between 1,400 ≤ kW < 2,000. For C1 and C2 engines, the Tier 4 HC + NO_x emission standard of 0.19 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

Therefore, the HC + NO_x emission standard within 40 C.F.R. part 1042 are the most stringent limits that would apply to the SCW-124 and SCW-125.

Sulfur Dioxide (SO_2)

For all units in EUG 1, the highest ranking BACT option for SO_2 is the use of ULSD (15 ppm).

GHG (CO_2e)

For all units in EUG 1, the highest ranking BACT option for GHG is the use of GCOP Plan.

EUG 2 - Marine Engines on Vessels when operating as an OCS Source(s)

For EUG 2, the most effective control technique in the ranking are a GCOP plan, visible emissions (opacity) limit and use of marine engines that meet the most stringent emission standard in NSPS IIII[68] or the most stringent emission standard set by EPA for those engines that are not subject to NSPS IIII. However, the specific emission standard that may apply to an engine is difficult to determine for this project because the specific vessels that will be used for a given activity is not known at the time of permit application. Therefore, the following paragraphs describe the most stringent emission standards depending on whether the engine is subject to NSPS IIII or not, and the size of the engine (i.e., engine displacement) considering that EPA currently does not have specific information on what vessels will be used for a given activity.

If a foreign-flagged vessel meets the definition of an OCS source and is constructed or reconstructed after the applicability dates contained within NSPS IIII, it is considered applicable and subject to the requirements of NSPS IIII.

NSPS IIII Covered Engines[69]

For marine engines with a displacement < 30 L/cylinder that meet the definition of an OCS source, the most effective control technique in the ranking at step 3 are the GCOP plan, utilizing ULSD (15 ppm), and the Tier 4 emission standards for Marine Engines (Category 1 and 2 Marine Engines) for NO_X, HC, CO, and PM at 40 C.F.R. part 1042. Per 40 C.F.R. § 60.4201(f)(2)), the EPA recognizes in its NSPS IIII that

[68] 40 C.F.R. part 60 NSPS IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines, if NSPS is applicable to the engine. Otherwise, 40 C.F.R. part 1042, Federal Marine Compression-Ignition (CI) Engines: Exhaust Emission Standards would be the appropriate emision standards for EUG 2.

[69] See Section VII. for more information about NSPS IIII. See 40 C.F.R. 60.4201(f). NSPS IIII applies to owners and operators of stationary compression ignition (CI) internal combustion engines (ICE) that both commence construction after July 11, 2005, and were manufactured after April 1, 2006, as well as those engines modified or reconstructed after July 11, 2005.

for some engines with a displacement less than 30 L/cylinder, a manufacturer of a stationary source in a marine environment can certify its engine based on the marine engine requirements at 40 C.F.R. part 1042 (including appendix I) as a means of demonstrating compliance with NSPS IIII.

For marine engines with a displacement ≥ 30 L/cylinder that meet the definition of an OCS source the most effective control technique in the ranking at step 3 are the GCOP plan, prioritizing the use of ULSD (with a sulfur content of 15 ppm) when technically feasible, and the emission standards for NO_x and PM at 40 C.F.R. part 60, subpart IIII. That is because for engines with a displacement ≥ 30 L/cylinder, NSPS IIII sets emissions standards for NO_x and PM only. For the other pollutants being emitted by these engines, which are HC and CO, the EPA is considering the applicable emissions standards for these pollutants at 40 C.F.R. part 1042 as the highest ranked option under BACT. Establishing emission standards for HC and CO in accordance with the Marine Tier 3 emission standards required by 40 C.F.R. part 1042 represent the most stringent level of emissions control required for this class or category of source (i.e., Marine Compression-Ignition (CI) Engines)[70].

Non-NSPS IIII Covered Engines[71]

For marine engines with a displacement < 30 L/cylinder that meet the definition of an OCS source, and *not* subject to NSPS IIII, the most effective control technique in the ranking at step 3 are the GCOP plan, utilizing ULSD (15 ppm) and the Tier 4 emission standards for Marine Engines (Category 1 and 2 marine engines) for NO_X, HC, CO, and PM emission standards at 40 C.F.R. 1042. Establishing emission standards for NO_X, HC, CO, and PM in accordance with the Marine Tier 4 emission standards required by 40 C.F.R. part 1042 represent the most stringent level of emissions control required for this class or category of source (i.e., Federal Marine Compression-Ignition (CI) Engines).

For marine engines with a displacement ≥ 30 L/cylinder, that meet the definition of an OCS source and *not* subject to NSPS IIII, the most effective control techniques in the ranking at step 3 are the GCOP Plan and the Marine Engines emission standards for NOx, HC, and CO at 40 C.F.R. part 1042. Part 1042 does not contain any PM emission limits for Category 3 marine engines (i.e., engine displacement ≥ 30 L/cylinder). Therefore, for PM, the most effective control technique in the ranking at step 3 is the GCOP Plan and prioritizing the use of ULSD (with a sulfur content of 15 ppm) in lieu of ECA Marine Fuel (with a sulfur content of 1000 ppm) when technically feasible.

For all units in EUG 2, the highest ranking BACT option for GHG is the use of a good combustion practices plan (GCOP).

[70] Note that the Marine Tier 1 emission standards do not contain any HC or CO emission standards for Category 3 marine engines. Therefore, for those engines which fall between model year dates of 2004 through 2010, the most effective control technique in the ranking at for HC and CO step 3 is the GCOP Plan.

[71] Engines might not be covered by NSPS IIII if they were manufactured outside the model years specified in NSPS IIII. As explained previously, NSPS IIII applies to owners and operators of stationary compression ignition (CI) internal combustion engines (ICE) that both commence construction after July 11, 2005, and were manufactured after April 1, 2006, as well as those engines modified or reconstructed after July 11, 2005. Commence construction is the date the engine is ordered by the owner or operator.

EUG 3 - HV and MV GIS on the OSP

For HV and MV switchgears, the highest ranked, feasible BACT options are as follows:

- A maximum annual leak rate not to exceed 0.1%, which is more stringent than the requirement contained in 310 CMR 7.72 (4)(a).
- Operating a Sealed System with leak detection and alarms and to complete any repairs of detected SF_6 leaks from switchgears within 5 days of discovery is considered for BACT.
- Equip with leak detection systems and alarms.
- Equip with low-pressure alarms and a low-pressure lockout where the alarms are triggered when 10% of the SF_6 (by weight) has escaped.

Step 4 – Evaluate most effective controls and document results.

EUG 1 - OCS Generator Engine(s) on the OSP(s) and WTG(s)
SCW has accepted the highest ranked control technologies in Step 3 as BACT for all engines on the OSPs and WTGs. Since the top-option is selected, no economic or energy analysis is required.

EUG 2 - Marine Engines on Vessels when operating as an OCS Source(s)
SCW has accepted the highest ranked control technologies in Step 3 as BACT for all engines on vessel when operating as OCS Source(s). Since the top-option is selected, no economic or energy analysis is required.

EUG 3 - HV and MV GIS on the OSP
For high voltage switchgears, SF_6-free equipment and SF_6-alternative gas-insulated equipment for HV and MV switchgears were not technically feasible for this project as explained previously in Step 2. Therefore, the following options remain as the BACT:

- A maximum annual leak rate not to exceed 0.1%.
- A sealed system with leak detection and alarms, and repair of detected SF_6 leaks from switchgear within 5 days of discovery.
- Equip with leak detection systems and alarms.
- Equip with low-pressure alarms and a low-pressure lockout where the alarms are triggered when 10% of the SF_6 (by weight) has escaped.

Step 5 – Select BACT

Using the "top-down" process, the option selected as BACT is the highest level of control (ranked at Step 3) for which the applicant could not adequately justify its elimination based on energy, environmental and economic impacts. In no event shall application of best available control technology result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 C.F.R. part 60, 61, or 63.

Based on the preceding analysis, the following combination of control technologies and associated emissions limitations have been determined to be BACT for this project.

EUG 1 - OCS Generator Engine(s) on the OSP(s) and WTG(s)

A portion of the SCW project lease area is within 25 NM of Massachusetts's SSB and, thus, is subject to NNSR and PSD requirements that apply to onshore stationary sources in Massachusetts. Therefore, LAER for NOx and VOC (ozone precursors) will be required for the inner OCS. The portion of the SCW project lease area that is located beyond 25 NM from the Massachusetts's SSB (i.e., in the outer OCS) is subject to only federal requirements including but not limited to PSD and therefore BACT.

OCS generator engines installed on the OSP(s) and WTGs certified to the highest emission standards contained in 40 C.F.R. part 60, subpart IIII.

Table 12: EUG-1 BACT Limits

EUG-1 BACT Limits	
SCW-1, SCW-62	
CO	3.5 g/kW-hr
NO_x	0.67 g/kW-hr
PM	0.03 g/kW-hr
SCW-2 – SCW-61, SCW-63—SCW-123	
CO	3.5 g/kW-hr
NO_x	0.40 g/kW-hr
PM	0.02 g/kW-hr
SCW-124—SCW-125	
CO	5.0 g/kW-hr
NO_x	1.8 g/kW-hr
PM	0.04 g/kW-hr

Table 13: EUG-1 BACT Limits (only in the outer OCS)

EUG-1 BACT Limits	
SCW-1, SCW-62	
NO_x	0.67 g/kW-hr
VOC	0.19 g/kW-hr
SCW-2 – SCW-61, SCW-63—SCW-123	

NO_x + HC	0.40 g/kW-hr
VOC (NO_x + HC)	0.19 g/kW-hr
SCW-124, SCW-125	
NO_x + HC	1.8 g/kW-hr
VOC (NO_x + HC)	0.19 g/kW-hr

SO_2

BACT for SO_2 is utilizing ULSD (15 ppm) solely in engines that have a displacement less than 30 L/cylinder.

GHG (CO_2e)

For all units in EUG 1, the highest ranking BACT option for GHG is the use of a GCOP Plan.

All Criteria Pollutants

For all pollutants in EUG 1, the highest ranking BACT option for all criteria pollutants is the use of a GCOP Plan and the emission limits reference above.

OCS generator engine(s) on the OSP(s) and WTG(s) shall be operated in accordance with the GCOP Plan for the facility. The Plan shall be incorporated into the facility SOPs and shall be made available for inspection. The Plan specifically should include, but is not limited to: i.) a list of combustion optimization practices and a means of verifying the practices have occurred for each engine type based on the most recent manufacturers' specifications issued for the engines at the time that they are certified (and any updates from the manufacturer should be noted and amended in the Plan); ii.) a list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred (if applicable); and iii.) a list of the design choices determined to be BACT and verification that designs were implemented in the final construction.

PM, PM_{10} and $PM_{2.5}$

For all units in EUG 1, the highest ranking BACT option for PM, PM_{10} and $PM_{2.5}$ is a visible emissions (opacity) limit and the emission limits reference above.

OCS generator engine(s) on the OSP(s) and WTG(s) must not cause, suffer, allow, or permit any OCS Source to emit smoke which has a shade, density, or appearance equal to or greater than No. 1 of the [Ringelmann] Chart for a period, or aggregate period of time in excess of six minutes during any one hour, provided that at no time during the said six minutes shall the shade, density, or appearance be equal to or greater than No. 2 of the [Ringelmann] Chart. Additionally, OCS generator engine(s) on the OSP(s) and WTG(s) must not cause, suffer, allow, or permit the operation of any OCS Source to emit any contaminant(s), exclusive of uncombined water or smoke, that exceed 20% opacity for a period or aggregate period of time in excess of two minutes during any one hour provided that, at no time during the said two minutes shall the opacity exceed 40%.

EUG 2 - Marine Engines on Vessels when operating as an OCS Source(s)

A GCOP is selected for all units in EUG 2. All engines covered by EUG 2 shall be operated in accordance with the GCOP Plan for the facility. The plan shall be incorporated into the facility SOPs and shall be

made available for inspection. The plan specifically should include, but is not limited to: i.) a list of combustion optimization practices to minimize emissions of pollutants and a means of verifying the practices have occurred for each engine type based on the manufacturer's most recent specifications issued for the engines at the time that they are certified (and any updates from the manufacturer should be noted and amended in the plan); ii.) a list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred (if applicable); and iii.) a list of the design choices determined to be BACT and verification that designs were implemented in the final construction.

The Permittee is required to prioritize the use of ULSD (with a sulfur content of 15 ppm) in EUG 2 engines that have a displacement greater than or equal to 30 L/cylinder when technically feasible.

The Permittee is required to use ULSD (15 ppm) in EUG 2 engines that have a displacement less than 30 L/cylinder.

NSPS IIII Covered Engines

For Marine Engines with a displacement < 30 L/cylinder that meet the definition of an OCS source, and subject to NSPS IIII, meeting the emission standards for NO_X, HC, CO, and PM Emission Standards at 40 C.F.R. part 60, subpart IIII at time of deployment. At a minimum, all engines subject to this condition shall comply with emission standards (in terms of g/kW-hr) equal to or cleaner than EPA Tier 1 marine engine emission standards (for Category 1 and Category 2 Marine Engines) for NO_X, HC[72], CO, and PM contained within 40 C.F.R. part 1042.

For Marine Engines with a displacement ≥ 30 L/cylinder that meet the definition of an OCS source and are subject to NSPS IIII, meeting the emission standards for NOx and PM at 40 C.F.R. part 60, subpart IIII and highest applicable emission standards for HC and CO within 40 C.F.R. part 1042 at time of deployment. At a minimum, all engines subject to this condition shall comply with emission standards (in terms of g/kW-hr) equal to or cleaner than EPA Tier 1 marine engine emission standards for (Category 3 Marine Engines) for NOx contained within 40 C.F.R. part 1042 and the NOx and PM emission standards within 40 C.F.R. part 60, subpart IIII.[73] Note that the Marine Tier 1 emission standards do not contain any HC or CO emission standards for Category 3 marine engines. Therefore, for those engines which fall between model year dates of 2004 through 2010, BACT for HC and CO is the GCOP Plan.

Non-NSPS IIII Covered Engines

For all other marine engines with a displacement < 30 L/cylinder that meet the definition of an OCS source and are not subject to NSPS IIII, meeting the highest applicable emission standards for NO_X, HC,

[72] Note that the marine engine emission limits within 40 C.F.R. part 1042 may be presented as NOx + HC or NOx and HC separately and the nonroad engine emission limits may be presented as NOx + NMHC or NOx and NMHC separately. If the Tier level combines both NOX and either HC or total hydrocarbon (THC) into one emission limit, then that emission limit shall be multiplied by 0.95 for NOX and 0.05 for either HC or THC (assume to be VOC). Manufacturers specifications, or site-specific data that indicate specific NOX/HC ratios, or specific HC or VOC emission factors shall supersede any general assumptions presented here for purposes of the emission calculation demonstration.

CO, and PM within 40 C.F.R. part 1042 at time of deployment. At a minimum, all applicable engines subject to this condition shall comply with emission standards (in terms of g/kW-hr) equal to or cleaner than EPA Tier 1 marine engine emission standards (for Category 1 and Category 2 Marine Engines) for NO_X, HC, CO, and PM contained within 40 C.F.R. part 1042. Currently, the Tier 1 marine engine emission standard in 40 C.F.R. part 1042 does not contain any HC, CO, or PM emission limits for Category 1 or 2 Marine Engines. Therefore, for these cases, BACT for HC, CO, and PM is GCOP and prioritizing the use of ULSD (15 ppm) in engines that have a displacement less than 30 L/cylinder.

For Marine Engines with a displacement < 30 L/cylinder that meet the definition of an OCS source, and For Marine Engines with a displacement ≥ 30 L/cylinder that meet the definition of an OCS source and *not* subject to NSPS IIII, meeting the highest applicable emission standards for NOx, HC, and CO, within 40 C.F.R. part 1042 at time of deployment. At a minimum, all applicable engines subject to this condition shall comply with emission standards (in terms of g/kW-hr) equal to or cleaner than EPA Tier 1 marine engine emission standards for NOx contained within 40 C.F.R. part 1042. Note that the Marine Tier 1 emission standards do not contain any HC or CO emission standards for Category 3 marine engines. Therefore, for those engines which fall between model year dates of 2004 through 2010, BACT for HC and CO is the GCOP Plan.

Other Considerations:

It is important to note the distinction in PSD's BACT and NNSR's LAER determination for certain vessel types in EUG 2. Specifically, the LAER determination for EUG 2 is presumed to be the more stringent determination because LAER is able to consider the SIP limitations for similar class of source. This means that certain specified vessel types shall at a minimum comply with emission limits equal to or more stringent than EPA Tier 2 marine engine emission standards. *See* Section V.B.2.b(5).

Note that for purposes of this section, to use a lesser Tier engine, the Permittee shall ensure one of the following conditions is met at time of deployment: 1) A vessel with a higher Tier engine is not available within two hours of when the vessel must be deployed; or 2) The total emissions associated with the use of a vessel with the higher Tier engine(s) would be greater than the total emissions associated with the use of the vessel with the next lower Tier engine(s).[74] When determining the total emissions associated with the use of a vessel with a particular engine, the permittee will include the emissions of the vessel that would occur when the vessel would be in transit to the WDA from the vessel's starting location.[75]

[74] EPA understands that offshore wind developers hold contracts with several vessel supply companies that may have multiple vessels of various tier levels capable of performing certain tasks. The condition was developed to require the selection of the cleanest vessel available within the contracted fleet. Note that the 2-hour requirement is not relative to the amount of time to travel to the WDA or conduct work on the WDA facility but rather to ensure construction isn't delayed if a cleaner vessel is available after 2 hours from the scheduled deployment time.

[75] For example, if the contracted fleet of vessels has a higher tiered vessel that is not located near the project (e.g., several hundred miles away), the permittee may compare the total emissions (tons) that would be emitted if a higher tiered vessel were to travel the longer distance to the project location verses the total emissions (tons) resulting from the use of a lower tiered vessel located and traveling a shorter distance to the project location.

SO_2

BACT for SO_2 is prioritizing the use of ULSD (with a sulfur content of 15 ppm) in engines that have a displacement greater than or equal to 30 L/cylinder in lieu of ECA Marine Fuel (with a sulfur content of 1000 ppm) when technically feasible and utilizing ULSD solely in engines that have a displacement less than 30 L/cylinder.

GHG (CO_2e)

For all units in EUG 2, the highest ranking BACT option for GHG is the use of a GCOP Plan.

All Criteria Pollutants

For all pollutants in EUG 2, the highest ranking BACT option for all criteria pollutants is the use of a GCOP Plan and the emission limits reference above.

OCS generator engine(s) on the OSP(s) and WTG(s) shall be operated in accordance with the GCOP Plan for the facility. The Plan shall be incorporated into the facility SOPs and shall be made available for inspection. The Plan specifically should include, but is not limited to: i.) a list of combustion optimization practices and a means of verifying the practices have occurred for each engine type based on the most recent manufacturers' specifications issued for the engines at the time that they are certified (and any updates from the manufacturer should be noted and amended in the Plan); ii.) a list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred (if applicable); and iii.) a list of the design choices determined to be BACT and verification that designs were implemented in the final construction.

PM, PM_{10} and $PM_{2.5}$

For all units in EUG 2, the highest ranking BACT option for PM, PM_{10} and $PM_{2.5}$ is a visible emissions (opacity) limit and the emission limits reference above.

OCS generator engine(s) on the OSP(s) and WTG(s) must not cause, suffer, allow, or permit any OCS Source to emit smoke which has a shade, density, or appearance equal to or greater than No. 1 of the [Ringelmann] Chart for a period, or aggregate period of time in excess of six minutes during any one hour, provided that at no time during the said six minutes shall the shade, density, or appearance be equal to or greater than No. 2 of the [Ringelmann] Chart. Additionally, OCS generator engine(s) on the OSP(s) and WTG(s) must not cause, suffer, allow, or permit the operation of any OCS Source to emit any contaminant(s), exclusive of uncombined water or smoke, that exceed 20% opacity for a period or aggregate period of time in excess of two minutes during any one hour provided that, at no time during the said two minutes shall the opacity exceed 40%.

EUG 3 - MV and HV GIS on the OSP

The BACT requirements for the HV and MV GIS will consist of a Sealed System with leak detection and alarms, repair of detected SF_6 leaks from switchgear within 5 days of discovery, and a maximum annual leak rate not to exceed 0.1%, low-pressure alarms and a low-pressure lockout where the alarms are triggered when 10% of the SF_6 (by weight) has escaped.

C. Ambient Air Impact Analysis

The regulations at 40 C.F.R. part 51, Appendix W (*Guideline on Air Quality Models* or the *Guideline*) provide the requirements for analyses of ambient air quality impacts. The *Guideline* specifies EPA's preferred models and other techniques, as well as guidance for their use in regulatory application in estimating ambient concentrations of air pollutants. The air quality impact analysis must demonstrate the project emissions will not cause or contribute to a violation of a National Ambient Air Quality Standard or PSD increment, listed in Table 14. The analyses of ambient air impacts described in this section were conducted in accordance with the *Guideline*.

The review in this section is based on the April 2023 and July 2024 revised modeling submitted with revised permit applications. The July 2024 revised modeling included updates to secondary $PM_{2.5}$ contributions and a small increase in O&M emissions from the addition of back-up generators located on the OSPs. The additional O&M emissions accounted for a request of 500 hours-per-year emergency generator operations limit on an OSP. Additional calculations and supplemental annual modeling were provided as part of the demonstration.

The ambient air impact analysis for the project was conducted to account for two phases of the project: the construction phase and the operations phase of the project. The construction phase emissions account for the highest annual and short-term emissions from the source, and the analysis of ambient air impacts due to construction are described in the first section below. Operational phase emissions from the source from O&M activities are considerably lower than construction phase emissions for the source on an annual basis. The analysis of ambient air impacts from the operational phase are described in the second part of this section below.

The modeled emissions rely on a conservative estimate of emissions and a conservative set of construction and operation scenarios associated with the source. The scenarios modeled are highly conservative, where emissions are assumed to occur continuously in fixed locations (rated to account for time of residence at each WTG/OSP site). However, in reality, the emissions will occur dispersed across the wide area of the project. Therefore, ambient air impacts from the source will be no worse than those shown in this ambient air impact analysis. The modeled domains account for each of the emissions scenarios at a central WTG or OSP node, described below. Since the emissions scenarios are generally the same at each WTG (or OSP) site, single node domains are considered sufficient to model the entire project.

