REGION 1
BOSTON, MA 02109

December 19, 2023

FACT SHEET

Outer Continental Shelf Preconstruction Air Permit
Sunrise Wind Farm Project
Sunrise Wind, LLC

Offshore Renewable Wind Energy Development
Renewable Energy Lease Area OCS-A-0487
EPA Draft Permit Number: OCS-R1-06

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
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
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
EUG	Emission Unit Group
FWS	U.S. Fish and Wildlife Service
GCOP	Good Combustion and Operation 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
LV GIS	Low Voltage Gas Insulated Switchgear
KV	Kilovolt
KW	Kilowatt
LAER	Lowest Achievable Emission Rate
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
OCS-DC	Offshore Converter Station
OnCS-DC	Onshore Converter Station
OECLA	Offshore Export Cable Laying Activities
OSCLA	Outer Continental Shelf Lands Act
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
RPM	Revolutions Per Minute
SER	Significant Emission Rate
SIC	Standard Industrial Code
SIL	Significant Impact Levels
SRW	Sunrise Wind, LLC
SO_2	Sulfur Dioxide
SOVs	Service Operation Vehicles
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:	Sunrise Wind, LLC 437 Madison Avenue, Suite 1903 New York, New York 10022
Location of regulated activities:	Outer Continental Shelf (OCS) Lease Area OCS-A 0487 is in federal waters, approximately 13 nautical miles (NM) south of Nomans Land Island, Massachusetts. See Section II.A for more information.
Draft OCS permit number:	OCS-R1-06
EPA contact:	Pujarini (Rini) Maiti

On August 17, 2022, Sunrise Wind, LLC (SRW or 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 Sunrise Wind Offshore Windfarm (SRW or the Project). On February 24, 2023, SRW submitted a revised application which EPA determined was administratively complete on March 21, 2023.

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-R1-06. 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 Sunrise Wind Project includes up to 84 wind turbine generators (WTGs) with a capacity of 11 MW per turbine, submarine cables (inter-array cables) between the WTGs, and one Offshore Converter Station (OCS-DC). Once operational, the project will have an anticipated maximum production capacity up to 1,034 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 0487. The lease area itself is approximately 109,952 acres. The Wind Development Area (WDA) for the project will be located approximately 13 nautical miles (NM)[1] south of Nomans Land Island, Massachusetts.[2] An electric export cable (direct current) will make landfall on Long Island, New York, and connect the wind farm to the existing electric transmission system via the Long Island Power Authority Holbrook Substation. See Figure 1.

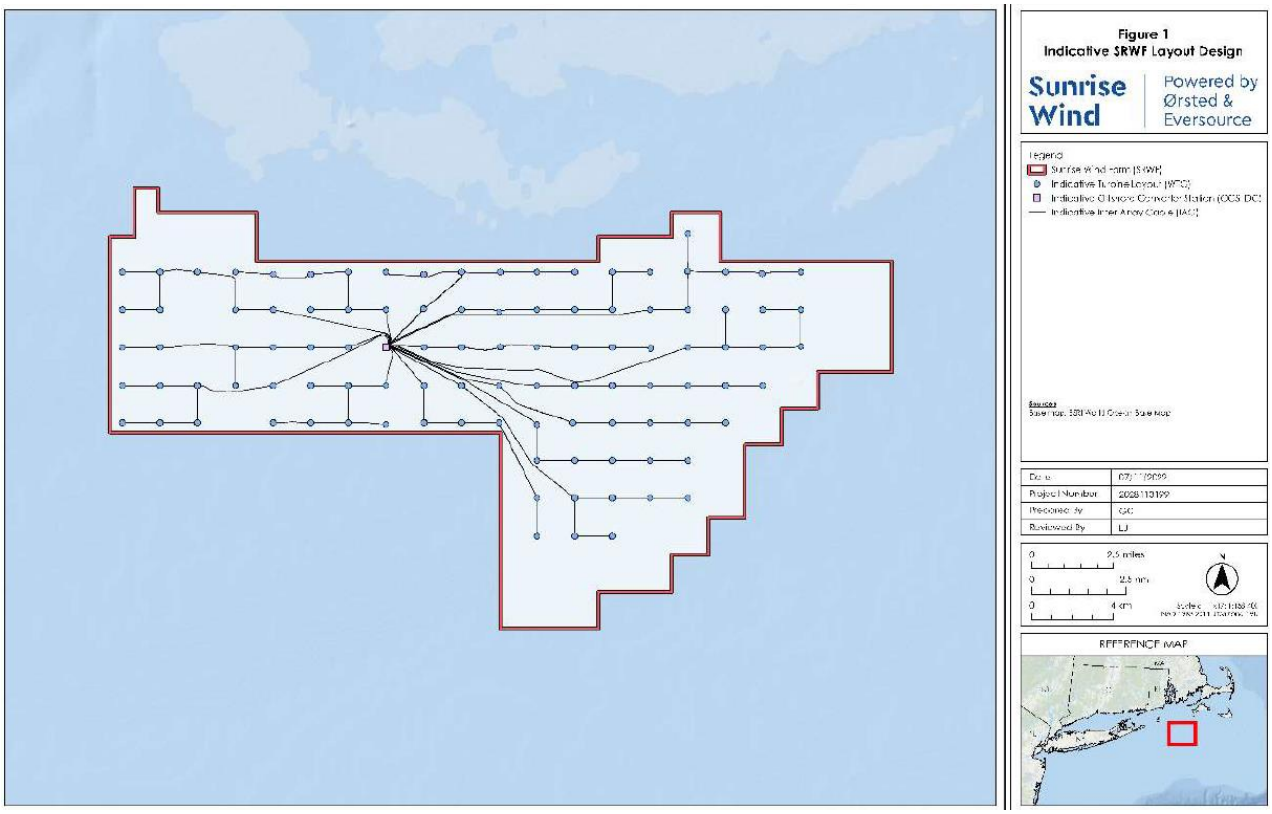

Figure 1 Location of Sunrise Wind Offshore Wind Farm Project

[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 SRW WDA is on Nomans Land, which is an uninhabited island that is closed to the public. The distance is measured from the boundary of the SRW WDA (not the nearest WTG position).

B. Construction Emissions from Sunrise Wind Project

Offshore construction will include activities involving scour protection, foundation, and offshore cable installation, followed by OCS-DC and WTG installation and commissioning. Table 1 contains the project's potential emissions during the construction phase (annualized), as contained in SRW's application provided to the EPA on September 27, 2023. Note that the estimates during the construction period represent the annualized worst-case potential to emit (PTE).

Table 1 Estimated Construction OCS Emissions (tons per year (tpy)) for the SRW Project

CO_2e	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	Lead	VOC
219,299	442.1	2,165	51.8	48.6	75.1	0.006	113.4

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.[3]

C. Operation and Maintenance Emissions from Sunrise Wind Project

The 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 SRW's application provided to the EPA on February 24, 2023. 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.

Table 2 Estimated Operations and Maintenance Emissions (tpy)

CO_2e	CO	NO_X	PM_{10}	$PM_{2.5}$	SO_2	Lead	VOC
22,722	48.8	108.4	3.9	3.6	6.7	<0.01	10.5

Once operational, electricity produced by the WTGs will displace electricity generated by fossil fuel power plants and therefore, significantly reduce emissions associated with the NYISO 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] EPA utilizes the centroid of the Wind Development Area to estimate PTE within 25 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. Note in this concept nautical miles is utilized.

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[4] 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.[5]

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.[6]

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

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

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[4] 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.

[5] 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.

[6] A copy of the Construction and Operation Plan may be found at https://www.boem.gov/renewable-energy/state-activities/new-england-wind-formerly-vineyard-wind-south

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[7] then follows the applicable procedural requirements for federal permitting in those regulations which follow the requirements in 40 C.F.R. part 124 or 40 C.F.R. part 71, and then finalizes the OCS permit in accordance with those federal requirements.[8]

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. NEW1 submitted to the EPA an NOI for the windfarm on January 28, 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 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

[7] 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 Regional Administrator in EPA Region 1. See Docket for Delegation of Authority.

[7] *See* 40 C.F.R. § 55.6(a)(3).

[8] *See* 40 C.F.R. § 55.6(a)(3).

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[9]. 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.[10]

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[11] 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.[12] Massachusetts was also designated as the COA for all three 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.[13]

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

[9] 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.
[10] *See* 40 C.F.R. §§ 55.12(d), 55.14(c).
[11] 86 Fed. Reg. 66,509–66,512.
[12] On February 1, 2023, Mayflower Wind Energy LLC notified EPA of a name change to South Coast Wind Energy, LLC.
[13] 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, LLC (formerly Mayflower Wind Energy).

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).

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.[14] 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[15], 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, EPA is treating all stationary equipment and activities within the proposed windfarm, including all wind turbines, as 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

[14] 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.

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

foundations, each ESP 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 OCS-DC) 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[16] 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 term is used in the permit to refer to individual pieces of equipment or vessels that meet the definition of "OCS source" which are subject to control technology requirements.[17]

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

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

[16] See Figure 1.

[17] Note that the CAA defines the term "OCS source" to include "any equipment, activity, or facility" that (1) emits or has the potential to emit any air pollutant, (2) is regulated or authorized under the Outer Continental Shelf Lands Act (OCSLA), and (3) is located on the OCS or in or on waters above the OCS. CAA § 328(a)(4)(C).

regulated NSR pollutant."[18] 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 [19][20]

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:

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.

[18] 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).

[19] 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).

[20] SRW 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.

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[21] 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.[22]

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 SRW project lease area. 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

[21] *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

[22] *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.

the South Fork Wind project and the Revolution Wind project were a single stationary source for purposes of CAA permitting.

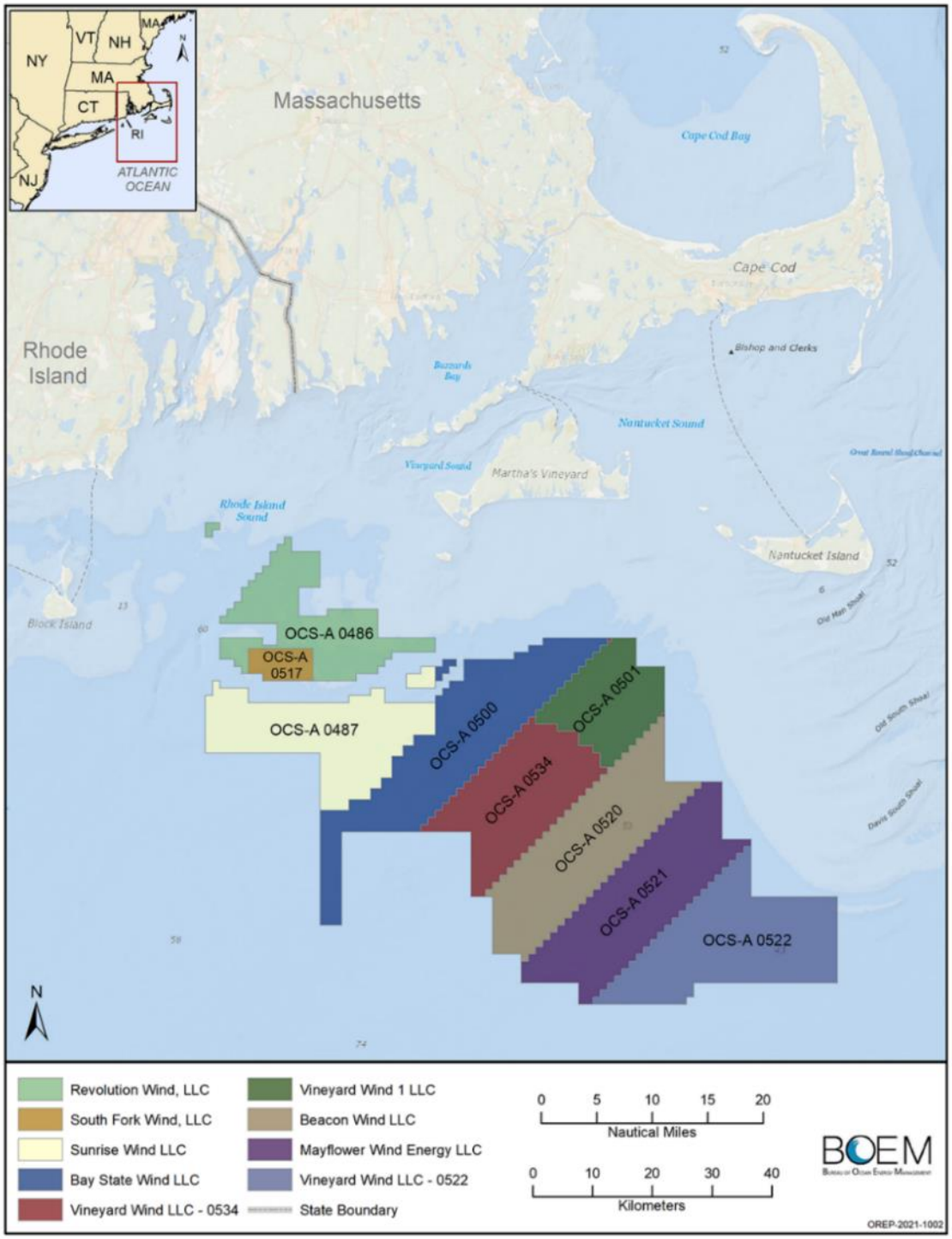

Figure 2 Map of Massachusetts/Rhode Island OCS Lease Area

EPA has evaluated whether the SRW project, also owned and operated by Orsted/Eversource, should be considered part of the same stationary source as South Fork and Revolution Wind.

While the three sources are classified under Standard Industrial Code (SIC) 4911, Electric Services, and are under common control through common ownership by Orsted/Eversource, SRW is located on property that is not contiguous or adjacent to the South Fork wind farm and Revolution Wind farm, thus not satisfying the second criterion used to determine whether sources should be aggregated into a single stationary source for CAA permitting purposes. The SRW lease area (OCS-A-0487) and the South Fork and Revolution Wind lease areas (OCS-A-0517 and OCS-A-0486, respectively) are separated by Cox Ledge[23] and therefore are not located on property contiguous or adjacent to SRW. *See* Figure 2. Based on this assessment, EPA has determined that SRW is a new major stationary source under the NSR and Title V permit programs and the potential emission of this 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;

[23] Cox Ledge is an "area of concern" for fishery managers that provides habitat for several commercially and recreationally valuable species that was removed from the lease areas for wind energy development by BOEM during the leasing process.

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 emission 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. Wind Turbine Generators and Offshore Converter Station

As described below, WTGs and OCS-DC(s) will be installed on the seabed within the wind development area.[24]

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 (OCS-DC).25 The OCS-DC 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.

The Project will consist of up to 84 WTGs, sited in a grid with approximately 1 NM by 1 NM spacing. The general process for installation of the wind farm involves the installation of the foundations to the sea floor and preparation of the structures for the WTGs and the OCS-DC. Work vessels then supply all the WTG components and install them on the foundations. SRW plans to install a monopile-style foundation for each WTG.

As mentioned earlier, the SRW project will consist of up to 84 WTGs and 1 OCS-DC. The WTGs and OCS-DC will be oriented in an east-west, north-south grid pattern with one NM spacing between positions and will be supported by monopile or piled 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 OCS-DC. Work vessels supply all the WTG components and install them on the foundations.

1. Generator Engines

[24] See Figure 1.

According to SRW's permit application, one 37-kW generator will be used for cable pull-in during construction. Power will be provided by the jack-up vessel when performing the foundation installation work. During the commissioning of the WTGs, the WTGs will be powered by the integrated battery backup system and are not anticipated to require the use of a generator engine. However, if the battery backup system were to fail, or not provide sufficient power for the full duration of commissioning, temporary 120 kW and 37 kW generators on the WTGs would be required until the WTGs are connected to, and able to be powered by, the grid. SRW anticipates that generator engines are necessary for use on the WTGs during the operations phase in the unlikely scenario where shore power from the grid is not available.

Specifically, the temporary diesel generators would be used to supply emergency power to the WTGs in the event the battery backup system fails. Therefore, SRW is requesting in its permit application approval for the ability to construct and operate generator engines for use on the WTGs.

SRW plans to construct and operate one OCS-DC to support the project's maximum production design capacity. Two auxiliary 1700 kW diesel generators will be installed on the OCS-DC during installation, commissioning, and operation. The generators will remain on the OCS-DC after commissioning for emergency use and for infrequent use to provide power during maintenance activities in the operations phase. The generator engine emissions on the OCS-DC and the WTGs (if installed) 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 OCS-DC. 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.

F. Vessels

According to the Permittee's application, offshore construction for the windfarm is anticipated to be completed in the following general sequence:[25]

1. Foundation and Scour Protection Installation
2. Offshore Cable Installation
3. WTG Installation and Commissioning
4. OCS-DC 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 OCS-DC components to the lease area. Installation of the WTGs, monopiles, and

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

OCS-DC is expected to be performed using a combination of jack-up vessels and dynamic positioning system (DPS) crane vessels. It is anticipated that scour protection will be installed around the WTG and ESP 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, a bubble curtain will be maintained via an anchor handling vessel.[26] In addition, four sound field verification vessels will be positioned around pile driving to monitor for sound.

CTVs and helicopters are expected to be used to transport personnel to and from the wind development area. 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 OCS-DC 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.

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.

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

Table 3 Description of Vessels and Equipment for WTG and OCS-DC Installation Activities included in the Potential to Emit

Vessel Type	Description of Vessel Type
Crew transport vessels	Transport crew to and from the WDA.

[26] Bubble curtains utilize a submerged, perforated tube or pipe from which compressed air is released. When laid on the seafloor around areas where offshore activities are expected to occur, the rising curtain of bubbles reduces and disperses the amount of underwater noise associated with a particular activity, protecting marine life from acoustic disturbances.