Table 14: NAAQS, PSD Increments, and Significant Impacts Levels

Pollutant	Averaging Time	NAAQS [1]		PSD [2] Class II Increment ($\mu g/m^3$)	Class II SIL ($\mu g/m^3$)	PSD [2] Class I Increment ($\mu g/m^3$)	Class I SIL ($\mu g/m^3$)
		Primary ($\mu g/m^3$)	Secondary ($\mu g/m^3$)				
CO	1-hr	40,000	--	--	2,000	--	--
	8-hr	10,000	--	--	500	--	--
$PM_{2.5}$	Annual	9.0	15.0	4	0.2 [3]	1	0.05 [3]
	24-hr	35	35	9	1.2 [3]	2	0.27 [3]
PM_{10}	Annual	--	--	17	1 [5]	4	0.2 [4]
	24-hr	150	150	30	5 [5]	8	0.3 [4]
NO_2	Annual	100	100	25	1 [5]	2.5	0.1 [4]
	1-hr	188	--	--	7.5 [6]	--	--
SO_2	Annual	--	--	20	1[7]	2	0.1
	24-hr	--	--	91	5[7]	5	0.2
	3-hr	--	1300	512	25[7]	25	1.0
	1-hr	196	--	--	7.9[8]	--	--

[1] *See* 310 CMR 6.04: Standards
[2] *See* 40 C.F.R. 52.21(c)
[3] EPA's April 17, 2018, Guidance and associated legal memorandum and technical support documents, included as part of the permit record.
[4] Values proposed by the applicant. These values are consistent with values proposed by EPA. *See* 61 Fed. Reg. 38250, "Prevention of Significant Deterioration (PSD) and Nonattainment New Source Review (NSR)."
[5] See 40 C.F.R. § 51.165(b)(2)
[6] EPA, June 29, 2010, "Guidance Concerning the Implementation of the 1-hour NO_2 NAAQS for the Prevention of Significant Deterioration Program." The interim SIL value of 4 ppb (or 7.5 $\mu g/m^3$) was used.
[7] See 40 C.F.R. § 51.165(b)(2)
[8] EPA, August 23, 2010, "Guidance Concerning the Implementation of the 1-hour SO_2 NAAQS for the Prevention of Significant Deterioration Program." The interim SIL value of 3 ppb (or 7.9 $\mu g/m^3$) was used.

1. Construction Phase

The PSD permitting regulations for proposed major new sources require applicants to perform an air quality impact analysis for those air pollutants emitted in significant quantities. All air pollutants with emissions greater than the significant thresholds during the construction and operational phases must be appropriately assessed to ensure that emissions from the source do not cause or contribute to a violation of the NAAQS or PSD increment. An assessment of the construction emissions and ambient impacts was provided by the applicant in an April 2023 report "Outer Continental Shelf Permit – Air Quality Modeling Report," included as Appendix C of the final revised SouthCoast Wind OCS Air Permit Application submitted to EPA on April 14, 2023. Supplemental modeling, and a revised report accounting for the revision, was provided to the EPA in July 2024. EPA's evaluation was based on modeling submitted in the April 2023 and July 2024 application packages.

The following sections provide the information EPA used in determining the appropriate ambient air impacts analysis requirements to which the source is subject for the construction period, and whether

those requirements have been satisfied. Specifically, the sections below describe, for the construction period: 1) an overview of the air modeling conducted by the applicant; 2) comparison of construction phase impacts against the SILs; 3) comparison of construction phase impacts against the NAAQS; 4) comparison of construction phase impacts against the PSD increments for Class II areas; 5) assessment of construction phase impairment to visibility, soils, and vegetation; and 6) EPA's conclusion about the ambient air impacts during the construction phase of the facility.

a. Overview of the Construction Phase Air Modeling Conducted by SouthCoast Wind

To assess near-field air quality impacts within a 50-km distance, the applicant submitted an alternative model request to EPA Region 1 to use the AERCOARE-AERMOD modeling system as an alternative to the regulatory offshore near-field dispersion model, the Offshore and Coastal Dispersion Model (OCD). The alternative model request was submitted October 17, 2022. Region 1 conducted a thorough review of the request and supporting evidence and found the proposed alternative model approach to satisfy the requirements of 40 CFR part 51, Appendix W § 3.2.2(e). Region 1 approved the use of the AERCOARE-AERMOD modeling system, to be used with prognostic model inputs, on November 18, 2022 and obtained concurrence from the EPA Model Clearinghouse on December 13, 2022. All records of the approval are available on the Model Clearinghouse website.[41]

The applicant prepared hourly representative offshore meteorological data using the AERCOARE meteorological preprocessor. The resulting meteorological dataset was used in all AERMOD model runs submitted with the application. Input meteorological data for AERCOARE was developed from a three-year prognostic dataset using the EPA's Mesoscale Model Interface Program (MMIF – Version 4.0). The three-year (2018 – 2020) dataset was provided to the applicant from the EPA's CONUS 12-km WRF dataset. AERCOARE was run using settings approved by the EPA under the alternative model approval, including:

- A calm wind threshold of 0.283 m/s, based on the minimum speed used by AERMOD
- Mixing heights provided directly from WRF using the "AER_MIXHT = WRF" setting
- Minimum mixing height of 25 meters
- Minimum Monin-Obukhov Length of 5 meters
- Warm/cool surface skin effects not considered in energy balance
- Wave height effects on surface roughness ignored.

The applicant submitted a prognostic model evaluation report to demonstrate the suitability of the dataset for regulatory use in the region of the project, as required under 40 CFR part 51, Appendix W § 8.4.5.2. The EPA reviewed the analysis and findings and agreed the evidence supports the conclusion that the dataset is sufficiently accurate and representative to use for near-field regulatory dispersion modeling. Key findings include:

- Qualitative comparison of measurement and modeled dataset wind-roses at nearby onshore and offshore locations shows a high level of similarity in wind direction and wind speed distribution.
- Buoy and WRF input temperature trends match very well.

- Mean bias and error of key variables output from WRF (wind speed, temperature, etc.) are generally low (when compared to nearby observation datasets).
- The general wind climate patterns and temperature trends/magnitude simulated by the WRF model at the project site match what was expected based on long-term measured meteorological data for the region.
- Hypothetical source AERMOD modeling with WRF- and measurement- based meteorology from select locations was used to show general equivalence.

The modeling analysis was conducted using a set of highly conservative "activities" scenarios. Modeling was conducted in an initial conservative basic "screening" process, summing the maximum impacts from various scenarios to account for operations at adjacent WTG and OSP sites. This approach was considered to be an adequate and conservative method to demonstrate compliance with air quality standards, with the understanding that refined modeling would be necessary if compliance could not be demonstrated using the conservative screening method. Emissions during the construction phase of the project will be highly transient, occurring only briefly at each WTG/OSP location (referred to here as "nodes" of the project site) as the entire source is constructed. The screening approaches used were highly conservative because they were conducted using persistent emissions at fixed and adjacent locations. Emission rate scaling is used to account for the fraction of time the group of sources will operate at each node, with respect to the averaging time of interest.

The applicant identified 18 separate modeling scenarios (14 of which are of the construction phase of the project) that were configured to represent typical activities and emissions during the project. These scenarios each conservatively assume all operations and emissions at a single location through a whole day, though in reality operations are likely to be spread among multiple sites per day. Project impacts were determined using combinations of scenarios, assumed to occur adjacent to each other, to conservatively estimate worst-case impacts. A list of each modeling scenario and a summary of emission activities under each scenario is as follows:

Scenario 1) **Seabed prep / scour protection**
- Emissions from the use of multipurpose support vessels for seabed prep., surveys, crew support, and fall-pipe vessel for rock deposition.

Scenario 2) **Foundation installations**
- Emissions from a dynamic positioning installation vehicle, pile driving hammer, heavy crane, and support vessels such as tugs for material transport and crew transports.
- Emissions from multipurpose support vessels such as "bubble curtain" vessels for noise mitigation during pile driving.

Scenario 3) **Transition piece / jacket installations**
- Emissions from a dynamic positioning installation vehicle and support vessels such as tugs for material transport and crew transports.

Scenario 4) **Offshore export cable preparation**

- Emissions along the cable route due to surveys and seafloor prep., through the use of multipurpose support vessels.

Scenario 5) **Export cable laying**

- Emissions along the cable route due to cable laying

Scenario 6) **Inter-array cable prep**

- Emissions due to surveys, seafloor prep, and grapnel runs from multipurpose support craft.

Scenario 7) **Inter-array cable lay, burial, and termination**

- Emissions due to multipurpose support craft for laying and burial of cables and transport of equipment and crews.

Scenario 8) **OSP Installation**

- Emissions from a heavy crane, dynamic positioning installation vessel, heavy lift transports, and multipurpose support vessels.
- Assumed to occur without adjacent construction activities at nearby node for short-term averaging periods.

Scenario 9) **OSP Commissioning**

- Emissions from heavy lift transport vessels, multipurpose support vessels, heavy crane, dynamic positioning installation vehicles, and tugs.
- Emissions from permanently fixed generator.

Scenario 10) **WTG Installation**

- Emissions from a heavy crane, jack-up vessel, heavy lift transports, and multipurpose support vessels.

Scenario 11) **WTG Commissioning**

- Emissions from multipurpose support vessels, , and tugs.
- Emissions from up to 60 150 kW generators located at 60 WTGs.

Scenario 12) **Operations & Maintenance period – routine operations**

- Emissions from vessel transits and activities related to daily inspections and maintenance.
- Receptor grid covers full domain (no safety zone applicable).
- Assumes each WTG/OSP location will be visited five times per year.
- Short-term impacts scenario.

Scenario 13) **Operations & Maintenance period – WTG/OSP major repair**

- Emissions from a major repair event, where a 500-meter safety zone would be enforced.
- Emissions from jack-up vessel, tugboats, and support vessels.
- Nearby O&M daily inspection / maintenance emissions also accounted for.
- Includes transit-corridor and cable-laying emissions.
- Short-term impacts scenario.

Scenario 14) **Annual modeling of construction – OSP location centroid**

- Emissions from OSP construction plus maximum contribution from all scenarios from all eight adjacent WTG locations.

Scenario 15) **Annual modeling of construction – WTG location centroid**

- Emissions only from a single WTG location over a year; used to provide contributions from WTG nodes as part of a cumulative impact assessment.

Scenario 16) **Annual modeling of construction – transit corridor**

- Emissions from vessel transits and activities related to daily inspections and maintenance.

Scenario 17) **Annual modeling of Operations & Maintenance period**

- Emissions from vessel transits and activities related to daily inspections and maintenance.
- Receptor grid covers full domain (no safety zone applicable).
- No transit corridor emissions included because this scenario was used to only identify impacts from nearby WTG/OSP nodes on a central node (Scenario 17 impacts are added to Scenario 18 impacts, which accounts for transit corridor emissions).

Scenario 18) **Annual modeling of Operations & Maintenance period – transit corridor**

- Emissions from vessel transits and activities related to daily inspections and maintenance.
- Transit corridor emissions included.
- Receptor grid covers full domain (no safety zone applicable).

The basic screen-modeling approach was based on a multi-step process:

- In a first step, maximum design concentrations at a single WTG or OSP site (referred to as "nodes") were determined for each criteria air pollutant, under each scenario listed above.
- In the second step, the maximum contribution from the set of scenarios that could possibly occur at the same time at an immediately adjacent WTG or OSP site were added (a conservative high 1st high, unless otherwise noted). Concentrations from the simultaneous activities at an adjacent site were determined at a radial distance of 1.5 km away (the minimum distance to an adjacent WTG/OSP location is 1.8 km); deemed conservative for construction scenarios, since nearest receptors with overlapping plumes would typically be about 2.3 km distance, given the 500 m safety zone radius).
- Any impacts from more distant sources were assumed to be insignificant and already accounted for by the conservative assumptions used for the SIL and NAAQS analyses. The likelihood of adjacent high-emission activities occurring simultaneously at three or more WTG nodes in a row (aligned to any given wind direction) was considered to be very low. The conservative nature of the modeling approach was considered adequate to cover and assess any rare case of direct plume alignment between multiple nodes.
- The cumulative sum of concentrations was compared to the respective SILs, and where the SILs were exceeded, full cumulative analyses were necessary.
- Full cumulative analysis involved the addition of a background concentration and adjacent activities. Additional refinement was used in a few cases, where compliance with the standards

could not be guaranteed by the base screening process or where additional refined analysis was requested or prudent. Refined cases included:

- Annual NO_2 construction phase: Combined single domain modeling of Scenario 14 at a center node, direct modeling of Scenario 15 at surrounding eight nodes, plus Scenarios 4, 5, and 16 centered on the center node.
- 1-hour NO_2 construction phase: Combined single domain modeling of Scenarios 6&9 at a center node and Scenario 3 upwind at adjacent node. Also, the analysis considered maximum construction phase impacts could only occur at any node for up to two years; a third year was assumed to have maximum operations phase impacts at the same node (the NAAQS is based on a 3-year average).
- $PM_{2.5}$ increment analysis: adjacent activities directly modeled in the same AERMOD domain, located at the adjacent nodes in all eight possible directions.

The modeling domain for each scenario varied by placement and arrangement of the sources. Each domain during construction consisted of a polar grid of receptors, with nearest receptors 500 meters distance from the central WTG/OSP node site. The 500-meters distance coincides with the U.S. Coast Guard enforced safety exclusion zone for construction activities. The domains all represent a central node located in the inner OCS, to account for the situation where ambient air receptors are nearest to the source units (at 500 meters when the safety exclusion zone is enforced, and at the hulls of vessels in other situations).

For domains with support vessels that were transient during an operations day, point sources representing these vessels were placed at multiple locations and emissions averaged over the day. For example, crew transport vessels, which would typically move throughout the domain and spend some time at a stationary position adjacent to the WTG/OSP, would be represented by two point sources in the domain: one adjacent to the central WTG/OSP node and one fixed location in the dense polar grid area just beyond the 500 meter boundary; a constant emission rate was assigned to each point source, representing half the maximum rate of the vessel. An example of a domain for Scenario 2, which resulted in some of the highest construction phase impacts, is shown in Figure 4.

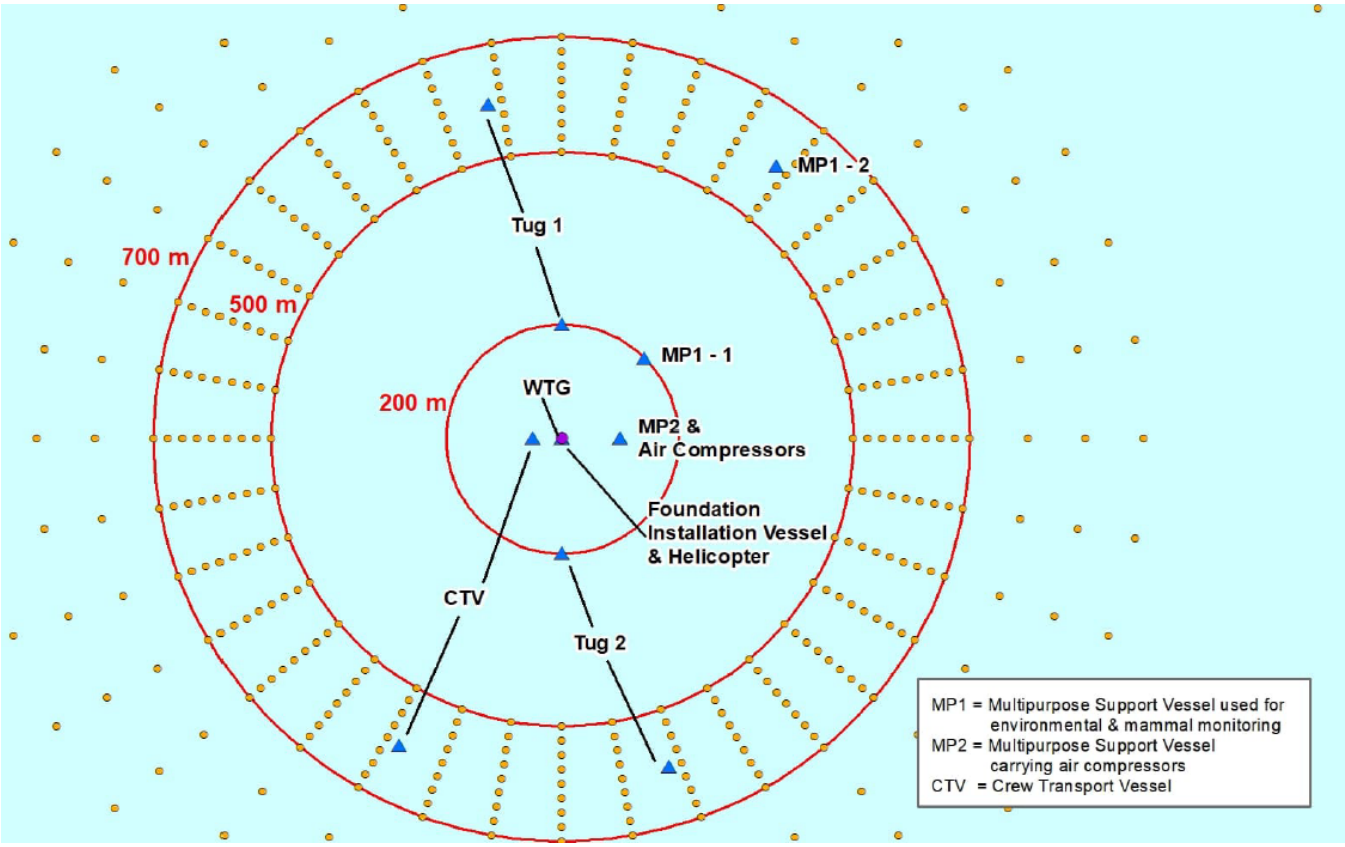

Figure 3: Distribution of receptors and sources for Scenario 2. Surrounding a WTG node as an example of AERMOD domain configuration, including Tug and CTV locations to simulate daytime vehicle movement.

Emissions included in the analysis represent the highest emitting activities anticipated for the construction phase of the source. Impacts from multiple emission scenarios (representing different activities) are assessed separately or combined as appropriate depending on the averaging time for the relevant air quality standard.

For the annual modeling, several scenarios were modeled for each pollutant, centered on the construction of an OSP or WTG site. The complete annual activity over the entire project area was averaged over the year and modeled at a single node site for purposes of the screen modeling approach. Additionally, maximum contribution from the surrounding eight nodes was considered by taking the maximum impact from all scenarios and multiplying the impact by eight (representing each possible adjacent node). This conservative screening approach was used for most cases, but further refinement was necessary for some cases, as described below.

The applicant also accounted for secondary formation of $PM_{2.5}$ resulting from precursor emissions of SO_2 and NO_x. To do so, the applicant employed the Modeled Emission Rates for Precursors (MERPs) approach, which is an appropriate Tier 1 demonstration tool consistent with requirements in section 5.4.2.b of the Guideline, as described in the EPA's April 30, 2019, Guidance.

Modeling methodologies, inputs, and techniques were consistent with the *Guideline* and associated EPA guidance. The applicant justified treatment of certain emissions as intermittent with regards to the 1-hour NO_2 NAAQS as addressed in the EPA's March 1, 2011, memorandum, "Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard" (EPA's March 1, 2011, Guidance). As such, the applicant applied a ratio of the number of operating hours per year by 8,760 hours to the 1-hour NO_2 emission rates in some cases. The EPA agrees that the applicant has appropriately represented the intermittent sources and accounted for their expected operation with respect to the 1-hour NO_2 standard. The same approach was also applied to intermittent emissions of the other criteria air pollutants modeled.

For modeling NO_2 impacts, the applicant applied EPA's Tier 3 Ozone Limiting Method (OLM) screening method consistent with Section 4.2.3.4.d of the *Guideline*. The OLM modeling was conducted using background ozone data from a site in Vineyard Haven, MA. Source-specific in-stack ratios were acquired for the various project source units using information from the USEPA in-stack ratio database.

As discussed earlier in this section, the assumption was made that the vessels would be operating continuously at or near one WTG, centered in the modeling domain. In reality, the vessels will be moving from location to location throughout the project area, spending only a fraction of the year at each WTG or OSP location. By modeling the vessels near a single WTG, the predicted air quality impacts are considered to be concentrated and conservative. In reality, the air quality impacts are presumed to be distributed across multiple WTGs and OSPs as construction continues throughout the construction phase of the project.

Secondary $PM_{2.5}$ impacts were considered using the *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program* (USEPA 2019) to provide conservative estimates of secondarily formed $PM_{2.5}$. The applicant used results from a December 2022 EPA study to develop relationships for offshore sources, to estimate secondarily formed $PM_{2.5}$ impacts. The secondary impacts were calculated and added to the primary impacts modeled with AERMOD, to determine total project impact for the assessment.

The EPA has evaluated the methods and techniques included in the air quality impact analyses for the operational period provided by the applicant and determined that they are appropriate for assessing compliance with the SILs, NAAQS, and PSD increment.

b. Assessment of Construction Phase Significant Impacts

The $PM_{2.5}$ SILs used in this portion of the assessment were established in the EPA's April 17, 2018, Guidance, as described earlier, with associated legal memorandum and technical support documents. The EPA is relying on the SIL recommended in the April 17, 2018, Guidance as appropriate for the project. The annual $PM_{2.5}$ SIL was updated and went into effect on May 6th, 2024, after the application for the project was submitted. The EPA has opted to apply the new annual SIL in this analysis.

The applicant conducted an analysis of background concentrations to provide additional justification for the use of SILs. In their analysis they demonstrate that the background concentration values are well below the NAAQS standards, and in every case, the difference between the NAAQS value and background concentration is much greater than the respective SILs. This analysis demonstrates sufficient "head room" to justify use of the SILs, such that in any case where the project is shown to be at or below a SIL, no possibility of NAAQS exceedance could occur.

The applicant's single-source modeling results for CO, NO_2, PM_{10}, $PM_{2.5}$, and SO_2 are presented in Table 15. The maximum modeled concentration from each modeling scenario was determined. These impacts included the contribution from the highest impact (1st high, unless otherwise specified) from an activity at an adjacent WTG/OSP at 1.5 km distance (considered a conservative distance, since adjacent nodes are located a minimum of 1.8 km distance).

For annual $PM_{2.5}$ and PM_{10}, single-source modeling was conducted including both emissions from vessels installing/working on the offshore cable routes (in applicable scenarios) and transiting between ports using a series of point sources spaced 1 nm (1.8 km) apart with total emissions split among the sources. For Scenarios 8 and 9, all annual emissions were modeled at the assumed OSP location. For the remainder of the scenarios, activities were assumed to occur at up to 84 WTG locations and one OSP location. The total annual emissions were spilt among all locations by ratioing the emission rates of all sources in the modeling domain. As with the short-term modeling, annual modeling was conducted using a local coordinate system to determine impacts around a single WTG/OSP. The maximum contributions from activities at all neighboring WTG locations were added to account for potential overlap of impacts from adjacent locations.

This single-source modeling indicates that impacts for annual PM_{10} and SO_2 were below the Class II significance thresholds, and no further analysis is warranted. Further cumulative analysis was required for all other pollutants and averaging times and the sections below provide summaries of these analyses.

Table 15: Comparison of the OCS Source Construction Period Impacts Against Class II SILs

Pollutant	Averaging Time	Class II SIL (ug/m^3)	Impact (ug/m^3)	Highest scenario #	Significant Impacts?
CO	1-hr	2,000	3415	2	**Yes**
	8-hr	500	1821	2	**Yes**
$PM_{2.5}$	Annual	0.13[1]	0.68	8	**Yes**
	24-hr	1.2	8.3	8	**Yes**
PM_{10}	Annual	1.0	0.85	14	No
	24-hr	5.0	14.6	3	**Yes**
NO_2	Annual	1.0	15.5	14	**Yes**
	1-hr	7.5	353	6 & 9	**Yes**
SO_2	Annual	1	0.992	14	No
	24-hr	5	36	3	**Yes**
	3-hr	25	85.2	3	**Yes**
	1-hr	7.9	102.1	3	**Yes**

[1]Revised as of April 2024 annual $PM_{2.5}$ SIL

c. Construction Phase Cumulative NAAQS Assessment

The applicant completed a cumulative modeling analysis for the air pollutants and averaging times indicated in that exceeded the SIL in the single-source analysis (as indicated in Table 15). When using results from cumulative refined modeling for NAAQS compliance, background concentrations including impacts from nearby sources, must be combined with impacts from the proposed source to identify total ambient concentrations for comparison with the NAAQS. The applicant selected onshore monitoring data as appropriately and conservatively representative of air quality in the area. The EPA finds that this assumption is protective of air quality because on- or near-shore concentration measurement datasets likely overestimate concentrations, when used to represent the offshore areas where maximum project impacts will occur.

The applicant evaluated the emissions sources in the area and determined that the only potentially interactive nearby sources (at the time of the application) were the South Fork Wind project and Vineyard Wind I project. South Fork Wind has been recently permitted and the Vineyard Wind I project is currently in construction.

The South Fork Wind project is located about 60 km northwest of the SouthCoast Wind project and no significant concentration gradient from South Fork is expected within the impact area of the SouthCoast Wind project at that distance. The EPA agreed that any possible impacts from the South Fork project would likely be accounted for in the conservative background concentrations used in this analysis.

Vineyard Wind 1 is located approximately 13 km from the SouthCoast Wind project and is also considered to not cause a concentration gradient in the vicinity of the project, given the distance of the two projects and general height of emission releases. Additionally, the Significant Impact Area (SIA) for 24-hr $PM_{2.5}$ from the Vineyard Wind Project (found to be up to 0.75 km outside of the Vineyard Wind project area at most) would not overlap the SouthCoast Wind SIA (5 km). This is additional evidence supporting the conclusion that Vineyard Wind I emissions impacts would be small and therefore adequately accounted for in the conservative background record.

Additionally, in the time since the application was received, there have been additional projects permitted, such as New England 1 and New England 2, both located about 13 km northwest from the SouthCoast Wind project at the nearest points. Contributions of impacts from these sources would be similar to those of Vineyard Wind 1, given their distance, location, and potential emissions. Also, the Sunrise Wind project was recently permitted, located about 35 km northwest from the SouthCoast Wind project at the nearest point. Again, emissions from Sunrise Wind are not expected to cause a concentration gradient in the vicinity of the SouthCoast Wind project given the distance and emissions magnitude. Also, it can be noted the Vineyard Wind Northeast and Beacon Wind projects, still in development (not yet permitted), will be located immediately adjacent to the SouthCoast Wind project. It will be the responsibility of Region 1 to ensure the emissions from these future projects do not result in a regional cumulative impact that violates an air quality standard. Overall, the EPA

concludes that the monitored background values conservatively account for all existing, recently permitted, under construction, or other nearby sources.

All refined modeling was performed in accordance with the *Guideline* and in consultation with the EPA. Total impacts of $PM_{2.5}$ included both primary and secondarily formed impacts. The results of the NAAQS assessment are listed in Table 16 and Table 17 below, where Table 16 provides the results from the conservative screening method, as described above. Table 17 provides the results for 1-hr average NO_2 modeling using refined modeling approaches.

Both annual $PM_{2.5}$ and annual NO_2 modeling was conducted using an expanded domain with a maximum OSP construction scenario (Scenario 14) assumed to occur continuously at a central node. Additionally, emissions from WTG construction (Scenario 15) assumed at all eight surrounding nodes are included as well as emissions from cable prep, laying, and vessel transits.

The 1-hour average NO_2 refined run was conducted using a 3-year design concentration determined by assuming construction emissions can only conceivably occur at an OSP/WTG source node within two consecutive years. The approach conservatively assumes maximum impact from construction emissions for year 1 and year 2 activities and a final year of maximum impact from O&M emissions at a central node, taking into account maximum contribution from an adjacent node in all cases. To demonstrate compliance, the adjacent contributing node was modeled in the same AERMOD domain (in all eight directions possible).

Overall, the EPA concludes that the applicant's modeling was appropriate to assess impacts for these pollutants. The modeling is generally highly conservative and demonstrates the project will not cause or contribute to a violation of a NAAQS of any pollutant.

Table 16: Construction phase NAAQS cumulative assessment results using the base conservative screening approach.

Poll.	Avg. Time	Rank	2018	2019	2020	Back-ground	Design Conc. (µg/m³)	Scenario / Description	NAAQS	Exceeds NAAQS?
CO	1-hr	H2H	3085	2840	3064	1803	4888	Scenario 2 highest, plus Scenario 6&9 adjacent	40,000	No
	8-hr	H2H	1798	1709	1374	1146	2945	Scenario 2 highest, plus Scenario 6&9 adjacent	10,000	No
$PM_{2.5}$	24-hr[1]	3-yr avg 98th %tile	9.2	8.0	8.7	16.2	24.8	Scenario 3 highest, plus Scenario 2 adjacent	35	No
	Annual[2,3]	3-yr avg.	0.70	0.55	0.81	6.6	7.3	Scenario 14 center, Scenario 15 at 8 surrounding nodes, plus Scenario 4, 5, and 16	9	No
NO_2	Annual[3]	Max	13.6	12.8	15.5	3.9	19.4	Scenario 14 center, Scenario 15 at 8 surrounding nodes, plus Scenario 4, 5, and 16	100	No
PM_{10}	24-hr	H2H	11.4	12.6	11.9	26	38.6	Scenario 3 highest, plus Scenario 2 adjacent	150	No
SO_2	3-hr	H2H	36.6	44.6	35.4	8.65	84.7	Scenario 3 highest, plus Scenario 2 adjacent	1300	No
SO_2	1-hr	3-yr avg. 99th %tile daily max	63.71	86.0	74.1	7.86	82.3	Scenario 3 highest, plus Scenario 7&9 adjacent	196	No

[1]A secondarily formed component of $PM_{2.5}$ of 0.033 ug/m3 was determined for 24-hr average $PM_{2.5}$ construction impacts; added to the results here.

[2] A secondarily formed component of $PM_{2.5}$ of 0.006 ug/m3 was determined for annual average $PM_{2.5}$ construction impacts; added to the results here.

[3] Annual NO_2 and $PM_{2.5}$ modeling involved a refined run with a domain including Scenario 14 (OSP construction) at a center node, Scenario 15 at surround eight nodes (WTG construction), plus Scenarios 4, 5, and 16. Construction was considered to occur at the modeled node all three years continuously.

Table 17: Construction Phase NAAQS cumulative assessment results applying refined approaches.

Poll.	Avg. Time	Rank	Year 1	Year 2	Year 3	Back-ground	Design Conc. ($\mu g/m^3$)	Scenario / Description	NAAQS	Exceeds NAAQS?
NO_2	1-hr[1]	3-yr avg. 98th %tile daily max	272.9	248.1	37.9	Included[2]	186.3	Scenario 2A 1st year, Scenario 3 2nd year (Scenario 6&9 upwind both years), Scenario 12 3rd year	188	No

[2] A 3-year design concentration for 1-hr NO2 is determined by assuming construction emissions can only conceivably occur at an OSP/WTG source node within two consecutive years. The screening approach used here conservatively assumes two years of maximum impact (98th percentile of the daily max. 1-hr concentrations) from construction activity emissions and a final year of maximum impact from O&M emissions. This screening approach is highly conservative, assuming worst-case impacts occurring at the same receptor, 3 years in a row, and assuming maximum contributions from adjacent node activities.

[3] Seasonal and hour-of-day background NO_2 concentrations used directly in AERMOD and included in project impact results.

d. Construction Phase Compliance with Class II PSD Increment

The applicant completed a Class II area cumulative PSD increment analysis using the same modeling scenarios and approaches used for the cumulative NAAQS analyses. The modeled scenarios were first evaluated against the SILs, as described in the section above. All pollutants and averaging times with respective PSD increments exceeded the SILs except for annual SO_2 and annual PM_{10}. Secondary $PM_{2.5}$ concentrations associated with project precursor emissions were accounted for in $PM_{2.5}$ increment consumption and estimated using the MERPs approach described above.

Given 24-hr $PM_{2.5}$ increment consumption was high and near the maximum allowable increase, the EPA performed additional modeling with a refined grid surrounding the area of the maximum concentration and confirmed the value submitted in the original modeling is the highest value possible (Scenario 8, at a receptor along the 500 m safety zone ambient air boundary, southwest of the central OSP position).

The construction phase Class II PSD increment analysis results are listed in Table 18. The results of the modeling demonstrate that the project will not cause or contribute to a violation of a Class II PSD increment. The maximum increment consumption for each pollutant and averaging time occurred at the ambient air boundary (the 500-meter safety radius), as shown in Figure 5.

Table 18: Construction phase Class II PSD increment analysis results

Poll.	Avg. Time	Rank	2018	2019	2020	Design Conc. (µg/m³)	Scenario / Description	Class II PSD inc. (µg/m³)	Exceeds Inc.?
$PM_{2.5}$	24-hr[1]	H2H	8.6	7.6	6.9	8.6	Scenario 7&9 is max, with max contribution from Scenario secondary impact included	9	No
	Annual	Max	0.70	0.55	0.80	0.80	Scenario 14 is max, with max contribution from Scenario 15 from all surrounding nodes, plus secondary impact, plus Scenarios 4, 5, and 16	4	No
PM_{10}	24-hr	H2H	11.4	12.6	11.9	12.6	Scenario 3 highest, plus Scenario 2 max adjacent	30	No
NO_2	Annual	Max	13.6	12.8	15.5	15.5	Scenario 14 is max, with max contribution from Scenario 15 from all surrounding nodes, plus Scenario 4, 5, and 16	25	No
SO_2	3-hr	H2H	68.1	76.1	66.9	76.1	Scenario 3 highest, plus Scenario 7 and 9 max adjacent	512	No
	24-hr	H2H	26.4	30.3	28.4	30.3	Scenario 3 highest, plus Scenario 7 and 9 max adjacent	91	No

[1]A secondarily-formed component of $PM_{2.5}$ of 0.033 ug/m3 was determined for 24-hr average $PM_{2.5}$ construction impacts; added to the results here.

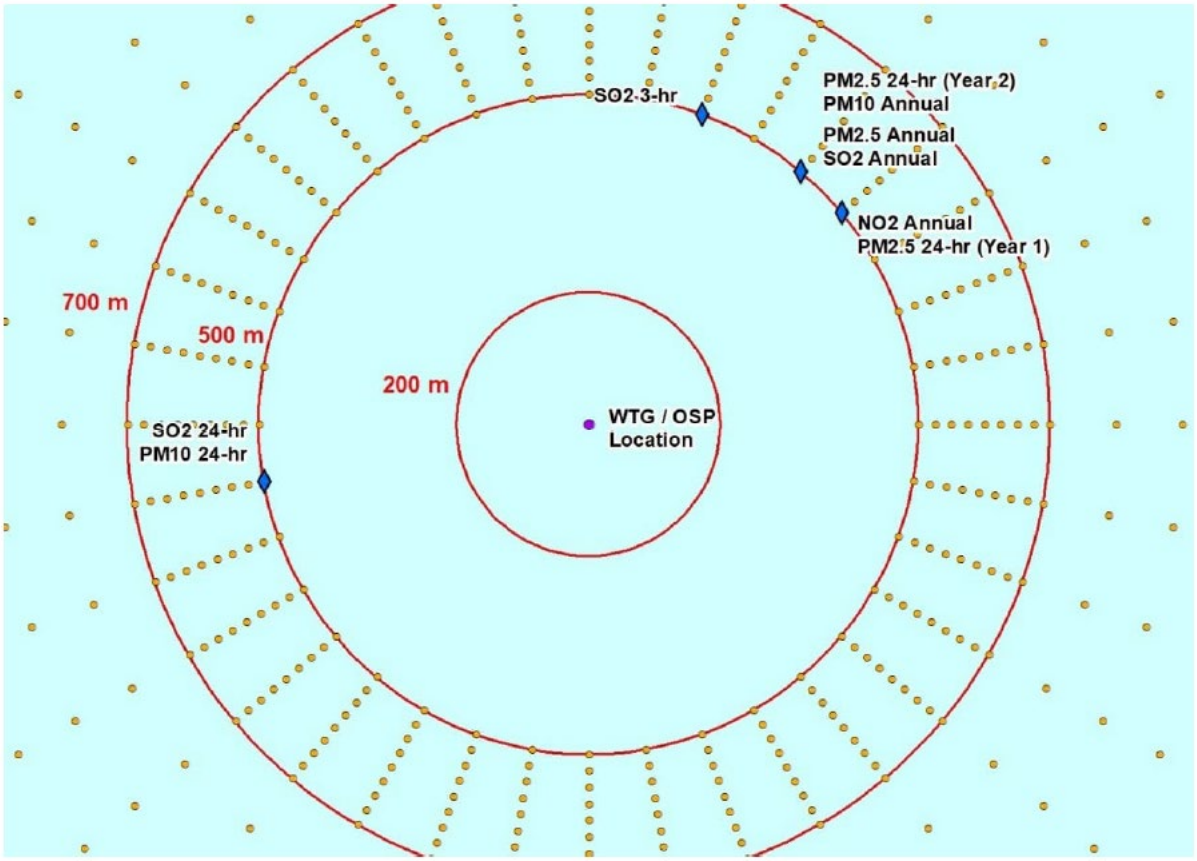

Figure 4: Construction Phase PSD increment consumption maximum impact locations.

e. Significance at Class I areas

The nearest Class I area relative to the Project is Lye Brook Wilderness area, approximately 204 mi (329 km) northwest of the lease area in southern Vermont, as shown in Figure 6. USEPA Region 1 contacted the appropriate FLMs regarding the Project and provided them with the modeling protocol (as initially submitted in August 2022). USEPA Region 1 received confirmation from the U.S. Forest Service that additional analysis of AQRVs was not required due to the distance of the project and unlikelihood of significant impacts (USEPA 2022i).

Figure 5: Class I area proximity to the SouthCoast Wind project lease area (originally specified as the Mayflower Wind project, as shown here).

The EPA did not require additional analysis of Class I PSD increment impacts as part of the application due to the unlikelihood of significant impacts at such a distance, for both the construction and O&M phases of the project. The applicant provided an analysis in Section 4.12.1 of the modeling protocol that tiered off of the Vineyard Wind I project Class I analysis to demonstrate Class I impacts from the SouthCoast Wind project would likely be well below Class I SILs at the nearest Class I areas.
In this analysis, the applicant provided the ratio of SouthCoast Wind annual emissions to Vineyard Wind emissions and used this ratio to scale modeled Class I impacts from the Vineyard Wind analysis at Lye Brook Wilderness. The scaled impacts were shown to be below the Class I SIL for all pollutants.

f. Construction Phase Impairment to Visibility, Soils, Vegetation, and Growth

For an assessment of visibility impacts, the applicant applied the near-field VISCREEN model to examine impacts at a nearest point of interest. The assessment focused on vistas at the Nantucket shore, which is a Class II area without specific Class I visibility protections. There are no specific regulatory thresholds for visibility impact in Class II areas, but the applicant used Class I Federal Land Manager screening levels as a gauge of impact significance. Modeling results showed any possible visibility impact will be below the de minimis screening criteria used for Class I areas. These impacts

can also be considered conservative because the modeling was conducted with maximum O&M emissions (major repair) from the nearest WTG node to shore, operating throughout the year. Construction emissions were not considered for visibility analysis, but these emissions are effectively temporary at any given node location and therefore not likely to affect visibility at any shore location for a significant period of time, if at all. Based on these results, EPA has no concerns regarding visibility impacts from the project.

The applicant also provided an analysis of impacts to soils and vegetation. Firstly, the EPA recognizes that the main modeling assessment showed the project would not cause or contribute to a violation of a secondary NAAQS (most of which are the same as the primary NAAQS), which provide protection to public welfare including damage to animals, crops, and vegetation.

The applicant's additional analysis used screening criteria provided in the EPA's *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils and Animals* (USEPA 1980). The maximum modeled concentrations, based on maximum construction and O&M emissions, were well below screening thresholds identified in the guidance document. Also, the applicant noted, the maximum impacts presented were at nearby overwater receptors, far from on-land locations where soils and vegetation are present. Based on the modeling analysis, the EPA has no concern of significant soil and vegetation impacts from project emissions.

g. EPA Conclusion About Ambient Air Impacts During Construction Phase

The EPA has reviewed the analyses submitted by the applicant related to ambient air impacts during the construction phase of the project. Based on this information and the EPA's assessment, as described above, the EPA concludes that the construction phase emissions will not cause or contribute to violations of the NAAQS and PSD increments, nor will risk significant impact to visibility, vegetation, and soils. Therefore, the ambient air impact requirements of the PSD regulations for the construction phase of the source have been satisfied. Under the applicable Massachusetts regulations at 310 CMR 7.00 incorporated into 40 C.F.R. Part 55, EPA has authority to require additional modeling for pollutants that are non-major or non-criteria for this project. Based on the location of the project in an area that is remote from residences, the generally diffuse nature of the emissions sources, and the anticipated environmental benefits of the project, EPA is choosing not to exercise its authority to require any additional modeling for the construction phase of this project.

2. Operations and Maintenance Phase

The PSD permitting regulations for proposed major new sources generally require applicants to perform an air quality impact analysis for those pollutants emitted in significant quantities. All pollutants with emissions greater than these thresholds during both the construction and operations phases must be assessed to ensure that emissions from the source do not cause or contribute to a violation of the NAAQS or PSD increment. An assessment of the O&M phase emissions and associated ambient impacts was provided by the applicant in an April 2023 report "Outer Continental Shelf Permit – Air Quality Modeling Report," included as Appendix C of the final revised OCS Air Permit Application submitted to EPA on April 14, 2023. Supplemental modeling, and revised reports accounting for

revisions, were provided to the EPA in February 2024 and July 2024. EPA's evaluation was based on modeling submitted in the April 2023, February 2024, and July 2024 application packages.

The following sections provide the information EPA considered in determining the appropriate ambient air impacts analysis requirements to which the source is subject for the O&M phase of the project and whether those requirements have been satisfied. Specifically, the sections below describe, for the operations phase: 1) an overview of the air modeling conducted by the applicant; 2) comparison of O&M assessment of operations phase impairment to visibility, soils, and vegetation; and 6) EPA's conclusion about the ambient air impacts during the O&M phase of the facility.

a. Overview of the Operations Phase Air Modeling Conducted by the Applicant

To assess direct near-field air quality impacts within a 50-km distance for the O&M phase of the project, the applicant used the alternative model AERCOARE-AERMOD modeling system, as described above. The alternative modeling approach was approved by EPA Region I for the assessment of impacts from both the construction and operations phases of the project.

The applicant used the same meteorological dataset for both the construction and operations phases of the project also. The development of the meteorological dataset was described in detail in the overview of construction phase air modeling above. The applicant submitted a prognostic model evaluation report to demonstrate the suitability of the dataset for regulatory use in the region of the project, as required under 40 CFR part 51, Appendix W § 8.4.5.2. The EPA reviewed the analysis and findings and agreed the evidence supports the conclusion that the dataset is sufficiently accurate and representative to use for near-field regulatory dispersion modeling. This finding is sufficient for both the construction and operations phases of the project.

The modeling analysis of impacts was conducted using a set of highly conservative activities scenarios. Modeling was conducted in a conservative screening format, summing the maximum impacts from various scenarios to account for operations at adjacent wind turbine generator (WTG) and offshore service platforms (OSP) sites. This approach was considered to be an adequate and conservative method to demonstrate compliance with air quality standards, with the understanding that refined modeling would be necessary if compliance could not be demonstrated using conservative screening methods. In actuality, emissions during the O&M phase of the project will be transient, occurring only briefly at each WTG/OSP location as vessels visit these locations for routine maintenance activities or rare major repairs. The screening approaches used were highly conservative because they were conducted using persistent emissions at fixed and adjacent locations.

The applicant identified 18 separate modeling scenarios that were configured to represent typical activities and emissions during the project (four of these scenarios are of the O&M phase of the project). These scenarios each conservatively assume all operations and emissions at a single location through a whole day, though in reality operations are likely to be spread among multiple sites per day. The list of all modeling scenarios, in the section above, identifies the O&M phase scenarios and emissions.

The screen-modeling approach consists of a multi-step process:

- In a first step, maximum design concentrations at a single WTG or OSP site were determined for each criteria air pollutant, under each activities scenario listed above.
- In the second step, the maximum contribution from the set of scenarios that could occur at the same time at an adjacent WTG or OSP site were added (High 1st high, unless otherwise noted). Concentrations from the simultaneous activities at an adjacent site were determined at a radial distance of 1.5 km away (less than the distance to the adjacent WTG/OSP location of 1.8 km; deemed conservative for construction scenarios, since nearest receptor with overlapping plumes would typically be about 2.3 km distance, given the 500 m safety zone radius).
- Any emissions from more distant sources were assumed to be insignificant and already accounted for by the conservative assumptions used for the SIL and NAAQS analyses. The likelihood of adjacent high-emission activities occurring simultaneously at three or more WTG nodes in a row (aligned to any given wind direction) was considered to be very low. The conservative nature of the modeling approach was considered adequate to cover and assess any rare case of emissions alignment.
- The cumulative sum of concentration was compared to the respective SILs, and where the SILs were exceeded, full cumulative analyses were necessary.
- Full cumulative analysis involved the addition of a background concentration and nearby source contributions.

The modeling domain for each activity emissions scenario differed by the placement and arrangement of the sources. The major O&M repair domain (Scenario 13) consisted of a polar grid of receptors, with nearest receptors 500 meters distance from the central WTG/OSP node site. The 500 meters distance coincides with the Coast Guard -enforced safety exclusion zone for heavy construction activities. The Scenario 13 O&M major repair domain is shown in Figure 7. For typical daily maintenance activities, a Coast Guard safety exclusion zone would not be enforced. In such cases, the ambient air boundary would be near to and adjacent to vessel hulls. The Scenario 12 O&M daily activity domain is shown in Figure 8.

For domains with support vessels that were transient during an operations day, point sources representing these vessels were placed at multiple locations and emissions averaged over the day. For example, crew transport vessels, which would typically move throughout the domain and spend some time at a stationary position adjacent to the WTG/OSP, would be represented by two-point sources: one adjacent to the central WTG/OSP node and one in the distance from the node.