[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

Vessel Type	Description of Vessel Type
Heavy lift crane vessels	Lift, support, and orient the components of each WTG and OCS-DC during foundation installation.
Feeder barge	Transport wind turbine components from port to installation vessels.
Cable installation vessels	Lay and bury inter-array and export cables in the seafloor.
Scour protection installation vessels/rock dumping vessels	Deposit a layer of stone around the WTG and OCS-DC foundations to prevent the removal of sediment by hydrodynamic forces. May place cable protection over limited sections of the offshore cable system.
Multipurpose offshore support vessels	Clear the seabed floor of debris prior to laying transmission cables.
Tugboats	Transport equipment and barges to the OCS.
Bubble curtain support vessel	Install underwater noise mitigation devices (e.g., bubble curtains).
Anchor handling tug supply (AHTS) vessels	Tow and handle anchors. Support offshore export cable installation.
Noise monitoring/sound field verification vessels	Vessels used for noise monitoring and sound field verification during construction activities.
Jack-up vessels	Transport WTG components to the WDA. Extend legs to the ocean floor to provide a safe, stable working platform. Used for offshore accommodations.
Boulder removal vessels	Clear seabed prior to cable laying.
Dredging vessels/sandware leveling vessels	Used in certain areas prior to cable laying to remove the upper portions of sand waves.
Pre-lay grapnel run vessels	Used to clear small debris from cable route.
Guard vessels	Used for monitoring and surveillance of offshore infrastructure and vessels.
Survey vessels	Used to perform geophysical and geotechnical surveys.
Service operation vessels	Transport crew to the WDA. May carry and deploy small daughter craft to transport personnel from the SOV to the work area. Provide offshore living accommodation and workspace.
Ocean-going heavy transport vessels (HTV)	Ocean-going vessels that may transport components directly to the WDA.
Fuel bunkering vessel	Supply fuel to other vessels

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 operations 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 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.

[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).

[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.

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 ESP) 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 ESP(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 OCS-DC 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 permit, until the point in time when fewer than three jack-up legs are attached to the seafloor[30,31].

[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

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 OCS-DC. 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.

EPA has previously determined that cable-laying vessels that utilize pull-ahead anchors or DPS and 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

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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.

[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".

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 OCS-DC) 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 ESP(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 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 ESP.

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

[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

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 OCS-DC. 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 OCS-DC on the seabed that will convert wind energy into electricity.

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 SRW windfarm 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 Clean Air Act. 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 Spaulding 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 Project is considered new, its emissions increase 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. In addition, since the project does not belong to one of the named source categories within 40 C.F.R. 52.21(b)(1)(iii), the fugitive emissions are not counted in determining the PTE for major applicability purposes.

1. Emission Increase Calculation (Potential to Emit)

As shown in Table 3, the project is a new major PSD source because emissions for at least one "regulated NSR pollutant" (i.e., NO_2 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 increases from this project are calculated on a pollutant-by-pollutant basis for each regulated NSR pollutant.

Table 3 Worst Case Annual Emissions Compared with PSD Major Source Thresholds

NSR Regulated Pollutant	Potential to Emit (TPY)	PSD Major Source Threshold (TPY)	PSD Triggered? (Y/N)
NO_2 (1)	2,165	250	**Y**
CO	442.1	250	**Y**

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

Since SRW 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.

For assessing the emission increases from the SRW 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, 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 in the significant emission increase of the Project.

Table 4 Significant Emission Increase from the Sunrise Wind Project

SRW - Project Emission Increase	Regulated NSR Pollutant (TPY)							
	NO_2	CO	PM_{10}	$PM_{2.5}$	SO_2	GHG (As CO_2e)	H_2S Mist	Pb
BAE	0	0	0	0	0	0	0	0
PTE	2,165	442.1	51.8	48.6	75.1	225,454	0	0.006
Δ (PTE-BAE)	+2,165	442.1	+51.8	+48.6	+75.1	+225,454	-	0.006

As shown in Table 5 and Table 6, PSD review is required for NO_2, CO, PM_{10}, $PM_{2.5}$, SO_2 and GHG as CO_2 equivalents. Total PM emissions were not provided by the applicant. In addition, the pollutant 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 CO2e or more, which is the case for SRW. [42]

Table 5 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	51.8 (1)	25	**Y**
PM_{10}	51.8	15	**Y**
$PM_{2.5}$	48.6	10	**Y**
SO_2	75.1	40	**Y**
GHG (as CO_2e)	225,454	75,000	**Y**
Sulfuric Acid Mist	0	7	N
Lead	0.006	0.6	N

(1) Emissions of PM was not submitted with the application. Since smaller particles are considered a subset of the larger sized particles, PM emissions must be greater than or equal to the PM_{10} emissions. Therefore, for permitting purposes, PM emissions are assumed to be equivalent to PM_{10}.

2. Emission Netting (Contemporaneous Netting)

SRW 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 5 and Table 6, NO_2, CO, PM, PM_{10}, $PM_{2.5}$, SO_2, and GHG are the NSR regulated pollutants that will be emitted by SRW in quantities exceeding the respective PSD SER.

Note that ozone (and therefore its precursors NO_X and VOC) is subject to NNSR and is therefore not explored further in this section. *See* Section V for details on the applicable NNSR requirements.

[42] 40 CFR 52.21(b)(49)(iv)(*a*)

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 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. 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).[43, 44]

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;[45]
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
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.

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[43] *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

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

[45] 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.

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 Sunrise Wind 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). Based on the emission levels for the project, NO_2, CO, PM, PM_{10}, $PM_{2.5}$, SO_2 and GHG are the NSR regulated pollutants that will be emitted by NEW1 and subject to PSD.

All applicable pollutant emissions at the source, including fugitive, are subject to subsequent NSR review steps (e.g., BACT/LAER review, air quality impacts) according to NSR program requirements.

a. Emission Unit Applicability

The SRW project is required to apply BACT to all the new emission units proposed in this project. 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 OCS-DC. 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 OCS-DC

Table 6 Emission Unit Group (EUG) 1 - OCS Generator Engine(s) Installed on the OCS-DC and/or WTG(s)

EU ID	Description	Type of Equipment	Engine Count	Engine Rating, kW	Hours per Engine
Construction Equipment					
SRW-1, 2	OCS Installation & Commissioning	Auxiliary Generator on OCS-DC	2	1,700	4,380[1]
SRW-3	OCS Installation & Commissioning	Generator for Cable Pull-WTG	1	37	7,344[1]
SRW-4,5	OCS Installation & Commissioning	Temporary Gensets during Commissioning of WTGs	2	120	3,500[1]
Operating Equipment					
SRW-1,2	Annual Operations	Auxiliary Generator on OCS-DC	2	1,700	600
SRW-6— SRW-13	Annual Operations	Emergency Generators on WTGs	7	120	720

[1] Note that this represents the total hours of operation during the entire construction period of the project.

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.[46]

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 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.[47] 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 7 EUG 2 - Marine Engines on Vessels Operating as Potential OCS Source(s)

Vessel Type	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	OCS Source	Contracted
Construction				
Monopile Installation				
Heavy Lift Installation Vessel	34,560	NA	No	Yes

[46] 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.

[47] 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.

Vessel Type	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	OCS Source	Contracted
Heavy Lift Installation Vessel (secondary steel)	24,960	1,100	No	Yes
Anchor Handling Tug	11,060	NA	No	Yes
Anchor Handling Tug	7,380	NA	No	Yes
Rock Dumping Vessel	13,500	1,692	No	Yes
Vessel for Bubble Curtain	11,060	NA	No	Yes
Heavy Transport Vessel 1	15,552	NA	No	Yes
Heavy Transport Vessel 2	15,552	NA	No	Yes
Heavy Transport Vessel 3	15,552	NA	No	Yes
Heavy Transport Vessel 4	13,000	NA	No	Yes
PSO Noise Measurements/Monitoring Vessel	1,432	NA	No	Yes
Platform Supply Vessel- SS Transport	4,920	NA	No	No
Platform Supply Vessel- Completions	4,852	NA	**Yes**	No
OCS-DC Jacket Installation				
Heavy Lift Installation Vessel	50,111	1,110	No	Yes
Fuel Bunkering Vessel	NA	NA	No	No
Towing Tug (for fuel barge)	4,049	NA	No	No
Anchor Handling Tug	11,060	NA	No	No
Vessel for Bubble Curtain	4,920	NA	No	No
Heavy Transport Vessel	13,500	NA	No	Yes
OCS-DC Topside Installation				
Heavy Life Installation Vessel	50,111	1,110	No	Yes
Heavy Transport Vessel	13,500	NA	No	No
Anchor Handling Tug	11,060	NA	No	No
Turbine Installation				
Jack-up Installation Vessel	28,800	NA	**Yes**	**Yes (Charybdis)**
Fuel Bunkering Vessel	NA	NA	**Yes**	No
Turbine Commissioning/Completion				
Service Operation Vessel	9,910	NA	**Yes**	**Yes (Paul Candies)**
Crew/assisting Transport Vessel	2,237	NA	**Yes**	No
Offshore Export Cable including OCS Interlink				
Tug - Small Capacity	4,049	NA	No	No
Support Barge	11,060	NA	No	No
PLGR (pre-lay grapnel run)	13,748	NA	No	No
Boulder Clearance Vessel	15,340	NA	No	No
Sandwave Clearance Vessel	7,300	NA	No	No
Cable Laying Vessel	11,746	NA	No	Yes
Cable Burial Vessel	11,746	NA	No	Yes
CTV	2,237	NA	**Yes**	No