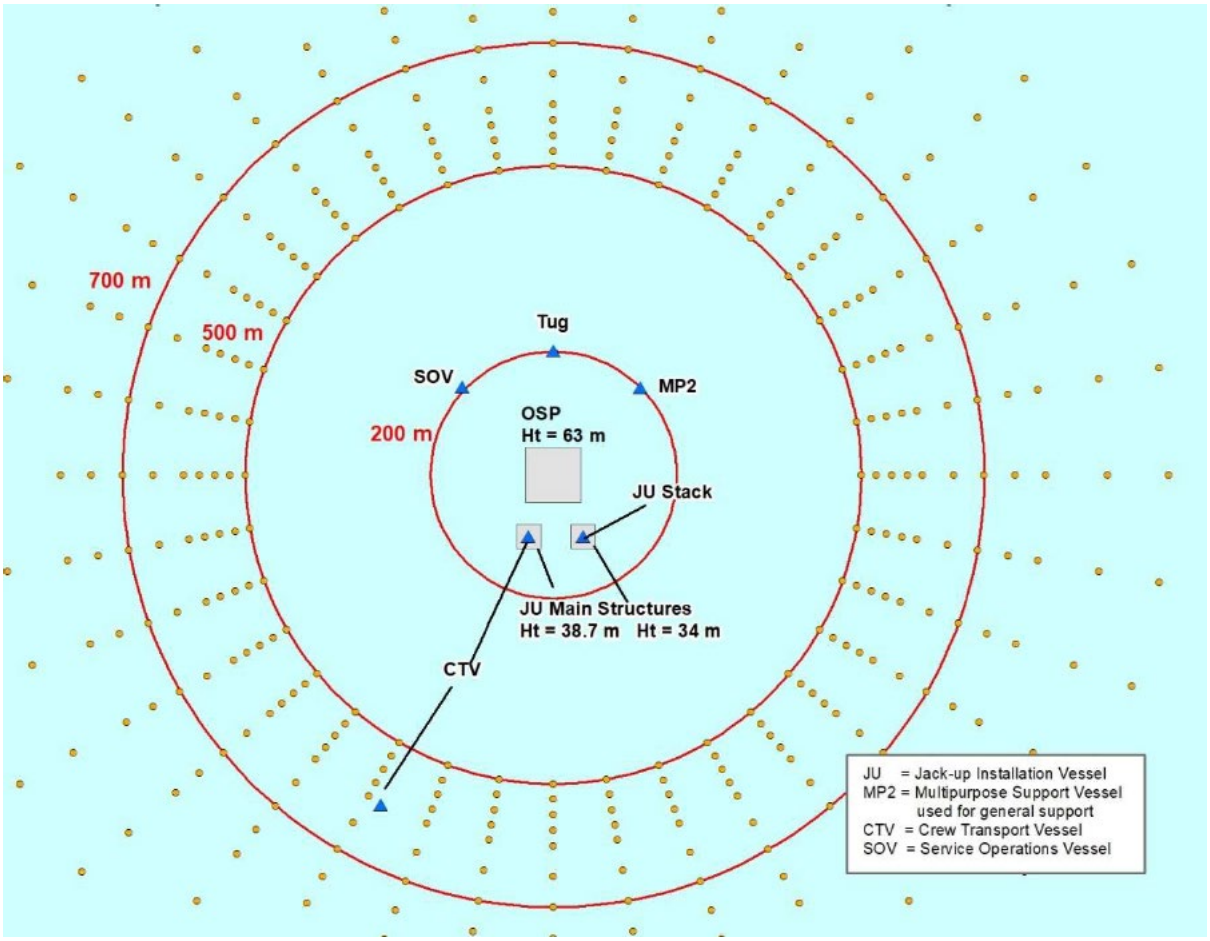

Figure 6: O&M major repair domain (Scenario 13)

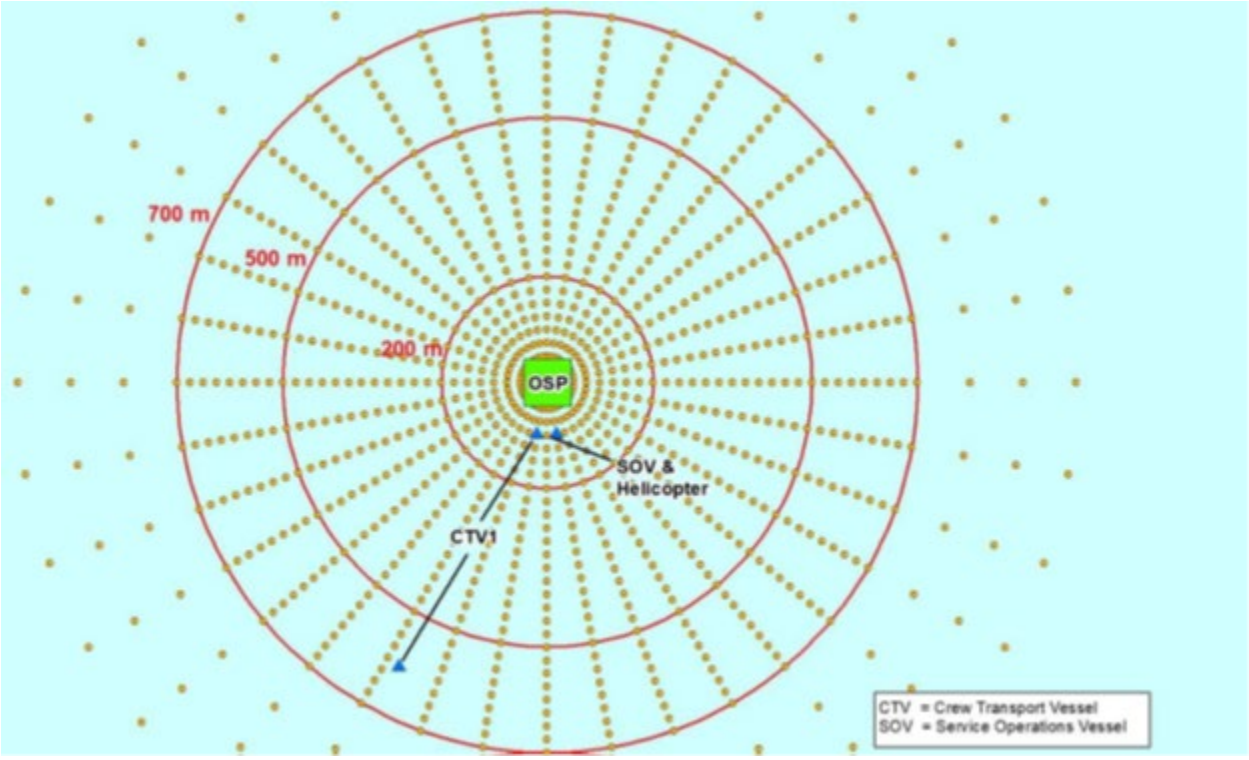

Figure 7: O&M daily routine activities domain (Scenario 12)

Emissions included in the analysis represent the highest emitting activities anticipated for the operations phase of the source. Impacts from multiple emission scenarios (representing different activities) are assessed separately or combined as appropriate depending on the averaging time for the relevant air quality standard.

For the annual modeling, several scenarios were modeled for each pollutant, centered on an OSP or WTG site. Scenarios modeled considered the case where the central node was under standard maintenance and when the central node was under major repair. The annual modeling assumes continuous O&M emissions that are distributed evenly across all 149 WTG/OSP nodes in the project, accounted for in the modeling through rated emissions. The modeling also assumes a major repair will be happening continuously throughout the year, but the emissions are spread evenly over the entire domain (all 149 WTG + OSP locations), since a major repair is a random unexpected event that could occur at any of the node locations at any time.

The facility must also account for secondary formation of $PM_{2.5}$ resulting from precursor emissions of SO_2 and NO_x. To do so, the applicant employed the MERPs approach, which is an appropriate Tier 1 demonstration tool consistent with requirements in section 5.4.2.b of the Guideline, as described in the EPA's April 30, 2019, Guidance.

Modeling methodologies, inputs, and techniques were used consistent with the *Guideline* and EPA guidance. The applicant justified treatment of certain emissions as intermittent with regards to the 1-hour NO2 NAAQS as addressed in the EPA's March 1, 2011, memorandum, "Additional Clarification

Regarding Application of Appendix W Modeling Guidance for the 1-hour NO2 National Ambient Air Quality Standard" (EPA's March 1, 2011, Guidance). As such, the applicant applied a ratio of the number of operating hours per year by 8,760 hours to the 1-hour NO2 emissions in some cases. The EPA agrees that the applicant has appropriately represented the intermittent sources and accounted for their expected operation with respect to the 1-hour NO2 standard.

For modeling NO_2 impacts, the applicant applied EPA's Tier 3 Ozone Limiting Method (OLM) screening method consistent with Section 4.2.3.4.d of the Guideline. The OLM modeling was conducted using background ozone data from a site in Vineyard Haven, MA. Source-specific in-stack ratios were acquired for the various project source units using information from the USEPA in-stack ratio database.

As discussed earlier in this section, the assumption was made that the vessels would be operating continuously at or near one WTG. In reality, the vessels will be moving from location to location throughout the wind farm spending only a fraction of the year at each WTG or OSP location. By modeling the vessels near a single WTG, the predicted air quality impacts are considered to be concentrated and conservative. In reality, the air quality impacts are presumed to be distributed across the entire set of WTG/OSP locations, since O&M activities will occur across the facility throughout the year. A major repair at any location is a random unscheduled activity that could occur at any WTG location throughout the year.

Secondary $PM_{2.5}$ impacts were considered using the *Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and PM2.5 under the PSD Permitting Program* (USEPA 2019) to provide conservative estimates of secondarily formed $PM_{2.5}$. The applicant used results from a December 2022 USEPA study to develop relationships for offshore sources, to estimate secondarily formed impacts. The secondary impacts were calculated and added to the primary impacts modeled with AERMOD, to determine total project impact for the assessment of O&M activities.

The EPA has evaluated the methods and techniques included in the air quality impact analyses for the operational period provided by the applicant and determined that they are appropriate for assessing compliance with the SILs, NAAQS, and PSD increment.

b. Assessment of Operations Phase Significant Impacts

The $PM_{2.5}$ SILs used in this portion of the assessment were established in the EPA's April 17, 2018, Guidance, as described earlier, with associated legal memorandum and technical support documents. The EPA is relying on the SIL recommended in the April 17, 2018, Guidance as appropriate for the project.

The applicant conducted an analysis of background concentrations to provide additional justification for the use of SILs. In their analysis they demonstrate that the background concentration values are well below the NAAQS standards, and in every case, the difference between the NAAQS value and background concentration is much greater than the respective SILs. This analysis demonstrates

sufficient "head room" to justify use of the SILs, such that in any case where the project is shown to be at or below a SIL, no possibility of NAAQS exceedance could occur.

The applicant's single-source model results for CO, SO_2, NO_2, PM_{10} and $PM_{2.5}$ are presented in Table 19. The maximum modeled concentration from each modeling scenario was determined. These impacts included the contribution from the highest impact from an activity at an adjacent WTG/OSP at 1.5 km distance (considered a conservative distance, since adjacent nodes are located a minimum of 1.8 km distance).

For annual $PM_{2.5}$ and PM_{10}, SIL modeling was conducted including both emissions from vessels transiting between ports using a series of point sources spaced 1 nm (1.8 km) apart with total emissions split among the sources. The total annual emissions were spilt among all locations. As with the short-term modeling, annual modeling was conducted using a local coordinate system to determine impacts around a single WTG/OSP. The maximum contributions from activities at all neighboring WTG locations were added to account for potential overlap of impacts from the different locations. For annual $PM_{2.5}$ and PM_{10}, the July 2024 updated emissions accounted for a 500 hour-per-year limit requested for emergency engines (48 hours were originally used in the modeling).

This single-source modeling results indicate that impacts for CO and all annual-averaged NAAQS (except for annual NO_2) were below the Class II significance thresholds, and no further analysis is warranted. Further analysis was required for all other pollutants and averaging times and the section below provides summaries of these analyses.

Table 19: Comparison of the OCS Source O&M Phase Impacts to Class II SILs

Pollutant	Averaging Time	Class II SIL (ug/m^3)	Impact (ug/m^3)	Highest scenario #	Significant Impacts?
CO	1-hr	2,000	633	12	No
	8-hr	500	408	12	No
$PM_{2.5}$	Annual	0.13[1]	0.085	17	No
	24-hr	1.2	10.5	12	**Yes**
PM_{10}	Annual	1.0	0.10	17	No
	24-hr	5.0	11.3	12	**Yes**
NO_2	Annual	1.0	3.7	17	**Yes**
	1-hr	7.5	20.8	12	**Yes**
SO_2	Annual	1	0.08	17	No
	24-hr	5	67.2	12	**Yes**
	3-hr	25	166.6	12	**Yes**
	1-hr	7.9	200.7	12	**Yes**

[1]Revised as of April 2024 annual $PM_{2.5}$ SIL

[2] Revised modeling as of July 2024 to account for 500 hour-per-year operation limit for emergency engines. Supplemental modeling conducted by EPA to confirm.

[3] Revised modeling with 500 hour-per-year operation limit for emergency engines.

c. Operations Phase Compliance with the NAAQS

The applicant completed a cumulative modeling analysis for the pollutants and averaging times that exceeded the SIL (refer to Table 19). When using results from refined modeling for NAAQS compliance, background concentrations including impacts from nearby sources must be combined with impacts from the proposed source to identify total ambient concentrations for comparison with the NAAQS. The applicant selected onshore monitoring datasets as conservatively representative of air quality in the offshore areas of the project. The EPA finds that this assumption is protective of air quality because it likely overestimates concentrations near the project.

The applicant evaluated the emissions sources in the area and determined that the only potentially interactive nearby sources were the South Fork Wind project and Vineyard Wind 1 project. South Fork Wind has been recently permitted and the Vineyard Wind 1 project is currently in construction. The South Fork Wind project is located about 60 km northwest of the SouthCoast Wind project and no significant concentration gradient from South Fork is expected within the impact area of the SouthCoast Wind project. The EPA agreed that any impacts from the South Fork project are likely represented in the conservative background concentration.

Vineyard Wind 1 is located approximately 13 km from the SouthCoast Wind project and is also considered to not cause a concentration gradient in the vicinity of the project. Additionally, the applicant found the Significant Impact Area (SIA) for 24-hr $PM_{2.5}$ from the Vineyard Wind Project (found to extend up to 0.75 km outside the Vineyard Wind project area at most) would not overlap the SouthCoast Wind SIA (5 km). This is additional evidence supporting the conclusion that Vineyard Wind 1 does not need to be included in the analysis as a nearby source. The EPA concludes that the monitored background values conservatively account for all other regional sources.

All refined modeling was performed in accordance with the *Guideline* and in consultation with the EPA. Total impacts of $PM_{2.5}$ included both primary and secondary impacts. The results of the NAAQS assessment are listed in Table 20 below. The modeling demonstrated that the project will not cause or contribute to a violation of a NAAQS during the operations phase of the project.
Overall, the EPA concludes that the applicant's modeling was conducted correctly and is adequate to determine the highest possible impacts of project emissions. The modeling is generally highly conservative and demonstrates the project will not cause or contribute to a violation of a NAAQS of any pollutant.

Table 20: Operations phase NAAQS assessment results using the base conservative screening approach.

Poll.	Avg. Time	Rank	2018	2019	2020	Back-ground	Design Conc. (µg/m³)	Scenario / Description	NAAQS	Exceeds NAAQS?
$PM_{2.5}$	24-hr[1]	3-yr avg. 98th %tile	6.6	6.3	6.3	16.2	22.6	Scenario 12 with adjacent Scenario 13	35	No
PM_{10}	24-hr	H2H	11.1	9.1	8.2	26.0	37.1	Scenario 12 with adjacent Scenario 13	150	No
NO_2	1-hr	3-yr avg. 98th %tile of daily max	37.5	38.4	37.8	Included[2]	37.9	Scenario 12 with adjacent Scenario 12	188	No
	Annual	Max	3.3	2.8	3.7	3.85	7.5	Scenario 17 and 18 with adjacent Scenario 17	100	No
SO_2	3-hr	H2H	141	146	130	8.7	155	Scenario 12 with adjacent Scenario 13	1300	No
	1-hr	3-yr avg. 99th %tile daily max	170	179	165	7.9	179	Scenario 12 with adjacent Scenario 13	196	No

[1]A secondarily formed component of $PM_{2.5}$ of 0.008 ug/m3 was determined for 24-hr average $PM_{2.5}$ O&M impacts; added to the results here.

[2]Seasonal and hour-of-day background concentrations used – implemented directly in AERMOD and included in the project impact results.

d. Compliance with Class II PSD Increment – Operations phase

The applicant completed a Class II area cumulative PSD increment analysis using the same modeling scenarios and general approaches used for the cumulative NAAQS analyses. The modeled scenarios were first evaluated against the SILs, as described in the section above. All pollutants and averaging times with respective PSD increments exceeded the SILs except for CO and annual-averaged values (except annual NO_2). For PSD increment analysis, exceedance of the SIL results in a need for cumulative assessment of annual NO_2, 24-hour average $PM_{2.5}$, 24-hour average PM_{10} and short-term SO_2 increments. Secondary $PM_{2.5}$ concentrations associated with project precursor emissions were accounted for in $PM_{2.5}$ increment consumption and estimated using the MERPs approach described above.

The O&M phase Class II PSD increment analysis results are listed in Table 21. The results of the modeling demonstrate that the project will not cause or contribute to a violation of a Class II PSD increment. The location of the modeled maximum consumption is shown in Figure 8. Maximum PSD

increment consumption is very near to the WTG/OSP location, about 50 meters downwind of the platforms.

Table 21: Operations Phase Class II PSD increment analysis results

Poll.	Avg. Time	Rank	2018	2019	2020	Design Conc. ($\mu g/m^3$)	Scenario / Description	Class II PSD inc. ($\mu g/m^3$)	Exceeds inc.?
NO_2	Annual	H1H	3.3	2.8	3.7	3.7	Scenario 17 and 18 with adjacent Scenario 17	25	No
$PM_{2.5}$	24-hr[1]	H2H	8.7	6.6	6.2	8.7	Scenario 12 with Scenario 13 adjacent (max. case with Scenario 13 to the south, refined model)	9	No
PM_{10}	24-hr	H2H	11.1	9.1	8.2	11.1	Scenario 12 with adjacent Scenario 13	30	No
SO_2	3-hr	H2H	145.5	146.4	129.7	146.4	Scenario 12 with adjacent Scenario 13	512	No
	24-hr	H2H	61.2	65.0	44.0	65	Scenario 12 with adjacent Scenario 13	91	No

[1]A secondarily formed component of $PM_{2.5}$ of 0.008 ug/m3 was determined for 24-hr average $PM_{2.5}$ construction impacts; added to the results here.

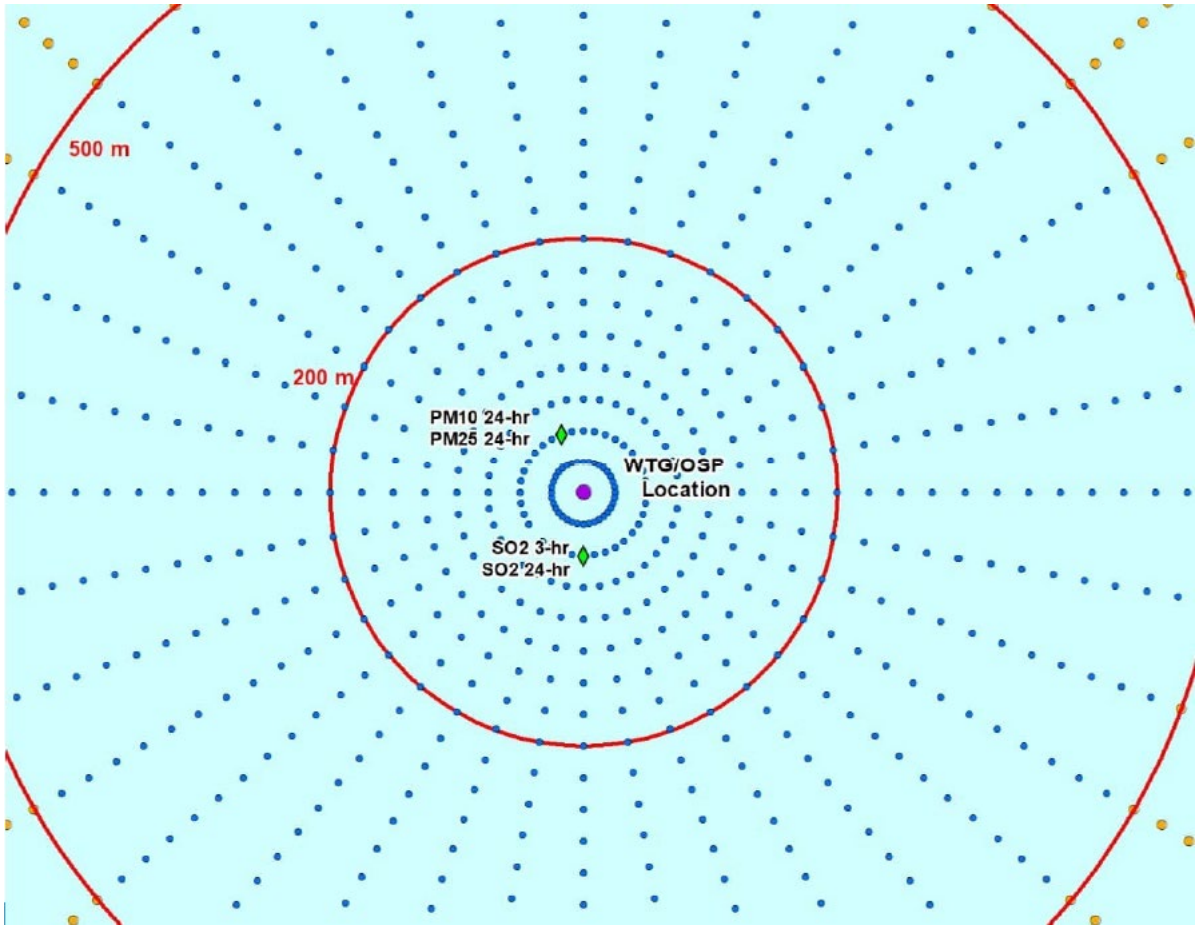

Figure 8: Operations phase location of maximum PSD increment consumption.

e. Significance at Class I areas

The EPA did not require additional analysis of Class I PSD increment impacts as part of the application due to the unlikelihood of significant impacts at such a distance from construction or operations phase emissions, as discussed above. The applicant provided an analysis in Section 4.12.1 of the modeling protocol that tiered off of the Vineyard Wind I project Class I analysis to demonstrate Class I impacts from the SouthCoast Wind project would likely be well below Class I SILs at the nearest Class I areas. In this analysis, the applicant provided the ratio of SouthCoast Wind annual emissions to Vineyard Wind emissions and used this ratio to scale modeled Class I impacts from the Vineyard Wind analysis at Lye Brook Wilderness. The scaled impacts were shown to be below the Class I SIL for all pollutants. The EPA concurs with the findings that no impacts to Class I areas from the project are expected for the operations phase of the project.

f. Operations Phase Impairment to Visibility, Soils, Vegetation, and Growth

For an assessment of visibility impacts, the applicant applied the VISCREEN model to examine impacts at a nearest point of interest, as discussed above. The assessment focused on vistas at the Nantucket shore, which is a Class II area without specific Class I protections. There are no specific regulatory requirements regarding level of visibility impact in Class II areas, but the applicant used Class I Federal

Land Manager screening levels as a gauge of impact significance. Modeling results showed any visibility impact to the area will be below the de minimis screening criteria used for Class I areas. These impacts can also be considered conservative because the modeling was conducted with maximum O&M emissions (major repair) from the nearest WTG node to shore, operating throughout the year. Based on these results, EPA has no concerns regarding visibility impacts from the project.