Vessel Type	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	OCS Source	Contracted
Guard/Scout Vessel	400	NA	No	No
Survey Vessel Large	1,302	NA	No	No
Survey Vessel Small	1,302	NA	No	No
DP2 Construction Vessel	13,748	NA	No	No
Misc. Floating Equipment Landfall	400	NA	No	No
Offshore Array Cable				
Array PLGR Vessel	13,748	NA	No	No
Export Boulder Clearance Vessel	13,748	NA	No	No
Array Sandwave Clearance	7,300	NA	No	No
Array Cable Laying Vessel	11,746	NA	No	Yes
Array Cable Burial Vessel	11,746	NA	No	Yes
CTV	2,237	NA	**Yes**	No
Array Walk-2-Work Vessel	6,440	NA	No	No
Array Survey Vessel	1,302	NA	No	No
Offshore Cable Transport				
Export Cable Transport Trips using CLV	11,746	NA	No	Yes
Array Cable Transport Freighter	11,746	NA	No	No
HDD Marine Support				
Support Barge	NA	NA	No	No
CTV	805	NA	No	**Yes (NOS Developer)**
Supply Vessel	2,237	NA	No	No
Guard Vessel	2,237	NA	No	No
Towing Tug	2,983	180	No	Yes
Support Vessels	276	NA	No	Yes
Spoil Containment Barge	NA	NA	No	No
Dive Vessel	507	NA	No	No
Crew Transport and Support				
Safety Vessel 1	400	NA	No	Pending
Safety Vessel 2	400	NA	No	Pending
CTV – Cat 4	2,162	NA	**Yes**	Pending
CTV – Cat 2	2,386	NA	**Yes**	Pending
CTV – Cat 6	2,984	100	**Yes**	Pending
Supply Vessel	7,530	NA	No	Pending
Helicopter	1,491	NA	No	Pending
SOV	6,800	NA	**Yes**	Pending
SOV	6,800	NA	**Yes**	**Yes (Eco Edison)**
SOV	6,800	NA	**Yes**	**Yes (Eco Edison)**
Flotel with Boat Landing	7,530	NA	Maybe	Pending
Fisheries Monitoring – Trawl Survey				
Fishing Vessel	400	NA	No	
Fisheries Monitoring – Export Cable Acoustic Telemetry				

Vessel Type	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	OCS Source	Contracted
Research Vessel	400	NA	No	
Fisheries Monitoring – Lease Site Acoustic Telemetry				
Fishing Vessel	799	NA	No	
Fisheries Monitoring – Scallops				
Fishing Vessel	400	NA	No	
Marine Mammal Mitigation – Real Time Situational Awareness/Project Area and Transits				
Research Vessel	400	NA	No	
Marine Mammal Mitigation – Long Term Acoustic				
Research Vessel	400	NA	No	
Marine Mammal/ST Long Term Studies				
Research Vessel	400	NA	No	
Operations				
Annual Operations – Planned Minor Repairs				
CTV	2,237	NA	**Yes**	**Yes (Windserve Explorer)**
SOV	6,800	NA	**Yes**	**Yes (Eco Edison)**
Service Daughter Craft	492	NA	**Yes**	Pending
CTV (3rd party)	2,237	NA	**Yes**	Pending
Annual Operations – Unplanned Major Components				
Jack Up (US flagged vessel)	25,200	NA	**Yes**	No
Annual Operations – Planned O&M Cables				
Offshore Survey Vessel – FOU and Array	18,000	NA	No	No
Offshore Survey Vessel - ECR	18,000	NA	No	No
Annual Operations – Unplanned O&M Cables				
CLV/Construction Vessel/Jack Up	18,000	NA	No	No
Cable Burial/Termination Team	18,000	NA	No	No
Surveys for Cable Repairs	18,000	NA	No	No
Fisheries Monitoring – Trawl Survey				
Fishing Vessel	400	NA	No	No
Fisheries Monitoring – Export Cable Acoustic Telemetry				
Research Vessel	400	NA	No	Yes
Fisheries Monitoring – Lease Site Acoustic Telemetry				
Fishing Vessel	400	NA	No	Yes
Fisheries Monitoring – Scallops				
Fishing Vessel	400	NA	No	Yes
Marine Mammal Mitigation/ST Long Term Studies				
Research Vessel	400	NA	No	No
Research Vessel	400	NA	No	No
Marine Mammal Mitigation – Long Term Acoustic				
Research Vessel	400	NA	No	No
Avian Ship-based Surveys				
Research Vessel	400	NA	No	No
Avian/Bat MOTUS radio tracking				
Research Vessel	400	NA	No	No

Table 8 – SRW Identified OCS Source Vessels

Vessel Type	Main Engine Rating (kW)	Auxiliary Engine Rating (kW)	OCS Source	Contracted
Monopile Installation				
Platform Supply Vessel-Completions	4,480	NA	**Yes**	No
Turbine Installation				
Jack-up Installation Vessel	28,800	NA	**Yes**	Yes (Charybdis)
Fuel Bunkering Vessel	4,852	NA	**Yes**	No
Turbine Commissioning/Completion				
Service Operation Vessel	9,910	NA	**Yes**	Yes (Paul Candies)
Crew/assisting Transport Vessel/CTV	2,237	NA	**Yes**	No
Offshore Export Cable including OCS Interlink				
CTV	2,237	NA	**Yes**	No
Offshore Array Cable				
CTV	2,237	NA	**Yes**	No
Array Walk-2-Work Vessel	6,440	NA	**Yes**	No
HDD Marine Support				
Crew Transport and Support				
Safety Vessel 1	400	NA	**Yes**	Pending
Safety Vessel 2	400	NA	**Yes**	Pending
CTV – Cat 4	2,162	NA	**Yes**	Pending
CTV – Cat 2	2,386	NA	**Yes**	Pending
CTV – Cat 6	2,984	100	**Yes**	Pending
Flotel with Boat Landing	7,530	NA	Maybe	Pending
SOV	6,800	NA	**Yes**	Yes (Eco Edison)
Annual Operations – Planned Minor Repairs				
CTV	2,237	NA	**Yes**	Yes (Windserve Explorer)
Service Operation Vessel (SOV)	6,800	NA	**Yes**	Yes (Eco Edison)
Service Daughter Craft	492	NA	**Yes**	Pending
Crew Transport Vessel (CTV) (third party add'l)	2,237	NA	**Yes**	Pending

EUG 3 – MV and HV GIS on the OCS-DC

Other units at this facility that are subject to a top-down BACT analysis are the MV and HV GIS on the OCS-DC because they have the potential to emit SF_6, which is a GHG. The facility has stated in their 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 MV and HV GIS located on the OCS-DC are required to apply BACT. *See Table 9.*

Table 9 EUG 3 - Medium, and High Voltage GIS on the OCS-DC

EU ID	Description	Type	Count (# GIS)	Maximum Quantity
MV-GIS	MV GIS (66kV) on OCS-DC	SF_6	1	3,960 lbs per OCS-DC
HV-GIS	HV GIS (320 kV or higher) on OCS-DC	SF_6	1	3,960 lbs per OCS-DC

(1) 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 OCS-DC 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.) 17.210 – Small ICEs (< 500 HP) - Fuel Oil (ASTM #1, 2, includes kerosene, aviation, diesel fuel). The resulting determinations were divided into three searches: large emergency/non-emergency engines (>500 HP), and small emergency/non-emergency engines (<500 HP). 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, and Revolution 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_2, PM, PM_{10}, $PM_{2.5}$, CO, 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.
Most stringent Emissions Standards required under 40 C.F.R. part 60 NSPS IIII [1]	NO_2, PM, PM_{10}, $PM_{2.5}$, CO	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).

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, and Revolution 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_2, PM, PM_{10}, $PM_{2.5}$, CO, SO_2, 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.
Most Stringent Emission Standards required under 40 C.F.R. part 60 NSPS IIII [1]		NO_2, PM, PM_{10}, $PM_{2.5}$, CO	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 SCR, DPF, and/or DOC.
Most Stringent Emission Standards at 40 C.F.R. Part 1042		NO_2, PM, PM_{10}, $PM_{2.5}$, CO	
Add-on air pollution control devices	Selective Catalytic Reduction (SCR)	NO_2	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.

Control Technology		Pollutant(s)	Note(s)
	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 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. 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.[48]

[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.

[48] 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.

EUG 3—MV and HV GIS on the OCS-DC

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

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

- A maximum annual leak rate not to exceed 0.5%, 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, which complies with the requirement contained in 310 CMR 7.72(4)(a), 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.[50]

(2) 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.
details, please refer to the permit application and support documents in the docket.

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

For SRW-1 and SRW-2, 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. pat 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 SRW's application "the engine manufacturers do not recommend the use of a Non-Road Genset (Nonroad Engine Standards at 40 C.F.R. part 1039) for SRW-1 and SRW-2. Technical concerns include general lack of suitability for use in an offshore environment, the need for reconfiguration of the engine-driven fan and on-skid radiator, which would compromise the EPA certification for the Genset, and the complexity and size of the SCR, which makes it less suitable for offshore unmanned use." 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 SRW-1 and SRW-2.

For SRW-3 through SRW-13, generators located on the WTGs (SRW-3 through SRW-13) will not be permanently installed on the WTGs. The generator engines (SRW-3 through SRW-5) used during WTG commissioning will not be permanently installed and will only be in place on the WTGs for each individual turbine during commissioning. The seven emergency generators (SRW-6 through SRW-13) will only be installed in the event of a failure necessitating their use. They will only remain installed and operating for the duration of the necessary repairs. As these generator engines (SRW-3 through SRW-13) 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 SRW-3 through SRW-13 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.[49]

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

[49] Refer to SRW October 20, 2023, memo for more information about how these standards apply to this project.

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.[50]
- 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 higher vessel could prevent the project from being built because many of the larger, more specialized, vessels are in limited supply.[51]

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 the BACT requirement based on vessel availability. For example, if a vessel meeting the most stringent emission standard for that pollutant is not available at 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 ESPs) 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 it does not own the vessels, the 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 EPA finds that the replacement and/or retrofit of the third-party engines on the marine vessels is technically infeasible for this project.

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) reduces condensable PM and SO_2 emissions. However, for marine engines with a displacement ≥ 30 L/cylinder,

[50] *Supra* note 47.