The applicant also provided an analysis of impacts to soils and vegetation. Firstly, the EPA recognizes that the main modeling assessment showed the project would not cause or contribute to a violation of the secondary NAAQS (most of which are the same as the primary NAAQS), which provide protection to public welfare including damage to animals, crops, and vegetation. The applicant's additional analysis used screening criteria provided in the EPA's *A Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils and Animals* (USEPA 1980). The maximum modeled concentrations, based on maximum construction and O&M emissions, were well below screening thresholds identified in the guidance document. Also, the applicant noted, the maximum impacts presented were at nearby overwater receptors, far from on-land locations where soils and vegetation are present. Based on the modeling analysis, the EPA has no concerns regarding soil and vegetation impacts from the project emissions.

g. EPA Conclusion About Ambient Air Impacts During Operations Phase

The EPA has assessed the analyses submitted by the applicant related to ambient air impacts during the operations phase of the project. Based on this information and the EPA's assessment, as described above, the EPA concludes that the operations phase emissions will not cause or contribute to violations of the NAAQS or PSD increments. Therefore, the ambient air impact requirements of the PSD regulations for the operations phase of the source have been satisfied. Under the applicable Massachusetts regulations at 310 CMR 7.00 incorporated into 40 C.F.R. part 55, EPA has authority to require additional modeling for pollutants that are non-major for this project. Based on the remoteness from residences, the generally diffuse nature of the emissions sources, and the anticipated environmental benefits of the project, EPA is choosing not to exercise its authority to require additional modeling for the operations phase of this project.

V. Nonattainment New Source Review (NNSR)

The SCW project is located 26 NM south of Martha's Vineyard and 20 NM south of Nantucket, Massachusetts, therefore, the NOA is Nantucket, Massachusetts. Massachusetts is part of the Ozone Transport Region (OTR),[76] and areas within the OTR are treated, at a minimum, as moderate Nonattainment areas for ozone, the ozone precursors NO_x and VOC are subject to the state's NNSR program requirements. The NNSR regulations in Massachusetts are implemented under 310 CMR 7.00, *Appendix A.* The regulations specify that new major stationary sources or major modifications to an existing major source within an air quality Nonattainment area must undergo a NNSR review and obtain all applicable federal and state preconstruction permits prior to commencement of construction. The intent of the NNSR review and conditions are to ensure that the increased emissions from a new or modified source are controlled to the greatest degree possible; and to ensure that more than an equivalent offsetting emission reduction (emission offsets) for operational emissions be achieved by existing sources; so that there will be reasonable further progress toward achievement of the NAAQS. Regulated NSR pollutants (and their precursors) for which an area is Nonattainment are not subject to PSD review even if the project emission increase and net emission increase is significant. Instead, they are subject to major NNSR permitting. Therefore, the ozone precursors NO_x and VOC are not subject to PSD review in the inner OCS and instead are subject to major NNSR permitting review as described below. The NNSR program applies to new major sources and major modifications at existing major sources as defined and described in 310 CMR 7.00*, Appendix A.*

Per 310 CMR 7.00*, Appendix A*, "Major Stationary Source means any stationary source of air pollutants which emits or has the federal potential emissions greater than or equal to, 100 TPY or more of any pollutant subject to regulation under the Act, except those lower emissions thresholds shall apply as follows: 50 TPY of volatile organic compounds (VOC), or 50 TPY of oxides of nitrogen (NO_x)." Since the source is considered a new source and subject to COA requirements for NNSR, the emissions increase from the project must be evaluated under NNSR to determine if it exceeds the major source thresholds. The NNSR requirements apply to each regulated NNSR pollutant that a "major source emits in significant amounts" per 310 CMR 7.00, *Appendix A. See* Table 22 *below for a summary of these applicable thresholds.*

Table 22: NNSR SER Thresholds under 310 CMR 7.00, Appendix A

NNSR Regulated Pollutant	NNSR Significant Emission Rate (SER)
Ozone	25 TPY of nitrogen oxides (NO_x) where an administratively complete application was received on or after November 15, 1992, for the physical change or change in the method of operation.
Ozone	40 TPY of VOC 25 TPY of VOC where an administratively complete application was received on or after November 15, 1992, for the physical change or change in the method of operation.

[76] In the CAA amendments of 1990, Congress created the OTR, located in the northeast portion of the country, to address ozone formation due to transport of air emissions. Congress included all of Massachusetts as one of the states or commonwealths within the OTR.

A. Major Source Applicability

For the NSR preconstruction permitting programs, (which include PSD and NNSR), stationary sources of air pollution are required to obtain permits before beginning construction, modification, and operation. Part D of Title I of the CAA contains the NNSR program, reflecting the requirements for the preconstruction review and permitting of new and modified major stationary sources of air pollution located in areas designated as not meeting the NAAQS ("nonattainment" areas) or areas located in the ozone transport region. The NNSR program requires for new major sources and major modifications of existing sources in a nonattainment area or in the ozone transport region application of control technology that meets the statutory definition of the LAER and requires that emissions offsets be obtained by the new or modified source. Therefore, both the Federal requirements set forth in 40 C.F.R. 55.13 and the Federal, State, and local requirements of the COA set forth in 40 C.F.R. 55.14 apply to the SCW project. Specifically, the portion of the OCS source located within 25 NM of the state seaward boundary is subject to all of the requirements applicable onshore, including the federal requirements identified in 40 C.F.R. part 55.13, and the applicable Massachusetts requirements incorporated into 40 C.F.R. 55.14(e) and Appendix A to 40 C.F.R. part 55. The portion of the OCS source that will be located beyond 25 NM from the Massachusetts's SSB is subject only to the federal requirements identified in § 55.13.

EPA is issuing a single preconstruction permit that incorporates both the State and Federal requirements applicable to the OCS source. Because the COA is treated as nonattainment for ozone, both the Federal PSD requirements pertaining to attainment pollutants and the State NNSR requirements pertaining to nonattainment pollutants will apply to the SCW project in the inner OCS.

1. Emission Increase Calculation (Potential to Emit)

As shown in Table 23, the project is a new major NNSR source because emissions for at least one "regulated NSR pollutant" (i.e., NOx and VOC) exceed their respective major source applicability threshold of 50 TPY. For major NNSR sources, once a "regulated NSR pollutant" is emitted at levels at or above the major source applicability threshold other "regulated NSR pollutant[s]" that are emitted at levels above the significant emission rate thresholds are subject to review. The emissions increase from the Project are calculated pollutant by pollutant for each regulated NSR pollutant.

Table 23: Worst Case Annual Emissions Compared with NNSR Major Source Thresholds

NNSR Regulated Pollutant	Potential to Emit (TPY)	NNSR Major Source Threshold (TPY)	NNSR Triggered? (Y/N)
NO_X [(1)]	4,214	50	**Y**
VOC	188	50	**Y**

[(1)] Nitrogen dioxide is the compound regulated as a criteria pollutant under PSD; however, significant emissions rate for NSR is based on the sum of all oxides of nitrogen, i.e., NO_X.

For projects that only involve the construction of new emission units, like SCW, the significant emissions increase is the new emissions unit's PTE.[77] For a new emission unit, the baseline actual emissions (BAE) for purposes of determining the emissions increase that will result from the initial construction and operation of such unit shall equal zero; and thereafter, for all other purposes, shall equal the unit's PTE.

For assessing the emission increases from the SCW Project, emissions from the equipment or activities considered part of the OCS source, and all emissions from vessels servicing or associated with the project, are included in the PTE. This includes emissions from vessels, regardless of whether the vessel itself meets the definition of an OCS source, when the vessels are at or going to or from an OCS source and are within 25 NM of the source's centroid. Thus, emissions from vessels servicing or associated with an OCS source that are within 25 NM of the source's centroid are considered in determining the PTE or "potential emissions" of the OCS source for purposes of applying the NNSR regulations.

The emission increases from the Project are calculated on a pollutant-by-pollutant basis for each regulated NNSR pollutant emitted by the source.

Table 24: Emission Increase from the SouthCoast Wind Project

SouthCoast Wind Project Emission Increase	Regulated NNSR Pollutant (TPY)	
	NO_x	VOC
BAE	0	0
PTE	4,214	188
Δ (PTE-BAE)	+4,214	+ 188

As shown in Table 24 a significant emissions increase (per the definition of "Significant" at *310 CMR 7.00, Appendix A)* of ozone has occurred. Note that NO_x and VOC are considered precursors for the criteria pollutant ozone.

Table 25: Worst Case Annual Emission Estimate Compared with NNSR SER Thresholds

NNSR Regulated Pollutant	Project Emission Increase (TPY)	NNSR Significant Emission Rate (TPY)	SER Triggered? (Y/N)
NO_x	4,214	25	**Y**
VOC	188	25	**Y**

2. Emission Netting (Contemporaneous Netting)

310 CMR 7.00: *Appendix A* define "net emission increase" as "the amount by which the sum of the following exceeds zero: (1) Any increases in actual emissions from a particular physical change or

[77] Under 310 CMR 7.00, "potential to emit" is defined as the maximum capacity of a source to emit a pollutant under its physical and operational design (pg. 430). Typically, emissions from mobile sources and secondary emissions do not count when determining a stationary source's PTE. However, the definition of "potential emissions" in the OCS Air Regulations is expanded to include emissions from all vessels servicing or associated with an OCS source when within 25 NM of the project centroid.

change in the method of operation at a stationary source; and (2) Any other increases and decreases in actual emissions at the source shall be included for netting purposes, that are contemporaneous with the particular change and are otherwise creditable as described in 310 CMR 7.00: *Appendix A* Net Emissions Increase (b), (c), (d), (e) and (f).” In other words, netting looks at the other projects that may have been or will be undertaken at a given OCS facility over the contemporaneous period.

SCW is a new major source, and therefore a Step 2 contemporaneous netting analysis is not applicable.

3. Summary

Based on the emission levels for the project, as presented in Table 25, NO_x and VOC will be emitted by the Project in quantities exceeding the respective NNSR SER. The project is considered a new major source subject to NNSR requirements for NO_x and VOC.

B. Lowest Achievable Emission Rate (LAER)

As defined in 310 CMR 7.00*, Appendix A*, LAER "means, for any source, the more stringent rate of emissions based on the following: (a) The most stringent emissions limitation which is contained in any state SIP for such class or category of stationary source, unless the owner or operator of the proposed stationary source demonstrates that such limitations are not achievable; or (b) The most stringent emissions limitation which is achieved in practice by such class or category of stationary source. . . . In no event shall LAER allow a proposed new or modified stationary source to emit any pollutant more than the amount allowable pursuant to an applicable new source standard of performance."

SCW does not yet know specifically which vessels will be utilized for the project. The procurement of the vessels requires contracts within short timeframes due to the specific nature of the OCS project which is described in more detail below. Thus, only some of the marine vessel (and associated engines) secured at the time of permit application are known. In addition, the applicant has indicated that some of the marine vessels will be owned by third parties; however, the procurement of the vessels for purposes of conducting the work on the project is decided by the facility (i.e., SCW). These third-party vessels are noted to have the potential to be considered an OCS source. The EPA is considering all these facts in determining LAER for those emission units proposed in the Project.

1. Methodology

Although the definition for LAER differs from BACT, the BACT and LAER analyses have overlap in the methodology used to perform them. EPA follows the equivalent Step 1 and Step 2 procedure[78] as outlined in the "top-down" process used to satisfy the BACT requirements (see Section IV.B.1 above) in its analysis of paragraph (a) of the definition of LAER. Paragraph (b) of the definition of LAER follows Steps 3 through 5 of the "top-down" BACT analysis closely with only one major distinction. In Step 4 of a BACT analysis, where energy, environmental, and economic impacts are assessed, the EPA can remove a technology from consideration based on any of those criteria. However, for LAER determinations, when determining the emission limit and identifying at least one technology that can be used to achieve the emission limit, the EPA cannot consider the energy, environmental, or economic impacts associated with that technology, it has to be the most stringent emissions limitation for the project as define in the previous paragraph. Furthermore, the LAER analysis is on a per pollutant basis, like PSD, but the regulated NSR pollutants that are evaluated under NNSR are only the NAAQS for each emission unit that could emit a NAAQS in a nonattainment area. In the case of this SCW permit application, NO_X and VOC are the only regulated NSR pollutants both subject to NNSR and thus LAER review. In light of these similarities, EPA has conducted a "top-down" LAER analysis consistent with the definition of LAER in 310 CMR 7.00*, Appendix A*.

[78] Paragraph (a) of the definition for LAER is addressed within Steps 1 and 2 of a BACT analysis. Step 1 of the BACT analysis requires the identification of all emission control technologies that are possible for the sources, including technologies used to comply with the most stringent emission limit in a state SIP. Step 2 of the BACT analysis requires the permitting authority, in this case EPA, to document why a particular control technology is technically infeasible, for that source category. Unless the proposed LAER has been indicated by the applicant to not be achievable, such that the cost is so great that project could not be built. The remaining highest ranked technically feasible technology after Step 3 of the BACT analysis was carried through to Step 5.

2. LAER Analysis for the SouthCoast Wind Project

a. Emission Unit Applicability

The Project is required to apply LAER to all emission units, located within the inner OCS, which meet the definition of an OCS source. OCS sources located within 25 NM of the SSB (in the inner OCS) are subject to the federal requirements set forth in 40 CFR part 55, including section 55.13, and the Federal, State, and local requirements of the COA set forth in section 55.14. *See* Section III.E.

b. Pollutant Applicability

A LAER analysis is required for each emission unit for each pollutant which exceeds the NNSR major source threshold. Based on the emission levels for the project, as presented in Table 25, NO_X and VOC are the precursors for the NNSR regulated pollutant ozone which will be subject to LAER.

Step 1 – Eligible LAER Controls

EUG 1—OCS Generator Engine(s) Installed on the OSP(s) and WTG(s)

Identified LAER control options for EUG 1 do not differ from those identified in the BACT section and therefore are not repeated here. *See* Section V.B.2.b(2).

EUG 2—Marine Engines on Vessels when operating as an OCS Source(s)

Identified LAER control options for EUG 2 do not differ from those identified in the BACT section, other than the inclusion of the SIP limitations outlined below, and therefore are not repeated here. *See* Section V.B.2.b(1).

As part of the LAER review pursuant to 310 CMR 7.00, *Appendix A*, Lowest Achievable Emission Rate(a), EPA identified the following state SIP limitations for similar classes of sources to EUG 2:

- Airborne Toxic Control Measure for Auxiliary Diesel Engines Operated on Ocean-Going Vessels At-Berth in a California Port (13 CCR § 2299.3 and 17 CCR § 93118.3, dated January 2, 2009); and

- *Airborne Toxic Control Measure for Commercial Harbor Craft* (17 CCR § 93118.5, excluding (e)(1), dated July 20, 2011).

California's "At-Berth Regulation" at 13 CCR § 2299.3 and 17 CCR § 93118.3 requires vessel operators visiting California ports to reduce at-berth emissions from auxiliary engines on ocean-going vessels by either: 1) turning off auxiliary engines and connecting the vessel to some other source of power (most likely grid-based shore power); or 2) using alternative control technologies that achieve equivalent emission reductions (CARB 2017b). This requirement does not apply to the project's OCS sources because project-related vessels will not be OCS sources while at-berth.

California's "Commercial Harbor Craft Regulation" at 17 CCR § 93118.5 requires all engines in "newly acquired" harbor craft that are intended to operate in any Regulated California Waters to be certified to meet the EPA Tier 2, Tier 3, or Tier 4 marine engine emission standards in effect at the time of acquisition (see 17 CCR § 93118.5(e)(3) and (4)). Under this regulation, marine engines for newly acquired in-use harbor craft are not required to meet Tier 4 marine standards, but engines that are already certified as meeting Tier 4 marine standards cannot be replaced with lower Tier engines (17 CCR § 93118.5(e)(3)). Any engines in newly acquired new harbor craft must meet applicable EPA Tier 2, 3, or Tier 4 marine standards in effect at the date of vessel acquisition (17 CCR § 93118.5(e)(4)).

At the time of application, EPA is not aware of vessels that will be "newly acquired" by the Permittee. However, if vessels became "newly acquired" by the Permittee, 17 CCR § 93118.5(e)(3) and (4) would apply to the project.

The Commercial Harbor Craft Regulation also requires the eventual replacement or cleanup of pre-Tier 1 or Tier 1 engines used in ferries, excursion vessels, tugboats, towboats, push boats, crew and supply vessels, barge, and dredge vessels. Under 17 CCR § 93118.5(e)(6), Tier 1 and earlier engines in these vessel types must be brought into compliance with emission limits equal to or more stringent than EPA Tier 2 marine engine emission standards through engine replacement, modification, or retrofit by the dates provided in the compliance schedules (CARB 2017a). The compliance dates are designed to clean up the fleet's oldest and dirtiest engines first, while giving more time for relatively newer, Tier 1 engines to be upgraded or replaced. Based on the EPA-approved 2011 version of the Commercial Harbor Craft Regulation that is incorporated into the California SIP (*see* 83 Fed. Reg. 23232, May 18, 2018), these vessel types are defined as:

- Ferry: A harbor craft having provisions only for deck passengers or vehicles, operating on a short run, on a frequent schedule between two points over the most direct water route, and offering a public service of a type normally attributed to a bridge or tunnel.

- Excursion vessel: A self-propelled vessel that transports passengers for purposes including, but not limited to, dinner cruises; harbor, lake, or river tours; scuba diving expeditions; and whale watching tours. "Excursion Vessel" does not include crew and supply vessels, ferries, and recreational vessels.

- Tugboat: Any self-propelled vessel engaged in, or intending to engage in, the service of pulling, pushing, maneuvering, berthing, or hauling alongside other vessels, or any combination of pulling, pushing, maneuvering, berthing, or hauling alongside such vessels in harbors, over the open seas, or through rivers and canals. Tugboats generally can be divided into three groups: harbor or short-haul tugboats, ocean-going or long-haul tugboats, and barge tugboats. "Tugboat" is interchangeable with "towboat" and "push boat" when the vessel is used in conjunction with barges.

- Towboat or push boat: Any self-propelled vessel engaged in or intending to engage in the service of pulling, pushing, or hauling alongside barges or other vessels, or any combination of pulling, pushing, or hauling alongside barges or other vessels. Push boats and towboats are interchangeable terms.

- Crew and supply vessel: A self-propelled vessel used for carrying personnel and/or supplies to and from off-shore and in-harbor locations (including, but not limited to, off-shore work platforms, construction sites, and other vessels).

- Barge: A vessel having a flat-bottomed rectangular hull with sloping ends and built with or without a propulsion engine.

- Dredge: A vessel designed to remove earth from the bottom of waterways, by means of including, but not limited to, a scoop, a series of buckets, or a suction pipe. Dredges include, but are not limited to, hopper dredges, clamshell dredges, or pipeline dredges.

The following vessel types and engines are exempt from 17 CCR § 93118.5(e)(6), as incorporated into the California SIP:

- Temporary replacement vessels (a temporary replacement vessel is only exempt upon written approval and can only be used as a replacement for up to one year
- Temporary emergency rescue/recovery vessels
- Recreational vessels, registered historic vessels, US Coast Guard (USCG) vessels, and military tactical support vessels
- Near-retirement vessels (must be taken out of service within one year of its engines' compliance date)
- Engines less than 50 horsepower
- Ocean-going vessels other than ocean-going tugboats and towboats.[79] Ocean-going vessels are defined as a commercial, government, or military vessels meeting any one of the following criteria:
    a) a vessel greater than or equal to 400 feet in length overall as defined in 50 C.F.R. § 679.2, as adopted June 19, 1996;

    b) a vessel greater than or equal to 10,000 gross tons per the convention measurement (international system) as defined in 46 C.F.R. 69.51.61, as adopted September 12, 1989; or,

    c) a vessel propelled by a marine compression-ignition engine with a per cylinder displacement of greater than or equal to 30 liters.

The EPA's review of SIPs found no other NO_X or VOC emission limitations relating to marine CI-ICEs.

[79] Ocean-going tugboats and towboats are defined as tugboats and towboats with a "registry" (foreign trade) endorsement on its USCG certificate of documentation, or tugboats and towboats that are registered under the flag of a country other than the U.S.

Step 2 – Eliminate Technically Infeasible Options

Below is a summary of the reasons for eliminating, or justification for not eliminating, each of the control options from further consideration in the top down LAER analysis for the Project. For more details, please refer to the permit application and support documents in the docket.

EUG 1 - OCS Generator Engine(s) Installed on the OSP(s) and WTG(s)

The reasoning for excluding certain control options identified for EUG 1 does not differ from the justification given in the BACT section and therefore is not repeated here. *See* Section IV.B.2.a(2).

EUG 2 - Marine Engines on Vessels when operating as an OCS Source(s)

The reasoning for excluding certain control options identified for EUG 2 does not differ from the justification given in the BACT section and therefore is not repeated here. *See* Section IV.B.2.a(2).

Step 3 – Rank remaining control technologies.

EUG 1 - OCS Generator Engine(s) Installed on the OSP(s) and/or WTG(s)

Nitrogen Dioxide (NO_X)

SCW-1, SCW-62

- The applicant has identified SCW-1 and SCW-62 to have a maximum power rating of 1400 kW. The Tier 4 emission standards for C1 and C2 engines are applicable to emission units with a maximum power rating (kW) between 1,400 ≤ kW < 2,000. The NO_X emission standard for C1 and C2 engines (Tier 4) ranges based on the specific power of the engine. For C1 and C2 engines, the Tier 4 NO_X emission standard of 1.8 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) greater than 900 kW, the NOx standard for generator sets is 0.67 g/kW-hr and represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

Therefore, the NO_X emissions standards within 40 C.F.R. part 1039 are the most stringent limits that would apply to the SCW-1 and SCW-62.

SCW-2 – SCW-61, SCW-63—SCW-123

- The Tier 4 emission standards for C1 and C2 engines are only applicable to emission units with a maximum power rating greater than or equal to 600 kW. The applicant has identified SCW-2 – SCW-61, SCW-63—SCW-123 to have a maximum power rating of 150 kW. The emission

standard for C1 and C2 engines (Tier 3) ranges based on the specific displacement (L/cylinder) and power density (kW/L) of the engine. Therefore, for C1 engines, the Tier 3 NOx + HC emission standard range of 5.4–5.8 (g/kW-hr) and C2 engines, the Tier 3 NOx + HC emission standard range of 6.2–11.0 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) between 130 ≤ kW < 225, the NO_x emission standard (Tier 4) of 0.40 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

Therefore, the NOx emissions standards within 40 C.F.R. part 1039 that would apply to the SCW-2 – SCW-61 and SCW-63—SCW-123 are more stringent than the NO_x emissions standards within 40 C.F.R. part 1042.

SCW-124, SCW-125

- The applicant has identified SCW-124 and SCW-125 to have a maximum power rating of 1680 kW. The Tier 4 emission standards for C1 and C2 engines are applicable to emission units with a maximum power rating between 1,400 ≤ kW < 2,000. For C1 and C2 engines, the Tier 4 NO_x standard of 1.8 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

Therefore, the NO_X emissions standards within 40 C.F.R. part 1042 are the most stringent limits that would apply to the SCW-124 and SCW-125.

VOC (HC or NMHC)

SCW-1, SCW-62

- The applicant has identified SCW-1 and SCW-62 to have a maximum power rating of 1400 kW. The Tier 4 emission standards for C1 and C2 engines are applicable to emission units with a maximum power rating (kW) between 1,400 ≤ kW < 2,000. For C1 and C2, the Tier 4 HC + NO_x emission standard of 0.19[80] (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) greater than 900 kW, the NMHC emission standard (Tier 4) of 0.19 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

[80] Note that the HC standard for generator sets is 0.19 g/kW-hr.

Therefore, the VOC (HC) emissions standards within 40 C.F.R. part 1039 are equivalent to the limits in 40 C.F.R. part 1042 that would apply to the SCW-1 and SCW-62.