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

it is problematic to require ULSD as the only fuel due to technical feasibility concerns[52]. Specifically, low viscosity fuel, i.e., ULSD, could have potentially harmful effects on some marine engines[53]. 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)[54], "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[55]). 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 it is available.

EUG 3 - MV and HV GIS on the OCS-DC

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 and HV switchgears are not technically feasible for the SRW Project due to the required configurations for the OCS-DC. For example, although Siemens 8VM11 is an MV switchgear, it is not suited for use on the OCS-DC 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 OCS-DC. The OCS-DC topside structure is pre-built onshore, and then transported to the pre-installed foundation at the final location. There are only two vessels globally that are capable of lifting the completed topside into position as currently designed; redesigning to an even larger footprint and with greater mass would likely exceed the capacities of even these vessels and/or the installed foundation.

For high voltage switchgears, the EPA is proposing to eliminate the consideration of SF_6-alternative gas-insulated switchgear equipment too because the applicability of the technology to this project is unknown, and the technology has not been demonstrated for High Voltage Direct Current (HVDC)

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

[55] 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

applications. The SRW OCS DC is using a 320kV transmission for transmitting power collected from the offshore wind farm to shore and although Siemens remains the market leader for HVDC switchgear, it currently does not have any SF_6-free options for this type of application. The EPA-referenced switchgear, g3 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.

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

In addition, EPA has concluded that SRW's November 14, 2023, memo letter does not adequately provide justification for exclusion of the option to complete any repairs of detected SF_6 leaks from switchgears within 5 days of discovery. While EPA acknowledges that periodic adverse marine weather conditions, mobilization logistics, and staff availability for making such a repair in a remote offshore location in a short period of time can create additional staffing, technical and safety challenges[56]; This response time has been demonstrated for a similar type of source (i.e., other OCS offshore windfarms).

(3) Step 3 – Rank Control Technologies by Control Effectiveness

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

For EUG 1, the most effective control techniques in the ranking (Step 3) are a GCOP Plan, 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 SRW, all EUG 1 engines are C1 or C2 engines and considered new units NSPS IIII.

Carbon Monoxide (CO)

SRW-1, 2

- The Tier 4 emission standards for C1 engines are only applicable to emission units with a maximum power rating greater than or equal to 600 kW. For C1 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.

[56] Refer to SRW November 14, 2023 memo for more information.

SRW-3

- The Tier 4 emission standards for C1 engines are only applicable to emission units with a maximum power rating greater than or equal to 600 kW. The applicant has identified SRW-3 have a maximum power rating of 37 kW. For C1 engines, the Tier 3 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.

- For engines with a power rating (kW) between 37 ≤ kW < 56, the CO emission standard (Tier 4) of 5.00 (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 and 40 C.F.R. part 1042 that would apply to the SRW-3 are equivalent.

SRW-4, 5

- The applicant has identified SRW-4, 5 have a maximum power rating of 120 kW but has not identified the specific displacement (L/cylinder) of the engine. The emission standard for C1 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 CO emission standard 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 75 ≤ kW < 130, the CO emission standard (Tier 4) of 5.0 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

The CO emissions standards within 40 C.F.R. part 1039 and 40 C.F.R. part 1042 that would apply to the SRW-4,5 are equivalent.

SRW-6 – SRW-13

- The applicant has identified SRW-6 through SRW-13 to have a maximum power rating of 120 kW with ≤ 35 kW/L power density. The emission standard for C1 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 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 75 ≤ kW < 130, the CO emission standard (Tier 4) of 5.0 (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 and 40 C.F.R. part 1042 that would apply to the SRW-6 through SRW-13 are equivalent.

Nitrogen Dioxide (NO_2)

SRW-1, 2

- The NO_X emission standard for C1 engines (Tier 4) ranges based on the specific power of the engine. For C1 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.

The NO_X emissions standards within 40 C.F.R. part 1042 are the most stringent limits that would apply to the SRW-1 and SRW-2

SRW-3

- The Tier 4 emission standards for C1 engines are only applicable to emission units with a maximum power rating greater than or equal to 600 kW. The applicant has identified SRW-3 have a maximum power rating of 37 kW. The emission standard for C1 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 4.7–5.8 (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) between $37 \leq kW < 56$, the NO_X + NMHC emission standard (Tier 4) of 4.7 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

SRW-4, 5

- The Tier 4 emission standards for C1 engines are only applicable to emission units with a maximum power rating greater than or equal to 600 kW. The applicant has identified SRW-4, 5 have a maximum power rating of 120 kW but has not identified the specific displacement (L/cylinder) of the engine. The emission standard for C1 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) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) between $75 \leq kW < 130$, 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.

SRW-6 – SRW-13

- The applicant has identified SRW-6 through SRW-13 to have a maximum power rating of 120 kW with ≤ 35 kW/L power density but has not identified the specific displacement (L/cylinder) of the engine. The emission standard for C1 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) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) between 75 ≤ kW < 130, 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.

The NO_X emissions standards within 40 C.F.R. part 1039 that would apply to the SRW-6 through SRW-13 are more stringent than 40 C.F.R. part 1042.

Particulate Matter (PM)

SRW-1, 2

- The PM emission standard for C1 engines (Tier 4) ranges based on the specific power of the engine. The Tier 4 emission standards for C1 engines are only applicable to emission units with a maximum power rating greater than or equal to 600 kW. Therefore, for C1 engines, the Tier 4 PM emission standard range of 0.04 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

The PM emissions standards within 40 C.F.R. part 1042 are the most stringent limits that would apply to the SRW-1 and SRW-2.

SRW- 3

- The Tier 4 emission standards for C1 engines are only applicable to emission units with a maximum power rating greater than or equal to 600 kW. The applicant has identified SRW-3 have a maximum power rating of 37 kW. The emission standard for C1 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- 0.30 (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 37 ≤ kW < 56, the PM emission standard (Tier 4) of 0.03 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

SRW-4, 5

- The applicant has identified SRW-4, 5 have a maximum power rating of 120 kW with ≤ 35 kW/L power density but has not identified the specific displacement (L/cylinder) of the engine. The emission standard for C1 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) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) between 75 ≤ kW < 130, 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.

SRW-6 – SRW-13

- The applicant has identified SRW-6 – SRW-13 to have a maximum power rating of 120 kW with ≤ 35 kW/L power density but has not identified the specific displacement (L/cylinder) of the engine. The emission standard for C1 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) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) between 75 ≤ kW < 130, 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 SRW-6 through SRW-13 are more stringent than 40 C.F.R. part 1042.

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 a OCS Source(s)

For EUG 2, the most effective control technique in the ranking are a GCOP plan and use of marine engines that meet the most stringent emission standard in NSPS IIII[57] 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[58]

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 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 NOx 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 NOx 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

[57] 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.

[58] See Section **Error! Reference source not found.** 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.

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)[59].

Non-NSPS IIII Covered Engines[60]

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).

EUG 3 - MV and HV GIS on the OCS-DC

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

- A maximum annual leak rate not to exceed 0.5%.
- A sealed system with leak detection and alarms, and repair of detected SF_6 leaks from switchgear within 5 days of discovery.
- 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.

[59] 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.

[60] 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.

(4) Step 4 – Evaluate most effective controls and document results.

EUG 1 - OCS Generator Engine(s) on the OCS-DC and WTG(s)
SRW has accepted the highest ranked control technology in Step 3 as BACT for all engines on the OCS-DC 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)
SRW has accepted the highest ranked control technology 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 - MV and HV GIS on the OCS-DC
For medium and high voltage switchgears, SF_6-free equipment for MV switchgears and SF_6-alternative gas-insulated equipment for HV 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 0.5%.
- A Sealed System with leak detection and alarms and to complete leak detection repair as soon as possible. Upon a detectable pressure drop that is greater than ten percent of the original pressure (accounting for ambient air conditions), the Lessee must perform maintenance to fix seals within 14 days.
- 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.

(5) 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 OCS-DC and WTG(s)

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

EUG-1 BACT Limits	
SRW-1, SRW-2	
CO	5.0 g/kW-hr

NO_x	1.8 g/kW-hr
PM	0.04 g/kW-hr
SRW-3	
CO	5.0 g/kW-hr
NO_x + HC	4.7 g/kW-hr
PM	0.03 g/kW-hr
SRW-4, SRW-5	
CO	5.0 g/kW-hr
NO_x	0.40 g/kW-hr
PM	0.02 g/kW-hr
SRW-6 – SRW-13	
CO	5.0g/kW-hr
NO_x	0.40 g/kW-hr
PM	0.02 g/kW-hr

OCS generator engine(s) on the OCS-DC 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.

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.

EUG 2 - Marine Engines on Vessels when 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.

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[61], 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.[62] 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, 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

[61] Note that the marine engine emission limits 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.

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 BACT and LAER determination for certain vessel types in EUG 2. Specifically, the LAER determination for EUG 2 is presumed to be the more stringent determination (thus resulting in the more stringent floor requirement) due to NNSR regulating NOx (which thereby include N_2O and NO_2 by proxy), and LAER being 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).[63] 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.[64]

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 1, the highest ranking BACT option for GHG is the use of a GCOP Plan.

EUG 3 - MV and HV GIS on the OCS-DC

The BACT requirements for the MV and HV 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

[63] 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.

[64] 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.

leak rate not to exceed 0.5%, 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

A source impact analysis is required under 40 C.F.R. § 52.21(k) for a proposed major source to demonstrate that the allowable emission increase from the project will not cause or contribute to a violation of a National Ambient Air Quality Standard (NAAQS) or PSD increment. 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 regulated NSR air pollutants. The analyses of ambient air impacts described in this section were conducted in accordance with the *Guideline*.

The ambient air impact analysis for the project was conducted to account for two periods: the construction phase and the operational phase. The construction phase emissions account for the highest annual emissions from the source, and the analysis of ambient air impacts due to construction are described in the first section below. Operational phase emissions for the source are lower than construction period emissions for the source on an annual basis, and the analysis of ambient air impacts for the source during the operational phase are described in the second section below. The modeled emissions rely on a conservative estimate of emissions associated with the source. Even though Sunrise Wind construction vessels will transit between the work area and several different ports, transiting emissions were conservatively based on all vessel transits originating from Rhode Island, which represents the ports closest to the Lye Brook Wilderness Area, the closest Class I area to the project. Therefore, ambient air impacts from the source will be no worse than those shown in this ambient air impact analysis.

Table 12 provides the applicable National Ambient Air Quality Standard (NAAQS), PSD increment, and significant impact levels (SILs), which were used in determining air quality impacts from the project.

Table 12 NAAQS, PSD Increments, and Significant Impacts Level

Pollutant	Averaging Time	NAAQS (1)		PSD (2) Class II Increment (ug/m^3)	Class II SIL (ug/m^3)	PSD (2) Class I Increment (ug/m^3)	Class I SIL (ug/m^3)
		Primary	Secondary				
CO	1-hr	35 ppm	--	--	2,000 (5)	--	--
	8-hr	9 ppm	--	--	500 (5)	--	--
$PM_{2.5}$	Annual	12.0 ug/m^3	15.0 ug/m^3	4	0.2 (3)	1	0.05 (3)
	24-hr	35 ug/m^3	35 ug/m^3	9	1.2 (3)	2	0.27 (3)
PM_{10}	Annual	--	--	17	1 (5)	4	0.2 (4)
	24-hr	150 ug/m^3	150 ug/m^3	30	5 (5)	8	0.3 (4)
SO_2	1-hr	75 ppb	--	--	7.8 (7)	--	--
	3-hr	--	0.5 ppm	512	25 (5)	25	1 (4)
	24-hr	--	--	91	5 (5)	5	.2 (4)
	Annual	--	--	20	1(5)	2	.1 (4)
NO_2	Annual	53 ppb	53 ppb	25	1 (5)	2.5	0.1 (4)
	1-hr	100 ppb	--	--	7.5 (6)	--	--

(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 µg/m^3) was used.

(7) EPA, August 23, 2010, "General Guidance for Implementing the 1-hour SO_2 National Ambient Air Quality Standard in Prevention of Significant Deterioration Permits, Including an Interim 1-hour SO_2 Significant Impact Level." The interim SIL value of 3 ppb (or 7.8 µg/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 pollutants emitted in significant quantities. For temporary emission sources subject to the PSD permitting requirements, the PSD regulations at 40 C.F.R. § 52.21(i)(3) require an assessment of the ambient air impact for Class I areas and areas where the applicable PSD increment is known to be violated. An assessment of the construction emissions was provided by the applicant in a February 2023 report "Class I Air Quality and Visibility Impact Analysis Report" to correspond with the revised Sunrise Wind OCS Air Permit Application submitted to EPA on February 24, 2023. The February 2023 report was supplemented by a memorandum provided by the applicant entitled "Sunrise Wind – Reduction in Wind Turbine Generator (WTG) Positions" on July 14, 2023. The February 2023 report was further supplemented by a report "Class I Air Quality and Visibility Supplemental Analysis Report, Revision 1", dated October 2023.

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 construction period, and whether those requirements have been satisfied. Specifically, the sections below describe, for the construction period: 1) the qualification as temporary; 2) the assessment of ambient air impacts at areas where PSD increment is known to be violated; 3) the assessment of ambient air impacts at Class I areas; 4) results of the assessment for the source; and 5) EPA's overall conclusion about the ambient air impacts during the construction phase for the source.

a. Qualification as a Temporary Source

The subject emissions associated with the construction of the source are anticipated to last no longer than a period of two years. The EPA considers construction sources operating for two years to be temporary sources for PSD permitting purposes, however a longer period could be considered at the Administrator's discretion. *See* Amended Regulations for Prevention of Significant Deterioration of Air Quality, 45 Fed. Reg. 52676, 52719, 52728 (Aug. 7, 1980). Since the construction emissions for the source are anticipated to last no longer than two years, the construction emissions are considered temporary.

b. Assessment of Ambient Air Impacts at Areas Where PSD Increment Is Known to be Violated

The impact-related criteria that must be met for a temporary source under 40 C.F.R. § 52.21(i)(3) require that emissions must not impact any area where the applicable increment is known to be violated. The proposed wind farm will be located approximately 12.6 nautical miles south of Nomans Land, Massachusetts. Based on consultation between SRW, the Commonwealth of Massachusetts, and EPA, there are no areas in the vicinity of the proposed project where an applicable PSD increment is known to be violated. Therefore, because of the absence of areas known to be in violation of the PSD increment in the vicinity of the source, EPA concludes that construction emissions for the source will not impact any such area where applicable PSD increment is known to be violated.

c. Assessment of Ambient Air Impacts at Class I Areas

The impact-related criteria that must be met for a temporary source under 40 C.F.R. § 52.21(i)(3) require that the emissions must not impact any Class I area. Class I areas are defined in 40 C.F.R. § 52.21(e). The Class I areas closest to the construction area are the Lye Brook Wilderness Area, located in southwestern Vermont (within the Green Mountain National Forest), 273 km from the WDA, the Presidential Range, 301 km from the WDA, and the Brigantine Wilderness Area, located in Southeastern New Jersey (within the Edwin B. Forsythe National Wildlife Refuge), 347 km from the WDA. These distances were provided by the applicant. A map of the location of these Class I areas with respect to the windfarm is presented in Figure 3.

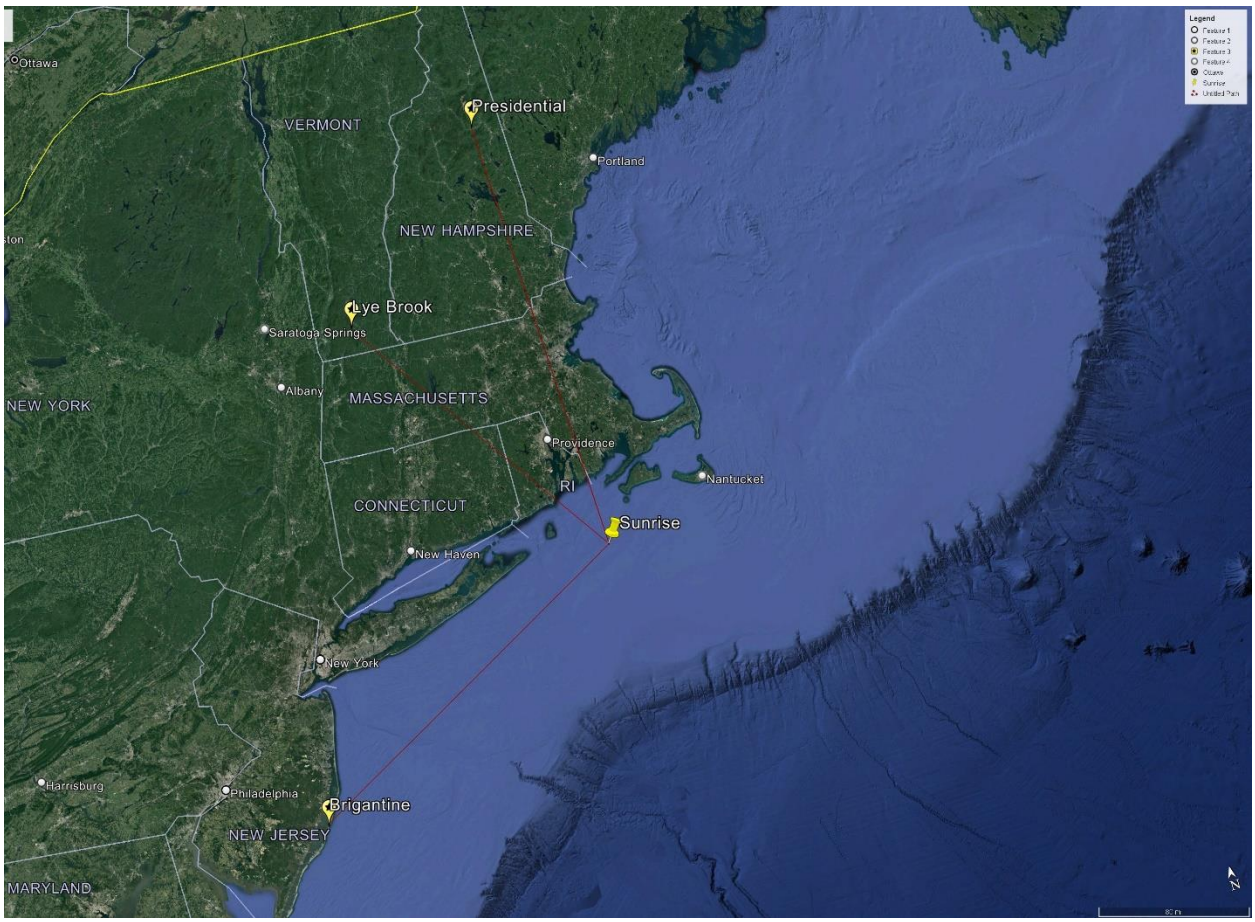

Figure 3 Distances Between the Sunrise Wind Area and Closest Class I Areas

For those pollutants for which Class I PSD SILs have been established, SRW has compared the modeled impacts at Class I areas with Class I PSD SILs to assess whether ambient air quality will be significantly affected. The *Guideline* specifies a two-tier screening approach for long-range transport assessments. The first-tier approach, described in section 4.2.c.i of the *Guideline*, is an assessment of near-field impacts at or within 50 km of the source. The second-tier approach, described in section 4.2.c.ii of the *Guideline*, sets forth a case-specific assessment in consultation with the EPA Regional Office.