SCW-2 – SCW-61, SCW-63—SCW-123

- The Tier 4 emission standards for C1 and C2 engines are only applicable to emission units with a maximum power rating greater than or equal to 600 kW. The applicant has identified SCW-2 – SCW-61, SCW-63—SCW-123 to have a maximum power rating of 150 kW. The emission standard for C1 and C2 engines (Tier 3) ranges based on the specific displacement (L/cylinder) and power density (kW/L) of the engine. Therefore, for C1 engines, the Tier 3 NO_x + HC emission standard range of 5.4–5.8 (g/kW-hr) and C2 engines, the Tier 3 NO_x + HC emission standard range of 6.2–11.0 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) between 130 ≤ kW < 225, the NMHC emission standard (Tier 4) of 0.19 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

Therefore, the emissions standards within 40 C.F.R. part 1039 are more stringent than the limits in 40 C.F.R. part 1042 that would apply to the SCW-2 – SCW-61 and SCW-63—SCW-123.

SCW-124, SCW-125

- The applicant has identified SCW-124 and SCW-125 to have a maximum power rating of 1680 kW. The Tier 4 emission standards for C1 and C2 engines are applicable to emission units with a maximum power rating between 1,400 ≤ kW < 2,000. For C1 and C2 engines, the Tier 4 HC + NO_x emission standard of 0.19 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

Therefore, the HC + NO_x emission standard within 40 C.F.R. part 1042 are the most stringent limits that would apply to the SCW-124 and SCW-125.

EUG 2 - Marine Engines on Vessels when operating as OCS Source(s)

The ranking of control options identified for EUG 2 does not differ from ranking as presented in the BACT section, other than the inclusion of the SIP limitations outlined below and is not repeated here. *See* Section IV.B.2.a(3).

The Project will require, at a minimum, that all engines on “newly acquired” harbor craft be certified to the EPA Tier 2, Tier 3, or Tier 4 marine engine emission standards in effect at the time of acquisition (see 17 CCR § 93118.5(e)(3) and (4)).

The Project will require, at a minimum, that all pre-Tier 1 or Tier 1 marine engines on vessels that are applicable vessel types under 17 CCR § 93118.5(e)(6) (i.e., ferries, excursion vessels, tugboats, towboats, push boats, crew and supply vessels, barge, and dredge vessels) comply with emission limits equal to or more stringent than EPA Tier 2 marine engine emission standards through engine replacement, modification, or retrofit.

Step 4 – Evaluate most effective controls and document results.

The LAER determination does not consider economic, energy, or other environmental factors. Therefore, the cost effectiveness of each control technology is not necessary for the selection of LAER.

Step 5 – Select LAER

Based on the preceding analysis, the following combination(s) are proposed as LAER for NO_X and VOC emissions from the regulated compression ignition internal combustion engines in the project.

EUG 1 - OCS Generator Engine(s) Installed on the OSP(s) and WTG(s)

OCS generator engines installed on the OSP(s) and WTGs certified to the highest emission standards contained in 40 C.F.R. part 60, subpart IIII.

Table 26: EUG-1 LAER Limits

EUG-1 LAER Limits	
SCW-1, SCW-62	
NO_x	0.67 g/kW-hr
VOC	0.19 g/kW-hr
SCW-2 – SCW-61, SCW-63—SCW-123	
NO_x + HC	0.40 g/kW-hr
VOC (NO_x + HC)	0.19 g/kW-hr
SCW-124, SCW-125	
NO_x + HC	1.8 g/kW-hr
VOC (NO_x + HC)	0.19 g/kW-hr

OCS Generator Engine(s) installed on the OSPs and WTGs shall be operated in accordance with the GCOP Plan for the facility. The plan shall be incorporated into the facility SOPs and shall be made available for inspection. The plan specifically should include, but is not limited to: i.) a list of combustion optimization practices to minimize emissions of pollutants and a means of verifying the practices have occurred for each engine type based on the most recent manufacturers' specifications issued for the engines at the time that they are certified (and any updates from the manufacturer should be noted and amended in the plan); ii.) a list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred (if applicable); and iii.) a list of the design choices determined to be LAER and verification that designs were implemented in the final construction.

EUG 2 - Marine Engines on Vessels Operating as an OCS Source(s)

A good combustion practices plan (GCOP) is selected for all units in EUG 2. All engines covered by EUG 2 shall be operated in accordance with the GCOP Plan for the facility. The plan shall be incorporated into the facility SOPs and shall be made available for inspection. The plan specifically should include, but is not limited to: i.) a list of combustion optimization practices to minimize emissions of pollutants and a means of verifying the practices have occurred for each engine type based on the manufacturer's most recent specifications issued for the engines at the time that they are certified (and any updates from the manufacturer should be noted and amended in the plan); ii.) a list of combustion and operation practices to be used to lower energy consumption and a means of verifying the practices have occurred (if applicable); and iii.) a list of the design choices determined to be BACT and verification that designs were implemented in the final construction.

NSPS IIII Covered Engines

For Marine Engines with a displacement < 30 L/cylinder that meet the definition of an OCS source, and subject to NSPS IIII, and that satisfy the definition of a tugboat, towboat, push boat, crew and supply vessel, dredge, or barge and which do not meet definition of an "exempt vessel" must meet the most stringent emission standards for NO_X and HC at 40 C.F.R. part 60, subpart IIII at time of deployment. At a minimum, all engines subject to this condition shall comply with emission standards (in terms of g/kW-hr) equal to or cleaner than EPA Tier 2 marine engine emission standards (for Category 1 and Category 2 Marine Engines) for NO_X and HC contained within 40 C.F.R. part 1042.

For all other Marine Engines with a displacement < 30 L/cylinder that meet the definition of an OCS source, and subject to NSPS IIII, must meet the most stringent emission standards for NO_X and HC Emission Standards at 40 C.F.R. part 60, subpart IIII at time of deployment. At a minimum, all engines subject to this condition shall comply with emission standards (in terms of g/kW-hr) equal to or cleaner than EPA Tier 1 marine engine emission standards (for Category 1 and Category 2 Marine Engines) for NO_X and HC contained within 40 C.F.R. part 1042.

For Marine Engines with a displacement ≥ 30 L/cylinder, subject to NSPS IIII, and that satisfy the definition of an OCS source and the definition of a *tugboat, towboat, push boat, crew and supply vessel, dredge,* or *barge* and which do not meet definition of an "*exempt vessel*"[81] must meet the most stringent emission standards for NOx at 40 C.F.R. part 60, subpart IIII and highest applicable emission standards for HC within 40 C.F.R. part 1042 at time of deployment. At a minimum, all applicable engines subject to this condition shall comply with emission standards for NOx and HC (in terms of g/kW-hr) equal to or cleaner than EPA Tier 2 marine engine emission standards (Category 3 Marine Engines) as contained within 40 C.F.R. part 1042.

For Marine Engines with a displacement ≥ 30 L/cylinder that meet the definition of an OCS source and are subject to NSPS IIII, meeting the emission standards for NOx and PM at 40 C.F.R. part 60, subpart

[81] Exempt Vessel means any vessel identified in 17 C.C.R. Section 93118.5.(c), dated July 20, 2011 (and approved by EPA into the California SIP at 83 Fed. Reg. 23232, May 18, 2018).

IIII and highest applicable emission standards for HC and CO within 40 C.F.R. part 1042 at time of deployment. At a minimum, all engines subject to this condition shall comply with emission standards (in terms of g/kW-hr) equal to or cleaner than EPA Tier 1 marine engine emission standards for (Category 3 Marine Engines) for NOx contained within 40 C.F.R. part 1042 and the NOx emission standards within 40 C.F.R. part 60, subpart IIII. Note that the Marine Tier 1 emission standards does not contain an HC emission standard for Category 3 marine engines. Therefore, for those engines which fall between model year dates of 2004 through 2010, BACT for HC is the GCOP Plan.

Non-NSPS IIII Covered Engines

For Marine Engines with a displacement < 30 L/cylinder, *not* subject to NSPS IIII, and that satisfy the definition of a *tugboat, towboat, push boat, crew and supply vessel, dredge,* or *barge* and which do not meet definition of an "*exempt vessel*"[82] must meet the most stringent emission standards for NOx and HC at 40 C.F.R. part 1042 at time of deployment. At a minimum, all applicable engines subject to this condition shall comply with emission standards (in terms of g/kW-hr) equal to or cleaner than EPA Tier 2 marine engine emission standards (for Category 1 and Category 2 Marine Engines) for NO_X and HC contained within 40 C.F.R. part 1042.

For all other Marine Engines with a displacement < 30 L/cylinder and not subject to NSPS IIII, meeting the most stringent emission standards for NO_X and HC Emission Standards at 40 C.F.R. part 1042 at time of deployment. At a minimum, all applicable engines subject to this condition shall comply with emission standards (in terms of g/kW-hr) equal to or cleaner than EPA Tier 1 marine engine emission standards (for Category 1 and Category 2 Marine Engines) for NO_X and HC contained within 40 C.F.R. part 1042. Currently, the Tier 1 marine engine emission standard in 40 C.F.R. part 1042 does not contain any HC emission limits for Category 1 or 2 Marine Engines. Therefore, for these cases, BACT for HC is GCOP.

For Marine Engines with a displacement ≥ 30 L/cylinder, *not* subject to NSPS IIII, and that satisfy the definition of a *tugboat, towboat, push boat, crew and supply vessel, dredge,* or *barge* and which do not meet definition of an "*exempt vessel*"[83] must meet the most stringent emission standards for NOx and HC at 40 C.F.R. part 1042 at time of deployment. At a minimum, all applicable engines subject to this condition shall comply with emission standards (in terms of g/kW-hr) equal to or cleaner than EPA Tier 2 marine engine emission standards contained within 40 C.F.R. part 1042.

For all other Marine Engines with a displacement ≥ 30 L/cylinder *not* subject to NSPS IIII, meeting the most stringent emission standards for NOx, and HC within 40 C.F.R. part 1042 at time of deployment. At a minimum, all applicable engines subject to this condition shall comply with emission standards (in terms of g/kW-hr) equal to or cleaner than EPA Tier 1 marine engine emission standards for NOx contained within 40 C.F.R. part 1042. Note that the Marine Tier 1 emission standards does not contain an HC emission standard for Category 3 marine engines. Therefore, for those engines which fall between model year dates of 2004 through 2010, BACT for HC is the GCOP Plan

[82] Exempt Vessel means any vessel identified in 17 C.C.R. Section 93118.5.(c), dated July 20, 2011 (and approved by EPA into the California SIP at 83 Fed. Reg. 23232, May 18, 2018).

[83] Exempt Vessel means any vessel identified in 17 C.C.R. Section 93118.5.(c), dated July 20, 2011 (and approved by EPA into the California SIP at 83 Fed. Reg. 23232, May 18, 2018).

C. Offset Requirements

EPA has applied the offset requirements of the NNSR program on the OCS only to emissions associated with the operation and maintenance of the OCS source. EPA finds this approach consistent with how the NNSR program, and specifically the offset requirement, has been implemented by EPA and states per the CAA, EPA's implementing regulations and the regulations in approved state NNSR programs, including Massachusetts, which is the COA for this action. [84] As defined in the permit itself, the Operational Phase Start Date is the critical point at which the new source has "commenced operations" and offset reductions must be in effect and enforceable.

To offset operating emissions, the permit requires a continuous emission reduction credit (CERC), or simply an ERC, which is referred to as a rate-based ERC in 310 CMR 7.00, Appendix B. The CERC is defined as a rate-based ERC in tons per year, to recognize that the emission credit can offset yearly emissions as they occur each year the source operates. Per 310 CMR 7.00, *Appendix A*, Section 6(e)(1), offsets for the project are subject to the adjustment factor of 1.2:1 for VOC or NO_X. In addition, per the requirement of 310 CMR 7.00, Appendix B, Section 3(e)(2), persons seeking to use ERCs from the Massachusetts ERC bank must obtain an amount of credit equal to five (5) percent (%) more than the amount needed for the offset calculation, this results in a 1.26:1 offset ratio[85].

As noted in Section III.E., the COA requirements[86] apply to the portion of the OCS source located within 25 NM of the state's seaward boundary, otherwise referred to as the "inner OCS". As such, the ERCs needed to offset the Project's emissions are based on the direct emissions associated with the WTG/OSP locations[87] and to-and-fro vessel emissions for those locations that fall within the inner OCS. *See* Figure 3 (i.e., 41 inner positions out of a total of 149 positions for the entire project).

Emissions were calculated based on the following:

- O&M Daily Inspections: This includes routine inspection and maintenance for any given WTGs and OSPs regardless of relative location. Therefore, to calculate those emissions for only those vessels that will operate within the inner OCS, the total emissions have been multiplied by a ratio factor of 0.275 (i.e., 41 inner positions/149 total positions).

- O&M Major Repair Scenario: This includes the replacement of major WTG/OSP components, that are otherwise not anticipated with routine inspection and maintenance. Emissions that occur within the inner OCS are based on the number of operating days anticipated based on project specific information.[88]

[84] As stated in the South Fork Wind Supplemental Fact Sheet (October 20, 2021) and in the EPA Response to Comment Document for the Revolution Wind, LLC (September 28, 2023). See ASOW Comment B.5.
[85] I.e., non-Brayton Point offsets
[86] Per 40 CFR 55.14
[87] This represents the worse-case potential to emit (PTE) occuring during O&M based on the 41 positions (1 OSP, 40 WTGs) located within the inner OCS.
[88] See October 21, 2024, emission spreadsheet in the docket

Table 27 – Operating Days for O&M Major Repair Scenario

Vessel Type	Major Repair Activities Occuring only within Inner OCS (days/yr.)
Jack-Up Vessel	60
Crew Transfer Vessel	60
Service Operations Vessel	60
Multipurpose Service Vessel	90
Tugboats	60

- OSP Back-up Generator: There will be no more than one (1) OSP location located within the inner OCS, therefore emissions include only one generator. Emissions are based on engine maximum horsepower rating and 500 hours per year of operation.

O&M Transit Emissions: Emissions from vessels servicing or associated with an OCS source are based on the centroid of the SCW WDA as the point to estimate support vessel emissions within 25 NM of the facility. Due to uncertainty of the specific distances of the vessels within the inner and outer OCS, the facility has assumed that all vessels could travel through the inner OCS and contribute to the total emission in that area. Therefore, the applicant has included all transit emissions as being a part of the inner OCS.

Based on the potential emissions from the operational phase of the project, the offsets required for the project are presented below.[89]

Table 28: Maximum NO_X Offsets Needed for Operational Phase of the Inner OCS (TPY)

Project Phase	NO_X Emissions	NO_X Offsets Needed 1.26:1 offset ratio	NO_X Offsets Needed 1.2:1 offset ratio
Operation and Maintenance	253.6	319.6	304.3

Table 29: Maximum VOC Offsets Needed for Operational Phase of the Inner OCS (TPY)

Project Phase	VOC Emissions	VOC Offsets Needed 1.26:1 offset ratio	VOC Offsets Needed 1.2:1 offset ratio
Operation and Maintenance	14.5	18.3	17.4

SCW is required to obtain sufficient emission offsets to mitigate potential increases in ozone precursor emissions from its operations within the inner OCS. Currently, Massachusetts holds NOx and VOC offsets from the shutdown of the Brayton Point Power Station, and in prior OCS permits the state has made these offsets available to offshore wind developers for past projects that serve Massachusetts.

[89] BOEM's NEPA Alternative D proposal could remove up to 6 WTGs in the inner OCS, in the event those positions are excluded, the emissions offsets needed for NO_x would be 309.6 TPY (1.26:1) or 294.8 TPY (1.2:1) and the emissions offsets needed for VOC would be 17.4 TPY (1.26:1) or 16.56 TPY (1.2:1).

SCW was awarded a power purchase agreement (PPA) in Massachusetts for 1,087 MW and in Rhode Island for 200 MW. SCW has indicated that it plans to request offsets from Massachusetts DEP for offsets associated with the Brayton Point shutdown. Should SCW be unable to secure offsets from the Brayton Point Power Station shutdown, SCW will need to pursue options for obtaining offsets, which may include purchasing offsets from other sources within Massachusetts or, if necessary, from appropriate out-of-state sources.

The permittee is seeking to obtain rate-based offsets through the following additional mechanisms:

- Purchasing ERCs identified in the Massachusetts ERC bank which have been created in accordance with 310 CMR 7.00, *Appendix B*. *Appendix B* allows companies to certify emission reductions by over-controlling their emissions, shutting down emission units or entire facilities, or taking enforceable restrictions on their operations that lead to emission reductions. 310 CMR 7.00, *Appendix B* was approved into the Massachusetts SIP on August 8, 1996. *See* 61 Fed. Reg. 41335.[90] ERCs in the Massachusetts ERC bank are federally enforceable;

- Entering into a third-party agreement that requires the third-party to lower its emissions. The requirement for the third-party to reduce emissions must then be made federally enforceable. One method for doing so would be to place a condition requiring the reductions in a federally enforceable permit applicable to the third party; or

- From a facility that has ceased operations and had its CAA permits revoked or rescinded and has not had the resulting emissions reductions certified under the Massachusetts trading bank regulations under 310 CMR 7.00, *Appendix B*. Offsets obtained in this manner must be memorialized in a document from the Commonwealth of Massachusetts to ensure that the offsets from such a shutdown are fully in compliance with the CAA and have not been relied on by Massachusetts to meet other CAA requirements. Once the offsets are used by a source pursuant to this option, the offsets would be retired and would no longer be available to be used by another company, or by the Commonwealth in meeting another CAA requirement.

The emissions reductions that the facility is relying on to meet this requirement must occur prior to the operational start date.

NNSR offsets are required to be obtained from sources within the same nonattainment area or may be obtained from another area if two criteria are met. *See* 310 CMR 7.00, *Appendix A*(6)(b). The two criteria that must be met when obtaining NNSR offsets from another classified area are:

1. The other area has an equal or higher nonattainment classification than the area in which the source is located; and

2. Where the proposed new source or modified source is located in a nonattainment area, emissions from such other area contribute to a violation of a national ambient air quality

standard in the nonattainment area in which the proposed new or modified source would construct.

Areas within the OTR are required to meet the requirements of a moderate nonattainment area, regardless of whether the area is classified as marginal nonattainment or unclassifiable/attainment, notwithstanding any more stringent standards that may be applicable in each state. All counties within Massachusetts, except for Dukes County, were designated unclassifiable/attainment for the 2008 ozone standard. All counties in Massachusetts were designated unclassifiable/attainment for the 2015 ozone standard.[91] Despite this, 310 CMR 7.00 *Appendix A* effectively treats the entire state as serious nonattainment with respect to applicability thresholds and offset ratios. NNSR offsets from sources within Massachusetts meet the first criterion since all of the Commonwealth is required to meet the same nonattainment requirements.[92] The second criterion requires a demonstration that emissions from the other area contribute to a violation of the ozone standard within Dukes County.[93] Based on recent air dispersion modeling that EPA conducted to assist states with their ozone transport analyses for the 2015 ozone NAAQS, sources within Massachusetts are projected to contribute 10.54 ppb ozone in Dukes County in 2023.[94] Therefore, with both criteria met, the EPA is determining that SCW can obtain offsets from anywhere within Massachusetts.

If offsets are obtained from another state, a separate analysis would need to be performed and submitted to the EPA and concurred upon prior to relying on those offsets for compliance with offset obligations.

1. Compliance Demonstration

For nonattainment pollutants, the OCS source will have to obtain offsets as required by the COA, as presented in Table 28 and Table 29 of this fact sheet. Furthermore, the required amount of NO_X and VOC offsets is calculated based on the OCS source's potential emissions during operations.

To ensure that the appropriate amount of NNSR offsets are obtained and that the source does not exceed these emission levels during operations, EPA has established federally enforceable facility-wide NO_X and VOC emission limits that apply once operations begin. The averaging period associated with the emission limits will be a daily rolling, 365-day total. The daily rolling, 365-day total for NO_X and VOC allows the facility the benefit and flexibility to operate the vessels it needs during operation while the daily emission calculations ensure that NO_X and VOC offsets for the operational phase of the project are properly accounted for. *See* Permit No. OCS-R1-09.

[91] *See* 40 C.F.R. § 81.322.
[92] The EPA notes that 310 CMR 7.00, Appendix A requires new or modified sources of NO_X and VOC to meet the requirement of NNSR as if the source were in a serious nonattainment area.
[93] The EPA determined that Dukes County attained the 2008 ozone standard by the July 20, 2015, attainment date. *See* 81 Fed. Reg. 26,697 (May 4, 2016).
[94] *See* https://www.epa.gov/Cross-State-Air-Pollution/memo-and-supplemental-information-regarding-interstate-transport-sips.The 2015 NAAQS Interstate Transport Assessment Design Values and Contributions spreadsheet can be found in the docket.

D. Alternative Site Analysis

The lease area auction and siting decisions by BOEM were the result of a multi-year effort by state and federal regulatory agencies to identify OCS areas suitable for offshore renewable energy development. An extensive review of site characterization data and the assessment of potential impacts was conducted, including environmental, economic, cultural, and visual resources, and use conflicts.

Alternative siting considerations are addressed extensively around BOEM's approval of the surrounding lease areas for the industry as outlined in the Construction and Operations Plan (COP) (11/2024) for the Project. EPA finds that SCW sufficiently satisfied the requirements of the alternative site analysis for the purposes of NNSR and 310 CMR 7.00, *Appendix A*, Section (8)(b) for this project by relying on the analysis outlined in the COP that weighed the necessary environmental, economic, cultural, and social factors and determined the best location for the Project considering those factors.

E. Nonattainment NSR Compliance Certification

Massachusetts regulations at 310 CMR 7.00, *Appendix A*, specify that all major facilities owned or operated in the state by the owner or operator of the proposed source (or by any entity controlling, controlled by, or under common control with such owner or operator) must be complying or on a schedule for compliance with all applicable emissions limitations. SCW is a new facility and has not begun activities subject to its OCS air permit. Issuance of the permit for SCW is recommended, contingent on public review.

VI. Other COA Emission Control Requirements

As previously stated, the COA for SCW is the Commonwealth of Massachusetts. The COA requirements apply only within the inner OCS, where the Massachusetts air quality regulations extend up to 25 NM from the SSB. Thus, the portion of the SCW Project that is located within 25 NM of the SSB is subject to applicable provisions of the Massachusetts air pollution control regulations which are codified at 310 CMR 4.00 (Timely Action Schedule and Fee Provisions), 6.00 (Ambient Air Quality Standards for the Commonwealth of Massachusetts), 7.00 (Air Pollution Control), and 8.00 (The Prevention and/or Abatement of Air Pollution Episode and Air Pollution Incident emergencies). These Massachusetts regulations are incorporated by reference in 40 C.F.R. part 55, Appendix A. This section identifies which Massachusetts regulations incorporated into part 55 apply to SCW, including the vessels that meet the definition of an OCS source and which regulations result in terms and condition(s) specified in Permit No. OCS-R1-09.

310 CMR 7.00 contains the following definitions, which are important to note when assessing the regulatory requirements of the COA.

Building, Structure, Facility, or Installation means all of the pollutant-emitting activities which belong to the same industrial grouping, are located on one or more contiguous or adjacent properties, and are under the control of the same person (or persons under common control). Any marine vessel is a part of a facility while docked at the facility. Any marine vessel is a part of an OCS source while docked at and within 25 NM en route to and from the OCS source's centroid.