SRW used a first-tier approach to assess the impacts of construction emissions on long-term PM_{10}, $PM_{2.5}$ and SO_2 at the Lye Brook Wilderness Area which is the Class I area closest to the proposed location of the Sunrise Wind facility. Consistent with section 4.2.c.i of the *Guideline*, SRW used the Offshore and Coastal Dispersion Model (OCD) to assess the significance of long-term PM_{10}, $PM_{2.5}$ and SO_2 impacts at a distance of 50 km from the source. SRW prepared hourly representative onshore and offshore meteorological data for use with the OCD model based on prognostic meteorological modeling data provided by EPA. The meteorological data were extracted from the WRF prognostic model for the three-year period of 2018-2020 using the Mesoscale Model Interface Program (MMIF, Version 3.4.2.). Prior to using the meteorological data with the OCD model, SRW submitted an evaluation to demonstrate the suitability of the prognostic meteorological data for such a purpose.[65]

[65] The evaluation is provided as Appendix A to the April 1, 2022, Offshore Coastal Dispersion Air Quality Impact Analysis Protocol, available as part of the administrative record for the draft permit.

The EPA's assessment of the SRW evaluation of the WRF simulation is that it provides a sufficient basis for use in a screening analysis with the OCD model for estimating NO_2, PM_{10}, $PM_{2.5}$ and SO_2 impacts out to 50 km from the Project. The OCD modeling utilized a ring of receptors at 1-degree spacing at a distance of 50 km from the Project centroid. Because the nearest Class I area is located approximately 273 km from the Project, actual impacts at the Class I area are expected to be significantly less than the impacts predicted by the OCD Model at a distance of 50 km from the Project centroid.

SRW used a second-tier approach to assess the impacts of construction emissions on long-term NO_2 and short-term PM_{10}, $PM_{2.5}$ and SO_2 at the Lye Brook Wilderness Area (the Class I area closest to the proposed location of the Project). To assess the impacts from these pollutants at the Lye Brook Wilderness Area, SRW selected the CALPUFF model (version 5.8.5) consistent with Section 4.2.c.ii of the *Guideline.* The CALPUFF model was applied with no chemistry or deposition consistent with Section 4.2.c.ii of the *Guideline*. SRW prepared representative meteorological data for use with the CALPUFF model based on prognostic meteorological data provided by EPA. The meteorological data were extracted from the Weather Research and Forecasting (WRF) prognostic model for the three-year period of 2018–2020 using MMIF (Version 3.4.2) and a horizontal grid resolution of 12 km. SRW provided an evaluation[66] to demonstrate the suitability of the prognostic meteorological data for this purpose. The EPA's assessment of the SRW evaluation of the WRF simulation is that it provides a sufficient basis for use in a screening analysis with CALPUFF for estimating NO_2, PM_{10}, $PM_{2.5}$, and SO_2 impacts from the project at distant Class I areas. The CALPUFF modeling utilized 103 receptors located in the Lye Brook Wilderness Area. These receptors were provided by the National Park Service.

d. Assessment of NO_2 Impacts at Class I Areas

Consistent with section 4.2.c.ii of the *Guideline*, SRW assessed the significance of ambient impacts for NO_2 at the Lye Brook Wilderness Area using a second-tier analysis. Even though SRW construction vessels will transit between the work area and several different ports, transiting emissions were conservatively assumed to be co-located 25 nautical miles from the Project centroid in the direction of the Lye Brook Wilderness Area. All vessels on station were conservatively assumed to be co-located at the Project centroid. The modeling of annual average NO_2 concentrations was based on the total annual emissions for the worst-case running 12-month period during the construction phase. SRW assumed 100% conversion of NO_x to NO_2. Assessment of NO_2 by the CALPUFF model demonstrated impacts well below the Class I significance level at the Lye Brook Wilderness Area. EPA has evaluated SRW's approach for assessing NO_2 impacts and believes it is suitable to identify those impacts resulting from the source in the Class I area. Comparison of construction period impacts for the source to the respective SILs are presented in Table 13.

e. Assessment of $PM_{2.5}$ Impacts at Class I Areas

To determine the total impact on $PM_{2.5}$ concentrations from the facility at the Lye Brook Wilderness Area, SRW summed the impact of direct $PM_{2.5}$ emissions with the impact of $PM_{2.5}$ precursor emissions

[66] The evaluation is provided as Appendix C to the February 2023, Class I Air Quality and Visibility Impact Analysis Report, available as part of the administrative record for the draft permit.

on the secondary component of $PM_{2.5}$ concentrations. The total $PM_{2.5}$ concentration, consisting of the direct and secondary components of $PM_{2.5}$ impacts, was then compared to the $PM_{2.5}$ SILs.

As explained in its April 17, 2018, memorandum, "Guidance on Significant Impact Levels (SIL) for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program" (EPA's April 17, 2018, Guidance), the EPA has recognized that permitting authorities have the discretion to apply SILs on a case-by-case basis in the review of individual permit applications. In 2010, the EPA finalized a rule to codify, among other things, particular $PM_{2.5}$ SIL values and specific applications of those values. In litigation over that rule, the EPA conceded the regulation was flawed because it did not preserve the discretion of permitting authorities to require additional analysis in certain circumstances. The court granted the EPA's request to vacate and remand the rule so that the EPA could address the flaw. *See Sierra Club v. EPA*, 705 F.3d 458 (D.C. Cir. 2013). The EPA subsequently addressed the use of SILs in the EPA's April 17, 2018, Guidance. For the purposes of this permitting action, the EPA is using $PM_{2.5}$ SILs as a compliance demonstration tool based on the technical and legal bases accompanying its April 17, 2018, Guidance. These documents (i.e., the SILs memorandum, technical analysis, and legal memorandum) are provided in the administrative record associated with the draft permit.[67] The use of the $PM_{2.5}$ SIL as an indication of a significant impact on a Class I area was not the basis for the court's $PM_{2.5}$ SIL vacatur. Given this fact, the previous use of the $PM_{2.5}$ SILs as a significant impact indicator, and the lack of any other objective concentration metric, its use as a concentration considered small enough to qualify for the temporary source exemption (i.e., no impact to Class I areas) is appropriate.

Consistent with section 4.2.c.i of the *Guideline*, SRW assessed the long-term impacts of direct $PM_{2.5}$ emissions at the Lye Brook Wilderness Area using a first-tier analysis. Consistent with section 4.2.c.i of the *Guideline*, SRW used the OCD Model to assess the significance of long-term direct $PM_{2.5}$ impacts at a distance of 50 km from the source. Construction emissions from all activities except vessel transit were modeled as occurring from a common point at the project centroid. Transiting emissions were modeled as a series of point sources spaced 1km apart along the anticipated transit route which extended from the project centroid towards the Rhode Island coast. The modeling for annual average $PM_{2.5}$ concentrations was based on the total annual emissions for the worst-case running 12-month period during the construction phase.

Consistent with section 4.2.c.ii of the *Guideline*, SRW assessed the short-term impacts of direct $PM_{2.5}$ emissions at the Lye Brook Wilderness Area using a second-tier analysis. SRW used the CALPUFF Model (version 5.8.5) for this second-tier analysis. Consistent with Section 4.2.c.ii of the *Guideline*, CALPUFF was applied with no chemistry or deposition. The CALPUFF modeling utilized 103 receptors located in the Lye Brook Wilderness Area. These receptors were provided by the National Park Service. Transiting emissions were conservatively assumed to be co-located 25 nautical miles from the project centroid in the direction of the Lye Brook Wilderness Area. All vessels on station were conservatively assumed to be co-located at the Project centroid. The short-term modeling is based on peak daily emissions during the worst-case short-term period during the construction phase.

For both short-term and long-term secondary $PM_{2.5}$ impacts, SRW used a Tier 1 demonstration tool based on existing technically credible and appropriate relationships between emissions and impacts

[67] The SILs memorandum, technical analysis, and legal memorandum can be found within the docket for this permit action.

developed from previous modeling, as described in sections 5.2(e) and 5.4.2(b) of the *Guideline*. SRW's approach for assessing secondary $PM_{2.5}$ impacts is consistent with EPA's April 30, 2019, "Guidance on the Development of Modeled Emission Rates for Precursors (MERPs) as a Tier 1 Demonstration Tool for Ozone and $PM_{2.5}$ under the PSD Permitting Program" (EPA's April 30, 2019, Guidance). In assessing secondary impacts for $PM_{2.5}$, SRW relied on information provided by the EPA related to the EPA modeling of the secondary formation of $PM_{2.5}$ constituents due to precursor emissions for hypothetical NO_x and SO_2 sources. Information about the EPA hypothetical source modeling is provided in the EPA's April 30, 2019, Guidance. To identify atmospheric chemistry that is suitably representative of the area around the WDA, SRW evaluated modeled secondary $PM_{2.5}$ impacts from two hypothetical sources located within 300 km of the facility in the direction of the Lye Brook Wilderness Area. These sources were the Norfolk County and Franklin County, Massachusetts, hypothetical sources. From the two hypothetical sources, SRW identified the highest annual and 24-hour nitrate and sulfate impact levels at a distance similar to the distance the project is from the Lye Brook Wilderness Area (273 km). By selecting the highest impacts from these two hypothetical sources at or near a distance of 273 km, the derived value is suitably conservative (i.e., likely to overestimate impacts) for use in this screening assessment. Then, SRW scaled the hypothetical source impacts based on the ratio of the emissions to the EPA's hypothetical source modeling emissions (i.e., 500 tpy) to derive an expected secondary impact for nitrate and sulfate constituents for the 24-hour and annual averaging periods. The sum of these nitrate and sulfate impacts is the total secondary $PM_{2.5}$ impact when using this approach.