Marine Vessel means any tugboat, tanker, freighter, barge, passenger ship, or any other boat, ship, or watercraft except those used primarily for recreation.

Stationary Source means any building, structure, facility, or installation which emits, or which may emit any air pollutant subject to regulation under the Act.

a) A stationary source may consist of one or more emissions units, and
    1. may be a land-based point or area source; or
    2. may be located in, or on, the OCS or other submerged lands beneath navigable waters (lakes, rivers, and coastal waters adjacent to Outer Continental Shelf lands); or
    3. may be any internal combustion engine, or engine combination, greater than 175 horsepower (hp) used for any stationary application; or
    4. may be any internal combustion engine regulated under Sec. 111 (NSPS) of the Act, regardless of size; or
    5. may be any internal combustion engine of less than 175 horsepower (hp) not actually controlled to meet a regulation under Sec. 213 (Nonroad Engines and Vehicles) of the Act.
b) A stationary source does not include:
    1. emissions resulting directly from an internal combustion engine for transportation purposes; or

    2. tailpipe emissions from any source regulated under title II of the Act or any emissions from in-transit, non-OCS marine vessels.

Fuel Utilization Facility means any furnace(s), fuel burning equipment, boiler(s), space heaters or any appurtenance thereto used for the burning of fuels, for the emission of products of combustion, or in connection with any process which generates heat and emits products of combustion but does not mean a motor vehicle or an incinerator.

Distillate Fuel Oil means No. 1 or No. 2 fuel oil.

*Residual Fuel Oil m*eans No. 4, No. 5, or No. 6 fuel oil.

A. 310 CMR 7.02: Plan Approval and Emission Limitations

Project emissions for all criteria pollutants have triggered the PSD applicability thresholds. Emissions of lead and sulfuric acid mist fall below PSD applicability thresholds and below Massachusetts' permitting and plan approval thresholds.[95] Therefore, the source is not subject to Massachusetts minor NSR permitting and/or State BACT requirements for lead and sulfuric acid mist.[96]

B. 310 CMR 7.05: Fuels All Districts

310 CMR 7.05(1)(a)(1) specifies that no person owning, leasing, or controlling the operation of a fossil fuel utilization facility shall cause, suffer, allow or permit the burning therein of any liquid fossil fuel having a sulfur content in excess of that listed in 310 CMR 7.05(1)(a)1.: Table 1 and in accordance with the associated timelines contained in the same table. For distillate oil (statewide), the sulfur content is restricted to 15 ppm which is equivalent to the fuel sulfur content requirement to utilize ULSD as contained in 40 C.F.R. part 60, subpart IIII.

310 CMR 7.05(1)(a)(3) specifies that on and after July 1, 2007, no person owning, leasing or controlling a stationary engine or turbine subject to the requirements of 310 CMR 7.02(8)(i), 310 CMR 7.03(10), or 310 CMR 7.26(40) through (44) shall accept for delivery for burning any diesel or other fuel unless said fuel complies with the applicable U.S. Environmental Protection Agency sulfur limits for fuel pursuant to 40 C.F.R. 80.29, 40 C.F.R. 80.500, and 40 C.F.R. 80.520(a) and (b) as in effect January 18, 2001.

EPA notes that the fuel regulations, previously within 40 C.F.R. part 80, have been incorporated into 40 C.F.R. part 1090 as of January 1, 2022. Per the definitions contained within 310 CMR 7.00, a marine vessel is considered to be an OCS source while docked at and/or within 25 NM en route to and from the project. Therefore, any marine vessels that meet the definition of an OCS source are subject to this

[95] In Massachusetts, a comprehensive plan approval is required for "any facility where the construction, substantial reconstruction, alteration or subsequent operation would result in an increase in potential emissions of a single air contaminant equal to or greater than ten tons per year, calculated over any consecutive 12-month time period." *See* 310 CMR 7.02(5)(a)(1). A limited plan approval is required for "any facility where the construction, substantial reconstruction, alteration or subsequent operation would result in an increase in potential emissions of a single air contaminant equal to or greater than one ton per year and less than ten tons per year, calculated over any consecutive 12-month time period." *See* 310 CMR 7.02(4)(a).

[96] 310 CMR 7.02(8)(a)(2) stipulates that a BACT analysis per state guidance is required for all plan approvals, i.e., comprehensive and limited plan approvals covering either major or minor sources emitting above the "significance" threshold for an air pollutant.

subpart when operating in the manner specified. All engines installed on WTGs or OSPs are also subject to the requirements of this section. All requirements contained in this regulation have been incorporated into the permit.

C. 310 CMR 7.06: Visible Emissions

310 CMR 7.06(1)(a) No person shall cause, suffer, allow, or permit the emission of smoke which has a shade, density, or appearance equal to or greater than No. 1 of the [Ringlemann Scale] Chart for a period, or aggregate period of time in excess of six minutes during any one hour, provided that at no time during the said six minutes shall the shade, density, or appearance be equal to or greater than No. 2 of the Chart.

310 CMR 7.06(1)(b) No person shall cause, suffer, allow or permit the operation of a facility so as to emit contaminant(s), exclusive of uncombined water or smoke subject to 310 CMR 7.06(1)(a) of such opacity which, in the opinion of the Department, could be reasonably controlled through the application of modern technology of control and a good Standard Operating Procedure, and in no case, shall exceed 20% opacity for a period or aggregate period of time in excess of two minutes during any one hour provided that, at no time during the said two minutes shall the opacity exceed 40%.

310 CMR 7.06(3) contain specific requirements that apply to marine vessels. All tailpipe emissions from OCS marine vessels (in-transit and when docked), and offshore engines installed on the WTG(s) and/or OSP(s) are subject to the visible emission standards contained in this section. Note that tailpipe emissions from any source regulated under Title II of the Act or any emissions from in-transit, non-OCS marine vessels are not subject to the requirements of this subpart. specifies that marine vessels shall be subject to the provisions of 310 CMR 7.06(1)(a) and 7.06(1)(b). 310 CMR 7.06(3) shall apply only in the Merrimack Valley Air Pollution Control District, Metropolitan Boston Air Pollution Control District, and the Southeastern Massachusetts Air Pollution Control District.

310 CMR 7.06(6) specifies that no person shall cause, suffer, allow, or permit excessive emission of visible air contaminants, other than water, from non-stationary source diesel engines. All requirements contained in this regulation have been incorporated into the permit.

D. 310 CMR 7.11: Transportation Media

310 CMR 7.11(4) contains specific requirements for Marine Vessels. No person owning, operating, or having control of a seagoing vessel while it is in the district shall cause, suffer, allow, or permit, aboard said vessel, tube blowing or soot removal activities that cause or contribute to a condition of air pollution. 310 CMR 7.11 shall apply only in the Merrimack Valley Air Pollution Control District, Metropolitan Boston Air Pollution Control District, and the Southeastern Massachusetts Air Pollution Control District. All requirements contained in this regulation have been incorporated into the permit.

E. 310 CMR 7.18: Volatile and Halogenated Organic Compounds

The purpose of 310 CMR 7.18 (30) is to limit VOCs in adhesive, sealant, adhesive primer, or sealant primer. The SCW project has potential to use adhesive, sealant, adhesive primer, or sealant primer and thus could become subject to the standards contained this section. Per 310 CMR 7.18(30)(4), if the total facility-wide VOC emissions from all adhesives, sealants, adhesive primers, and sealant primers used are less than 200 pounds per calendar year, or an equivalent volume, the facility is exempt from the requirement of 310 CMR 7.18(30)(c)3 and 5. Any person claiming this exemption shall maintain sufficient monthly operational records in accordance with 310 CMR 7.18(30)(e) to demonstrate compliance with this exemption. All requirements contained in this regulation have been incorporated into the permit.

F. 310 CMR 7.72: SF_6

The purpose of 310 CMR 7.72 is to assist the Commonwealth in achieving the greenhouse gas emissions reduction goals by reducing sulfur hexafluoride (SF_6) emissions from GIS through the imposition of declining annual aggregate emission limits and other measures on GIS. All requirements contained in this regulation have been incorporated into the permit.

Per 310 CMR 7.72 (4)(a), Any newly manufactured GIS that is placed under the ownership, lease, operation, or control of any GIS owner on or after January 1, 2015, must be represented by the manufacturer to have a 1.0% maximum annual leak rate.

- The applicant has accepted a best achievable control technology limit of a maximum annual leak rate not to exceed 0.1%, which is more stringent that the requirement contained in 310 CMR 7.72 (4)(a).

Per 310 CMR 7.72 (4)(b), any GIS owner that places GIS under ownership, lease, operation, or control on or after January 1, 2015, shall comply with any manufacturer-recommended maintenance procedures or industry best practices that have the effect of reducing leakage of SF_6.

- The applicant has a BACT limit of a sealed system with leak detection and alarms and a commitment to repair detected leaks within 5 days of discovery, which complies with the requirement contained in 310 CMR 7.72 (4)(a).

The facility is required to comply with all annual reporting requirements contained in 310 CMR 7.72 (6), including but not limited to, the number of pounds of SF_6 emitted from GIS equipment owned, leased, operated, or controlled by the federal reporting GIS owner and located in Massachusetts during the year, using the equation specified in 40 C.F.R. §98.303 if 40 C.F.R. Part 98 subpart DD applies.

User Emissions = (Decrease in SF_6 Inventory) + (Acquisitions of SF_6) – (Disbursements of SF_6) – (Net Increase in Total Nameplate Capacity of Equipment Operated)

(Eq. DD-1)

Figure 9 - Calculate the annual SF_6 emissions using the mass-balance approach.

Where:

Decrease in SF_6 Inventory = (pounds of SF_6 stored in containers, but not in energized equipment, at the beginning of the year) − (pounds of SF_6 stored in containers, but not in energized equipment, at the end of the year).

Acquisitions of SF_6 = (pounds of SF_6 purchased from chemical producers or distributors in bulk) + (pounds of SF_6 purchased from equipment manufacturers or distributors with or inside equipment, including hermetically sealed-pressure switchgear) + (pounds of SF_6 returned to facility after off-site recycling).

Disbursements of SF_6 = (pounds of SF_6 in bulk and contained in equipment that is sold to other entities) + (pounds of SF_6 returned to suppliers) + (pounds of SF_6 sent off site for recycling) + (pounds of SF_6 sent off-site for destruction).

Net Increase in Total Nameplate Capacity of Equipment Operated = (The Nameplate Capacity of new equipment in pounds, including hermetically sealed-pressure switchgear) − (Nameplate Capacity of retiring equipment in pounds, including hermetically sealed-pressure switchgear).

Note that Nameplate Capacity refers to the full and proper charge of equipment rather than to the actual charge, which may reflect leakage.

VII. Other Federal Requirements

Pursuant to 40 C.F.R. § 55.13(c) and (d), regulations at 40 C.F.R. part 60 (NSPS) and 40 C.F.R. part 61 (NESHAPs), together with any other provisions promulgated pursuant to section 112 of the Act, shall apply to OCS sources. For example, NSPS IIII, Standards for Performance for Stationary Compression Ignition Internal Combustion Engines, and NESHAP ZZZZ for Stationary Reciprocating Internal Combustion Engines, apply to OCS sources even when marine vessel engines and offshore construction equipment are typically not considered stationary sources.

A. New Source Performance Standards (NSPS)

Subpart IIII, Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. This subpart establishes technology-based federal emissions limitations and other requirements for stationary CI ICE based on the engine's function (emergency or non-emergency) model year, power (in kW or hp)) and engine displacement (L/cyl).

NSPS IIII applies to owners and operators of stationary CI ICE that both commence construction[97] after July 11, 2005, and were manufactured after April 1, 2006, as well as those engines modified or reconstructed after July 11, 2005.

For non-emergency engines with a displacement less than 30 L/cyl, NSPS IIII requires compliance with the emissions standards and other requirements specified in 40 CFR part 1039 ("Control of Emissions from New and In-Use Nonroad Compression Ignition Engines") ("part 1039"), 40 CFR part 1042 ("Control of Emissions from New and In-Use Marine Compression-Ignition Engines and Vessels") ("part 1042), or within NSPS IIII itself.[98] For certain non-emergency engines with a displacement of less than 10 L/cyl, 40 C.F.R. § 60.4201(f) provides that if these non-emergency engines will be used solely at marine offshore installations, they may be certified[99] to the Tier standards in part 1042 for marine engines, instead of the more stringent emission standards in part 1039.[100] For non-emergency engines with a displacement of ≥ 30 L/cyl, NSPS IIII requires compliance with the emission standards and other requirements within NSPS IIII itself, which are mainly emission standards for NO_x and PM. See 40 C.F.R. § 60.4204(c). Other NSPS IIII requirements, besides the emissions standards, that apply to non-emergency engines include, but are not limited to, fuel, monitoring, notification, reporting, recordkeeping, and compliance requirements.

For EUG 1, the permittee will comply with NSPS IIII by procuring certified engines that meet the highest applicable tier emission standards, complying with the applicable work practice standards and burning fuel that meets the sulfur content requirements as applicable in subpart IIII. Since the permittee indicated in the application that all engines associated with EUG 1 will have individual engine displacements less than 30 L/cylinder, the permittee is also proposing to procure new engines that are built to the standards contain in 40 C.F.R. part 1042 (including appendix I) or the non-road engine standards contained in 40 C.F.R. part 1039 (including appendix I) as a means of demonstrating compliance with NSPS IIII[101]. 40 C.F.R. part 1042 contains emission standards and certification requirements for Category 1 and Category 2 marine diesel engines on vessels[102] and 40 C.F.R. part 1039 sets emission standards and certification requirements for nonroad diesel engines. The emission standards are structured as a progression (Tiers 1 through 4), with Tier 4 including the most stringent air emissions standards. For both 1042 and 1039, the Tier 4 emission standards are fully in effect at the time of this fact sheet. The exact emission limits (in g/kW-hr) that apply to each engine depend on the engine's size, displacement, speed, and/or power density.

[97] "Commence construction" is the date the engine is ordered by the owner or operator. See 40 C.F.R. § 60.4200(a).
[98] See 40 C.F.R. §§ 60.4201 and 60.4204.

[100] See 40 C.F.R. § 60.4201(f), which states that "Notwithstanding the requirements in paragraphs (a) through (c) of this section, stationary non-emergency CI ICE identified in paragraphs (a) and (c) of this section may be certified to the provisions of 40 CFR part 1042 for commercial engines that are applicable for the engine's model year, displacement, power density, and maximum engine power if the engines will be used solely in either or both of the following locations: (2) Marine offshore installations". See exceptions at 40 C.F.R. § 60.4201(a) and 40 C.F.R. § 60.4201(c).
[101] *See* 40 C.F.R. § 60.4201(f)(2).
[102] The 40 C.F.R. part 1039 non-road engine regulations set emissions standards and certification requirements for the same pollutants as 40 C.F.R. 1042: NO_x, HC, PM, and CO.

For the units within EUG 2 that are subject to NSPS IIII and have a displacement less than 30 L/cylinder, an owner of a stationary source in a marine environment can also certify its engine based on the marine engine requirements at 40 C.F.R. part 1042 (including appendix I) as a means of demonstrating compliance with NSPS IIII[103]. However, EUG 2 engines that have a displacement greater than or equal to 30 L/cylinder, are subject to NO_x and PM emissions standards as described in 40 C.F.R. § 60.4204(c) and other requirements in Subpart IIII. The specific NO_x emissions standards that apply to each engine are based on the date when the engine was constructed (or reconstructed) and the maximum engine speed (in revolutions per minute or RPM).

B. National Emission Standards for Hazardous Air Pollutants (NESHAP)

Subpart ZZZZ, Reciprocating Internal Combustion Engines. This subpart establishes national emission limitations and operating limitations for hazardous air pollutants (HAP) emitted from stationary reciprocating internal combustion engines (RICE) located at major and area sources of HAP emissions. An affected source is any existing, new, or reconstructed stationary RICE located at a major or area source of HAP emissions, excluding stationary RICE being tested at a stationary RICE test cell/stand.

SCW is considered an area source of HAP.

The project's CI-ICE that become OCS sources and were built or reconstructed after June 12, 2006, are considered "a new or reconstructed stationary RICE located at an area source." Per 40 C.F.R. § 63.6590(c), an affected source that meets any of the criteria in paragraphs (c)(1) through (7) of this section must meet the requirements of this part by meeting the requirements of 40 C.F.R. part 60, subpart IIII, for compression ignition engines. Therefore, RICEs that become OCS sources and were built or reconstructed after June 12, 2006, must meet the requirements of NSPS IIII and by complying with the general provisions of 40 C.F.R. Part 63, subpart A that are listed in Table 8 of NESHAP ZZZZ.

The Project's existing RICE (constructed or reconstructed before June 12, 2006) that are OCS sources are subject to emission limitations, operating limitations, and other requirements at 40 C.F.R. § 63.6603, which applies to existing stationary RICEs located at an area source of HAP emissions. *See* 40 C.F.R. § 63.6590(a)(1)(iii). However, existing stationary non-emergency compression-ignition RICEs with a rating greater than 300 horsepower located on an offshore vessel that is an OCS source do not have to meet the CO emission limitations specified in Table 2d of subpart ZZZZ; they must meet the management practices at 40 C.F.R. § 63.6603(c).

[103] Please note that NSPS IIII allows compliance with 40 C.F.R. 1042 in lieu of compliance with 40 C.F.R. 1039 for most engines with a displacement less than 30l/cyl except for a small subsect of engines for certain model years and sizes. For that small subset of engines, compliance with 40 C.F.R. 1039 is still required. See 40 C.F.R. § 60.4201(c) and 60.4204(b) for more information about those regulatory requirements.

Table 30: Table 2d to Subpart ZZZZ of Part 63 - Requirements for Existing Stationary RICE Located at Area Sources of HAP Emissions

RICE Category	You must meet the following requirement, except during periods of startup….	During periods of startup, you must….
1. Non-Emergency, non-black start CI stationary RICE ≤300 HP	a. Change oil and filter every 1,000 hours of operation or annually, whichever comes first [(1)]	Minimize the engine's time spent at idle and minimize the engine's startup time at startup to a period needed for appropriate and safe loading of the engine, not to exceed 30 minutes, after which time the non-startup emission limitations apply.
	b. Inspect air cleaner every 1,000 hours of operation or annually, whichever comes first, and replace as necessary;	
	c. Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.	
2. Non-Emergency, non-black start CI stationary RICE 300<HP≤500	a. Limit concentration of CO in the stationary RICE exhaust to 49 ppmvd at 15 percent O2; or	
	b. Reduce CO emissions by 70 percent or more.	
3. Non-Emergency, non-black start CI stationary RICE >500 HP	a. Limit concentration of CO in the stationary RICE exhaust to 23 ppmvd at 15 percent O2; or	
	b. Reduce CO emissions by 70 percent or more.	
4. Emergency stationary CI RICE and black start stationary CI RICE.2	a. Change oil and filter every 500 hours of operation or annually, whichever comes first;	
	b. Inspect air cleaner every 1,000 hours of operation or annually, whichever comes first, and replace as necessary; and	
	c. Inspect all hoses and belts every 500 hours of operation or annually, whichever comes first, and replace as necessary.	

[1] Sources have the option to utilize an oil analysis program as described in § 63.6625(i) or (j) in order to extend the specified oil change requirement in Table 2d of this subpart.

[2] If an emergency engine is operating during an emergency and it is not possible to shut down the engine in order to perform the management practice requirements on the schedule required in Table 2d of this subpart, or if performing the management practice on the required schedule would otherwise pose an unacceptable risk under federal, state, or local law, the management practice can be delayed until the emergency is over or the unacceptable risk under federal, state, or local law has abated. The management practice should be performed as soon as practicable after the emergency has ended or the unacceptable risk under federal, state, or local law has abated. Sources must report any failure to perform the

management practice on the schedule required and the federal, state, or local law under which the risk was determined to be unacceptable.

C. MARPOL Annex VI, the Act to Prevent Pollution from Ships, and 40 C.F.R. Part 1043

Annex VI of the International Maritime Organization's (IMO's) International Convention for the Prevention of Pollution from Ships (MARPOL) treaty is the main international treaty that addresses air pollution from marine vessels. The IMO has also adopted legally binding energy efficiency measures as amendments to MARPOL Annex VI. It was implemented in the United States through the Act to Prevent Pollution from Ships (APPS), 33 U.S.C. §§ 1901–1905. Annex VI requirements comprise both engine-based and fuel-based standards and apply to U.S.-flagged ships wherever located and to non-U.S. flagged ships operating in U.S. waters.

- Annex VI establishes:
    - Limits on NO_X emissions from marine diesel engines with a power output of more than 130 kW. The standards apply to both main propulsion and auxiliary engines and require the engines to be operated in conformance with the Annex VI NO_X emission limits.
    - Limits on the sulfur content of marine fuels. 40 C.F.R. Part 1090, subpart D contains the standards for Diesel Fuel and ECA Marine Fuel. ECA marine fuels, both ECA marine distillate and ECA marine residual, are limited to a maximum sulfur content of 1000 ppm for all marine vessels operating in the ECA area. However, per 40 C.F.R. § 1090.325, the use of ECA Marine Fuel (1000 ppm sulfur) is limited to use in Category 3 Marine Engines only, which is defined as a marine engine having a displacement greater than 30 L/cylinder. All other engines category's (Category 1, Category 2, and nonroad) will fall into the ULSD (15 ppm) limitation as contained in 40 C.F.R. § 1090.305 and subpart IIII.
- U.S.-flagged vessels are subject to inspection for compliance with Annex VI. Non-U.S. flagged ships are subject to examination under Port State Control while operating in U.S. waters. The USCG or EPA may bring an enforcement action for a violation.
- Ships operating up to 200 nautical miles off U.S. shores must meet the most advanced standards for NO_X emissions and use fuel with lower sulfur content. This geographic area is designated under Annex VI as the ECA.
- Each regulated diesel engine in U.S.-flagged vessels must have an EIAPP certificate, issued by EPA, to document that the engine meets Annex VI NO_X standards. Certain vessels are also required to have an IAPP Certificate which is issued by the USCG. Ship operators must also maintain records on board regarding their compliance with the emission standards, fuels requirements and other provisions of Annex VI.

VIII. Monitoring, Reporting, Recordkeeping and Testing Requirements

The following reports required by the Specific Conditions of Permit No. OCS-R1-09 Section IX.

- Self-reporting (i.e., prompt reporting) of deviations from permit terms and conditions. The EPA is requiring the prompt reporting of permit deviations as a condition of the preconstruction permitting requirements of the draft permit.

- Submit to EPA a copy of the USCG 500-meter safety buffer approval.

- The permit associated with this Fact Sheet contains the exact information that must be submitted. See Specific Conditions of Permit No. OCS-R1-09, Section IV. through IX.

Demonstrating compliance with the permit requirements require monitoring and recordkeeping of activities. The monitoring, recordkeeping, and testing requirements can be grouped into several categories. These categories are:

- Tracking actual facility-wide emissions of NO_X and VOC, on a daily rolling, 365-day total upon commencement of the operational phase start date. This includes emissions from all OCS sources including support vessels servicing or associated with the OCS source while at or going to or from an OCS source while within 25 NM of the source's centroid.

- Documenting key design parameters and manufacturers certifications for every internal combustion engine and any other emission unit classified as an OCS source. This information is necessary to demonstrate compliance with the BACT and LAER emission limits. Certifying that at the time a vessel will become an OCS source, the vessel in question has the least polluting internal combustion engines on it available to the permittee or its contractors.

- Demonstrating compliance with the sulfur fuel limits by obtaining the fuel supplier's certificate that contains information regarding the fuel's sulfur content.

- All applicable requirements under NSPS IIII and NESHAP ZZZZ.

IX. Consultations

For the purposes of the Endangered Species Act (ESA), Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), and the National Historic Preservation Act (NHPA), the issuance of an OCS air permit is a federal action undertaken by the EPA. BOEM is the lead federal agency for authorizing renewable energy activities on the OCS and the SCW Project is also a federal action for BOEM. BOEM's regulations at 30 C.F.R. part 585 require SCW to obtain a COP approval before commencing construction on the windfarm. In conjunction with the COP approval, BOEM is also responsible for issuing the Record of Decision (ROD) on the Environmental Impact Statement conducted under the National Environmental Policy Review Act (NEPA).

The applicant requests a lease, easement, right-of-way, and any other related approvals from BOEM necessary to authorize construction, operation, and eventual decommissioning of the proposed action. BOEM's authority to approve, deny, or modify the project derives from the Energy Policy Act of 2005. Section 388 of the Act amended the OCSLA by adding subsection 8(p), which authorizes the Department of the Interior to grant leases, easements, or rights-of-way on OCS lands for activities that produce or support production, transportation, or transmission of energy from sources other than oil and gas, such as wind power.

The EPA assesses its own permitting action (i.e., to issue an OCS air permit for the windfarm) as interrelated to, or interdependent with, the BOEM's COP approval and issuance of the NEPA ROD for the SCW. Accordingly, the EPA and BOEM have agreed that BOEM is the lead Federal agency for purposes of fulfilling statutory obligations under the statutes mentioned previously.[104] BOEM has accepted the designation as lead Federal agency.[105]

A. Endangered Species Act, Magnuson-Stevens Fishery Conservation and Management Act, and National Historic Preservation Act

Under Section 7(a)(2) of the ESA, 16 U.S.C. § 1536(a)(2), the EPA must ensure that any action authorized, funded, or carried out by the EPA is not likely to jeopardize the continued existence of any federally-listed endangered species or threatened species or result in the destruction or adverse modification of such species designated critical habitat. If the EPA's action (i.e., OCS air permit issuance) may affect a federally-listed species or designated critical habitat, Section 7(a)(2) of the ESA, and relevant implementing regulations at 50 C.F.R. part 402, requires consultation between the EPA and the U.S. Fish and Wildlife Service (FWS) and/or the National Marine Fisheries Service (NMFS), depending on the species and/or habitat at issue.

In accordance with Section 305(b)(2) of the MSFCMA, 16 U.S.C. § 1855(b)(2), Federal agencies are also required to consult with the NMFS on any action that may result in adverse effects to essential fish habitat (EFH).

Section 106 of the NHPA, 54 U.S.C. § 306108, and the implementing regulations at 36 C.F.R. part 800 require federal agencies to consider the effect of their actions on historic properties and afford the opportunity for the Advisory Council on Historic Preservation (ACHP) and consulting parties to consult on the federal undertaking.

The ESA regulations at 50 C.F.R. § 402.07, the MSFCMA regulations at 50 C.F.R. § 600.920(b), and the NHPA regulations at 36 C.F.R. § 800.2(a)(2), provide that where more than one federal agency is involved in an action, the consultation requirements may be fulfilled by a designated lead agency on behalf of itself and the other involved agencies. As previously discussed, BOEM is the designated lead agency for the purposes of fulfilling EPA's obligations under Section 7 of the ESA, Section 305(b) [of the

[104] A copy of the July 25, 2018, letter from EPA R1 to the BOEM regarding lead agency designation is included in the administrative record for this action.
[105] A copy of the September 24, 2018, letter from the BOEM to EPA R1 accepting lead agency designation is included in the administrative record for this action.

MSFCMA, and Section 106 of the NHPA for offshore wind development projects on the Atlantic OCS, including the Project. As a result of this designation, BOEM will consider the effects of the EPA's OCS permitting action in fulfilling its consultation obligations under each of these statutes for the NEPA ROD and COP approval process.

At the time of writing this Fact Sheet and the EPA's associated proposal of the draft permit, BOEM has commenced but not completed its consultation requirements for ESA, MSFCMA, and NHPA for the COP approval and NEPA ROD for the project. The EPA understands that BOEM will satisfy its statutory obligations as lead federal agency under each of these statutes prior to EPA issuance of a final OCS air permit for the SCW. Should any substantive changes to the draft permit become necessary as a result of BOEM's consultation processes under one or more of these statutes, the EPA will provide an additional opportunity for public comment regarding any such new conditions or restrictions as necessary and appropriate.

B. Coastal Zone Management Act ("CZMA")

Section 307 of the CZMA, 16 U.S.C. § 1456, and the implementing regulations at 15 C.F.R. part 930, provides a federal consistency process for state programs to use to manage coastal activities and resources and to facilitate cooperation and coordination with federal agencies. Generally, federal consistency requires that federal actions, within and outside the coastal zone, which have reasonably foreseeable effects on any coastal use (land or water) or natural resource of the coastal zone be consistent with the enforceable policies of a state's federally approved coastal management program. Federal actions include federal agency activities, federal license or permit activities, and federal financial assistance activities. Federal agency activities must be consistent to the maximum extent practicable with the enforceable policies of a state coastal management program, and license and permit and financial assistance activities must be fully consistent.

Under 15 C.F.R. part 930, subpart D, a non-federal applicant for a federal license or permit is required to provide a state with a consistency certification if the state has identified the federal license or permit on a list of activities subject to federal consistency review in its federally approved coastal management program. State federal consistency lists identify the federal agency, federal license or permit, and federal financial assistance activities that are subject to federal consistency review if the activities occur and have effects on a state's coastal zone pursuant to the applicable subparts of the regulations at 15 C.F.R. part 930. The EPA has reviewed the listed federal actions for federal license or permit activities for Massachusetts and Rhode Island. The EPA's action to issue an OCS air permit under the regulations at 40 C.F.R. Part 55 is not included on the current list of federal actions for federal consistency review. Thus, issuance of this OCS air permit is not required to be preceded by a federal consistency review.[106]

[106] The EPA confirmed with the State of Rhode Island and the Commonwealth of Massachusetts that the states do not seek a consistency review for OCS air permits. A copy of the email confirmation from Rhode Island and Massachusetts is included in the administrative record for this action.

C. Clean Air Act General Conformity

Pursuant to 40 C.F.R. § 93.153(d)(1), a conformity determination is not required for the portion of an action that includes major or minor new or modified stationary sources that require a permit under the NNSR, PSD, or minor NSR program.

X. Environmental Justice

Executive Order (EO) 12898 titled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" requires that federal agencies identify and address, as appropriate and to the extent practicable and permitted by existing law, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. *See* Executive Order 12898, Section 1-101, 59 Fed. Reg. 7629 (Feb. 16, 1994). Consistent with EO 12898 and the EPA's "Plan EJ 2014: Considering Environmental Justice in Permitting," the EPA must: (1) consider the environmental justice issues, on a case-by-case basis, connected with the issuance of federal permits (particularly when permitting projects for major sources that may involve activities with significant public health or environmental impacts on already overburdened communities); and (2) focus on whether the federal permitting action would have disproportionately high and adverse human health or environmental effects on minority or low income populations.

The EPA defines "Environmental Justice" (EJ) as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. The EPA's goal with respect to Environmental Justice in permitting is to enable overburdened communities to have full and meaningful access to the permitting process and to develop permits that address environmental justice issues to the greatest extent practicable under existing environmental laws. Overburdened is used to describe the minority, low-income, and tribal nations and indigenous peoples or communities in the United States that potentially experience disproportionate environmental harms and risks as a result of greater vulnerability to environmental hazards.

In light of Executive Order 12898, the White House Council on Environmental Quality (CEQ) issued Environmental Justice: Guidance Under the National Environmental Policy Act (NEPA). As part of the NEPA process, BOEM conducted an environmental justice analysis in accordance with this guidance. The guidance includes six principles for environmental justice analyses to determine any disproportionately high and adverse human health or environmental effects to low-income, minority, and tribal populations. The EPA evaluated BOEM's analysis of these principles with regard to environmental justice for the Project. The principles are:

1. Consider the composition of the affected area to determine whether low-income, minority or tribal populations are present and whether there may be disproportionately high and adverse human health or environmental effects on these populations;

2. Consider relevant public health and industry data concerning the potential for multiple exposures or cumulative exposure to human health or environmental hazards in the affected population, as well as historical patterns of exposure to environmental hazards;

3. Recognize the interrelated cultural, social, occupational, historical, or economic factors that may amplify the natural and physical environmental effects of the proposed action;

4. Develop effective public participation strategies;

5. Assure meaningful community representation in the process, beginning at the earliest possible time; and

6. Seek tribal representation in the process.

Additionally, EPA has published eight principles to assist each Region to promote environmental justice in air permitting programs.[107] The following principles were also evaluated or implemented with regard to environmental justice for the Project:

1. Identify communities with potential environmental justice concerns;
2. Engage early in the permitting process to promote meaningful participation and fair treatment;
3. Enhance public involvement throughout the permitting process;
4. Conduct a "fit for purpose" environmental justice analysis;
5. Minimize and mitigate disproportionately high and adverse effects associated with the permit action to promote fair treatment;
6. Provide federal support throughout the air permitting process;
7. Enhance transparency throughout the air permitting process; and
8. Build capacity to enhance the consideration of environmental justice in the air permitting process.

A. Air Quality Review

For purposes of Executive Order 12898 on EJ, the EAB has recognized that compliance with the NAAQS is "emblematic of achieving a level of public health protection that, based on the level of protection afforded by a primary NAAQS, demonstrates that minority or low-income populations will not experience disproportionately high and adverse human health or environmental effects due to the exposure to relevant criteria pollutants."[108] This is because the NAAQS are health-based standards, designed to protect public health with an adequate margin of safety, including sensitive populations such as children, the elderly, and asthmatics. Based on PSD-required modeling for this project, the EPA has determined that issuance of this OCS permit will not contribute to NAAQS or PSD increment violations nor have potentially adverse effects on ambient air quality. *See* Section IV.C of this document for a detailed analysis of the ambient air impact analysis of the project.

[107] *See* EPA's December 22, 2022, EJ in Air Permitting - Principles for Addressing Environmental Justice Concerns in Air Permitting. https://www.epa.gov/caa-permitting/ej-air-permitting-principles-addressing-environmental-justice-concerns-air.

[108] See Environmental Appeals Board order In re Shell Gulf of Mexico, Inc. & In re Shell Offshore, Inc., 15 E.A.D. 103, 156 (December 30, 2010). A copy of the order can be found in the administrative record for this action.

B. Environmental Impacts to Potentially Overburdened Communities

EPA's EJ Screen tool[109] is an environmental justice screening and mapping tool that utilizes standard and nationally consistent data to highlight places that may have higher environmental burdens and vulnerable populations. In EJ Screen, EPA uses the 80th percentile as a threshold to identify geographic areas that may warrant further consideration, analysis, or outreach for environmental justice. CEQ's 1997 guidance document identifies minority populations in an affected environment if: (a) the minority population of the affected area exceeds 50 percent of the affected area's total population; or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis. The Commonwealth of Massachusetts has more stringent criteria and defines an EJ community as one or more U.S. Census block groups that meet one or more of the following criteria: the annual median household income is not more than 65 per cent of the statewide annual median household income; minorities comprise 40 per cent or more of the population; 25 per cent or more of households lack English language proficiency; or minorities comprise 25 per cent or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150 per cent of the statewide annual median household income.[110]

In the Final Environmental Impact Statement (FEIS) for SCW, BOEM analyzed potential air quality impacts as a result of the construction and operation of the Project.[111] EPA finds BOEM's analysis helpful in identifying potential EJ areas of concern. Indirect air quality impacts[112] to EJ communities were evaluated for the Geographic Analysis Area (GAA). The GAA includes all counties adjacent to the Lease Area and any areas where Project offshore infrastructure may be visible. Counties adjacent to onshore Project infrastructure or ports used to support Project construction, O&M, and decommissioning activities in the WDA and along the export cable route are also included in the GAA. In addition, the GAA includes counties adjacent to major ports that support commercial fisheries potentially affected by the Project. The percentage of minority and low-income populations in each block group, county, and city/town were determined using EPA's EJ Screen tool in BOEM's FEIS for SCW. Potential environmental justice areas of concern were identified if: 1) the minority population exceeds 50%; or 2) the minority or low-income population percentage is meaningfully greater than the minority or low-income population percentage of a reference population. Of the estimated block groups, several were identified as EJ areas of concern. The analysis area also includes tribal lands and

[109] EJSCREEN is an environmental justice mapping and screening tool that provides the EPA with a nationally consistent dataset and approach for combining environmental and demographic indicators. More information on EPA's EJ Screen tool is available at https://www.epa.gov/ejscreen.

[110] *See* Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs. Available at: https://www.mass.gov/doc/environmental-justice-policy6242021-update/download. Last accessed October 16, 2023.

[111] A copy of BOEM's 2024 FEIS for the SouthCoast project can be found in the administrative record for this action.

[112] For the purposes of this discussion, indirect air quality impacts are those that are caused by activities such as onshore construction, staging of materials, and emissions from vessels associated with the construction and operation of SCW. These emissions are not directly regulated by EPA's CAA OCS permit and are outside the regulatory authority of EPA within the context of CAA OCS permitting.

communities that the Project may affect, and port areas indirectly affected by the project.[113] The analysis area also includes tribal lands and communities that the Project may affect, and port areas indirectly affected by the project.

Any direct air quality impacts[114] during the construction phase of the Project are occurring over three years. As described in section IV.C of the factsheet, there will be no violation of the NAAQS or PSD increment as a result of construction activities associated with the project. Direct air quality impacts from ongoing Project activities regulated by this permit are localized around the WDA (which is 26 NM south of Martha's Vineyard and 20 NM south of Nantucket, Massachusetts) and insignificant in all onshore areas.

Many of the air emitting activities analyzed by BOEM's FEIS are not regulated under EPA's OCS air permit program. Vessel emissions, such as transit vessels and vessel activity at port communities beyond 25 NM from the project are not subject to EPA's OCS air permit. In addition, only vessels within the WDA that meet the definition of an OCS source are subject to the permit terms and conditions. However, these vessels are subject to stringent EPA and IMO standards for marine engines found at 40 C.F.R. part 1042, 40 C.F.R. part 1043, and IMO Annex VI. These standards also require the use of ULSD for certain engine categories. These standards apply to the marine engines on all vessels independent of this OCS air permit.

According to SCW's FEIS, the potential port facilities to be used to support construction of the Project include existing ports in Massachusetts, Rhode Island, Connecticut, Maryland, South Carolina, Texas, and some international ports. During O&M, the potential ports to be used to support the Project include existing ports in Massachusetts, Connecticut, Rhode Island, Maryland; and South Carolina.[115] EPA and the states operate an extensive network of air quality monitoring locations to ensure ambient air quality meets the NAAQS. Many of these air monitoring locations coincide with port communities such as New Bedford, MA; Fall River, MA; Providence, RI; New London, CT; and Bridgeport, CT, as well as other northeast and mid-atlantic states.[116] See below Figure 11 for a map of Ozone and PM Air Monitoring Stations in states with potential port facilities. Air quality monitoring data from these locations is publicly available online at https://www.epa.gov/outdoor-air-quality-data.

[113]BOEM (2024). SouthCoast Final EIS, 3.4.2-23

[114] For the purposes of this discussion, direct air quality impacts are those that are regulated by EPA's CAA OCS permit and include emissions associated with the OCS source.

[115] BOEM (2024). SouthCoast Final EIS, 3.4.2-23

[116] An interactive map of air quality monitoring locations is available at https://www.epa.gov/outdoor-air-quality-data

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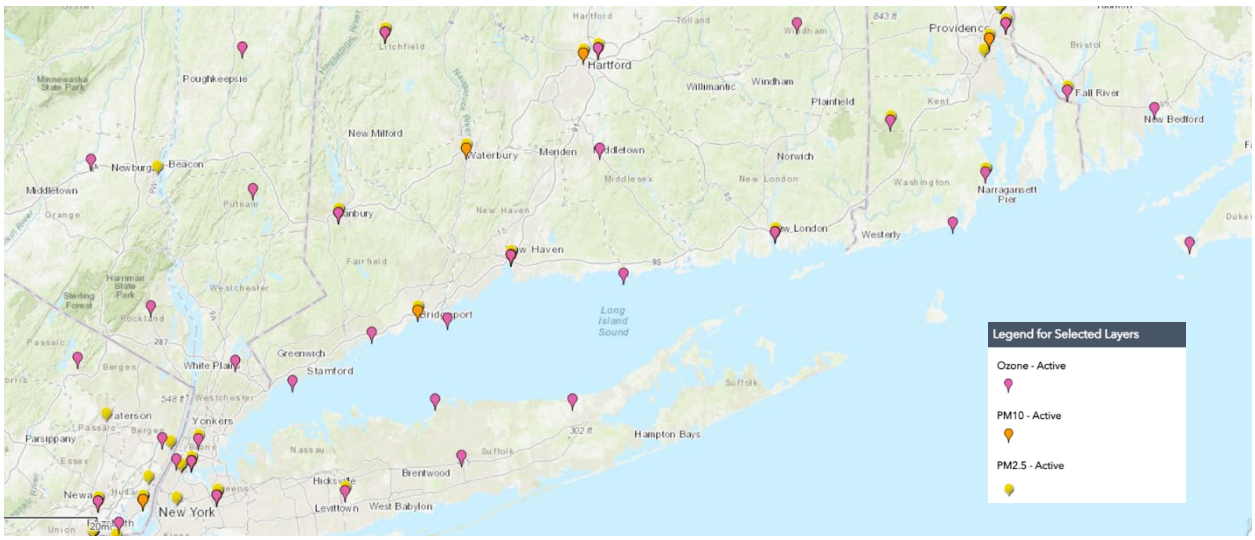

Figure 10: Map of Ozone and PM Air Monitoring Stations in Southeastern New England and Portions of New York and New Jersey

Over time, the development of offshore wind, a renewable and non-emitting energy source, on the Atlantic Coast is expected to displace fossil-fuel fired generation of electricity and improve air quality in the region, in turn significantly reducing adverse health impacts to EJ communities in the area. SCW estimates avoided emissions of offshore wind displacing fossil fuel generators for the project are 692 tons of NO_X per year, 313 tons of SO_X per year, and 4,038,482 tons of CO_{2e} per year.[117] EPA expects substantial, long-term air quality improvements will have a beneficial impact on the health and safety of EJ populations as a result of this project. Furthermore, BOEM analyzed the employment and economic activity impacts associated with offshore wind development and found there to be minor beneficial impacts from new job formation.[118]

Direct air emissions from the Project are subject to BACT and LAER emission limits as well as the requirement to obtain emissions offsets (for the operational phase of the Project) in advance under the NNSR permitting programs. Thus, the emissions generating activities at the OCS source will be controlled by compliance with the OCS air permit. In other words, emissions control and NNSR offset requirements in the air permit will minimize air pollutant emissions. The emissions generated during the operation phase of the windfarm engines would be very low and the engines are certified to meet EPA emissions standards. In addition, work practice standards that will be employed during the construction and operation of the Project include minimizing the idling of the engines of the vessels; and the use of ultra-low sulfur diesel whenever possible to minimize sulfur and particulate emissions. The EPA notes that some of the emissions generated by the vessels' engines, which will depart from and return to the ports, would occur near shore. According to the SCW FEIS, these emissions would have negligible to minor adverse impacts attributable to air emissions, noise at ports, onshore construction, and impacts on marine businesses.[119]

[117] SouthCoast , COP Volume I, Table 3-47.
[118] BOEM (2024). SouthCoast Final EIS, Table 2.4.
[119] BOEM (2024). SouthCoast Final EIS, Table 2.4.

C. Tribal Consultation

Per the EPA Policy on Consultation and Coordination with Indian Tribes, the EPA Region 1 offers tribal government leaders an opportunity to consult on all OCS air permit actions. On May 19, 2023, the EPA notified all federally recognized tribes in Massachusetts, Rhode Island, and Connecticut that they will be provided the opportunity to conduct government-to-government consultation prior to issuing the OCS air permit.[120] To date the EPA has not received a request from any tribe requesting consultation on this permit action. However, tribes may request consultation at any time.

D. Public Participation

Section 5-5(c) (Public Participation and Access to Information) of EO 12898 requires that each federal agency work to ensure that public documents, notices, and hearings relating to human health, or the environment are concise, understandable, and readily accessible to the public to provide opportunity for meaningful involvement for all communities, including potentially impacted environmental justice communities. The EPA is taking or will take the following actions to provide public participation and access to information in accordance with EO 12898:

- Prepared a Public Notice, along with this Fact Sheet, which are available on the EPA website https://www.epa.gov/caa-permitting/caa-public-comment-opportunities-region-1.
- Will hold a virtual public hearing for this permit action during the public comment period. Please refer to the public notice on EPA's website for details on how to register.
- Providing Email notification of future Region 1 CAA permit public comment opportunities. Interested parties can sign up at: https://www.epa.gov/caa-permitting/caa-permitting-epas-new-england-region.

XI. Comment Period, Hearings and Procedures for Final Decisions

All persons, including applicants, who believe any condition of the Draft Permit is inappropriate must raise all issues and submit all available arguments and all supporting material for their arguments in full by the close of the public comment period, in writing. EPA prefers that all comments be submitted by electronic means to:

Andre D. Turner
Email: turner.andre@epa.gov

Comments may also be submitted electronically through https://www.regulations.gov (Docket ID: EPA-R01-OAR-2024-0393)

If electronic submittal of comments is not feasible, hard copy comments may be submitted via mail to the address below:

[120] Letters offering government-to-government consultation to each of the affected tribes are included in the administrative record for this air permit action.

U.S. EPA Region 1
Air and Radiation Division
Air Permits, Toxics and Indoor Programs Branch
Attn. Andre D. Turner
Mailing Address: 5 Post Office Square, Suite 100, 5-MD, Boston, Massachusetts 02109

A public hearing will be held during the public comment period. Please refer to the public notice for details on how to register. The EPA will consider requests for extending the public comment period for good cause. In reaching a final decision on the Draft Permit, the EPA will respond to all significant comments and make these responses available upon request.

Following the close of the public comment period, and after the public hearing, the EPA will issue a Final Permit decision and forward a copy of the final decision to the applicant and each person who has submitted written comments or requested notice. Within 30 days following the notice of issuance of the Final Permit decision, any eligible parties may submit a petition for review of the Final Permit decision to the EPA's EAB consistent with 40 C.F.R. § 124.19.

XII. EPA Contacts

Additional information concerning the OCS permit may be obtained from:

Andre D. Turner
Telephone: (617) 918-1216
Email: turner.andre@epa.gov

All supporting information regarding this permitting action can also be found on EPA's website at https://www.epa.gov/caa-permitting/epa-issued-caa-permits-region-1, or at www.regulations.gov (Docket ID: EPA-R01-OAR-2024-0393)