The sum of the direct short-term $PM_{2.5}$ impacts predicted by the CALPUFF model and the secondary short-term $PM_{2.5}$ impacts from the Tier I analysis demonstrated total impacts below the short-term Class I $PM_{2.5}$ significance levels at the Lye Brook Wilderness Area. Also, the sum of the direct long-term $PM_{2.5}$ impacts predicted by the OCD model and the secondary long-term $PM_{2.5}$ impacts from the Tier I analysis demonstrated total impacts below the long-term Class I $PM_{2.5}$ significance levels at the Lye Brook Wilderness Area. EPA has evaluated SRW's approach for assessing $PM_{2.5}$ impacts and believes it is suitable to identify those impacts resulting from the source in the Class I area. Comparison of construction period impacts for the source to the respective SILs are presented in Table 13.

f. Assessment of PM_{10} Impacts at Class I Areas

Consistent with section 4.2.c.i of the *Guideline*, SRW assessed the long-term impacts of PM_{10} emissions at the Lye Brook Wilderness Area using a first-tier analysis. Consistent with section 4.2.c.i of the *Guideline*, SRW used the OCD Model to assess the significance of long-term PM_{10} impacts at a distance of 50 km from the source. Construction emissions from all activities except vessel transit were modeled as occurring from a common point at the Project centroid. Transiting emissions were modeled as a series of point sources spaced 1km apart along the anticipated transit route which extended from the Project centroid towards the Rhode Island coast. The modeling for annual average PM_{10} concentrations was based on the total annual emissions for the worst-case running 12-month period during the construction phase. Assessment of long-term PM_{10} impacts by the OCD model demonstrated impacts well below the Class I significance level at the Lye Brook Wilderness Area. EPA has evaluated the approach used by Sunrise Wind for assessing long-term PM_{10} impacts and believes it is suitable to identify those impacts resulting from the source in the Class I area. Comparison of construction period impacts for the source to the respective SILs are presented in Table 13.

Consistent with section 4.2.c.ii of the *Guideline*, SRW assessed the short-term impacts of PM_{10} emissions at the Lye Brook Wilderness Area using a second-tier analysis. Sunrise Wind used the CALPUFF Model (version 5.8.5) for this second-tier analysis. Consistent with Section 4.2.c.ii of the *Guideline*, CALPUFF was applied with no chemistry or deposition. The CALPUFF modeling utilized 103 receptors located in the Lye Brook Wilderness Area. These receptors were provided by the National Park Service. Transiting emissions were conservatively assumed to be co-located 25 nautical miles from the Project centroid in the direction of the Lye Brook Wilderness Area. All vessels on station were conservatively assumed to be co-located at the Project centroid. The short-term modeling is based on peak daily emissions during the worst-case short-term period during the construction phase. Assessment of short-term PM_{10} impacts by the CALPUFF model demonstrated impacts well below the Class I significance level at the Lye Brook Wilderness Area. EPA has evaluated SRW's approach for assessing short-term PM_{10} impacts and believes it is suitable to identify those impacts resulting from the source in the Class I area. Comparison of construction period impacts for the source to the respective SILs are presented in Table 13.

g. Assessment of SO_2 Impacts at Class I Areas

Consistent with section 4.2.c.i of the *Guideline*, SRW assessed the long-term impacts of SO_2 emissions at the Lye Brook Wilderness Area using a first-tier analysis. Consistent with section 4.2.c.i of the *Guideline*, SRW used the OCD Model to assess the significance of long-term SO_2 impacts at a distance of 50 km from the source. Construction emissions from all activities except vessel transit were modeled as occurring from a common point at the Project centroid. Transiting emissions were modeled as a series of point sources spaced 1km apart along the anticipated transit route which extended from the Project centroid towards the Rhode Island coast. The modeling for annual average SO_2 concentrations was based on the total annual emissions for the worst-case running 12-month period during the construction phase. Assessment of long-term SO_2 impacts by the OCD model demonstrated impacts well below the Class I significance level at the Lye Brook Wilderness Area. EPA has evaluated SRW's approach for assessing long-term SO_2 impacts and believes it is suitable to identify those impacts resulting from the source in the Class I area. Comparison of construction period impacts for the source to the respective SILs are presented in Table 13.

Consistent with section 4.2.c.ii of the *Guideline*, SRW assessed the short-term impacts of SO_2 emissions at the Lye Brook Wilderness Area using a second-tier analysis. SRW used the CALPUFF Model (version 5.8.5) for this second-tier analysis. Consistent with Section 4.2.c.ii of the *Guideline*, CALPUFF was applied with no chemistry or deposition. The CALPUFF modeling utilized 103 receptors located in the Lye Brook Wilderness Area. These receptors were provided by the National Park Service. Transiting emissions were conservatively assumed to be co-located 25 nautical miles from the Project centroid in the direction of the Lye Brook Wilderness Area. All vessels on station were conservatively assumed to be co-located at the Project centroid. The short-term modeling is based on peak daily emissions during the worst-case short-term period during the construction phase. Assessment of short-term SO_2 impacts by the CALPUFF model demonstrated impacts well below the Class I significance level at the Lye Brook Wilderness Area. EPA has evaluated SRW's approach for assessing short-term SO_2 impacts and believes it is suitable to identify those impacts resulting from the source in the Class I area.

Comparison of construction period impacts for the source to the respective SILs are presented in Table 13.

(1) Ambient Air Impacts for the Construction Phase

SRW used a first-tier approach to assess the impacts of construction emissions on long-term PM_{10}, $PM_{2.5}$ and SO_2 at the Lye Brook Wilderness Area. SRW used a second-tier approach to assess the impacts of construction emissions on long-term NO_2 and short-term PM_{10}, $PM_{2.5}$ and SO_2 at the Lye Brook Wilderness Area. To assess secondary $PM_{2.5}$ impacts, SRW used a Tier 1 demonstration tool based on existing technically credible and appropriate relationships between emissions and impacts developed from previous modeling, as described in section 5.2(e) of the *Guideline*. The total $PM_{2.5}$ concentration, consisting of the direct and secondary component of $PM_{2.5}$ impacts, was then compared to the appropriate SIL.

The total ambient air impacts for pollutants emitted from construction of the source discussed in this section are presented in Table 13 below. Concentrations in air are given in micrograms per cubic meter ($\mu g/m^3$). Impacts for each pollutant and associated averaging time for which Class I area SILs have been established are shown to be well below significance levels at the Lye Brook Wilderness Area.

Table 13 Assessment of Construction Period Ambient Air Impact for the Source

Pollutant	Averaging Time	Class I PSD SIL (ug/m^3)	Highest Total Impact (ug/m^3)	Impact Below Class I SIL?
$PM_{2.5}$	Annual	0.05	0.01 [(2) (4)]	Yes
	24-hr	0.27	0.15 [(1) (3)]	Yes
PM_{10}	Annual	0.2	0.01[(4)]	Yes
	24-hr	0.3	0.09 [(1)]	Yes
SO_2	Annual	0.1	0.01[(4)]	Yes
	24-hr	0.2	0.14 [(1)]	Yes
	3-hr	1.0	0.55 [(1)]	Yes
NO_2	Annual	0.1	0.005[(1)]	Yes

Note: Concentrations are presented in $\mu g/m^3$, though NO_2 concentrations are typically reported for non-modeling applications in parts per billion (ppb).

(1) Impact predicted by the CALPUFF Model at the Lye Brook Wilderness Area.

(2) Includes 0.002 $\mu g/m^3$ predicted secondary $PM_{2.5}$ impacts.

(3) Includes 0.064 $\mu g/m^3$ predicted secondary $PM_{2.5}$ impacts.

(4) Impact predicted by the OCD Model at a distance of 50 km from the Project centroid.

The predicted impacts from the Project shown in Table 13 above are also compared to the Class I PSD increments in Table 14. As shown in the table, all predicted impacts are well below the Class I increments.

Table 14 Comparison of Construction Period Impacts to Class I PSD Increments

Pollutant	Averaging Time	Class I PSD Increment (ug/m^3)	Highest Total Impact (ug/m^3)	Percent of Increment
$PM_{2.5}$	Annual	1.0	0.01 (1)	1%
	24-hr	2.0	0.15 (1)	8%
PM_{10}	Annual	4.0	0.01	<1%
	24-hr	8.0	0.09	1%
SO_2	Annual	2.0	0.01	<1%
	24-hr	5.0	0.14	3%
	3-hr	25.0	0.55	2%
NO_2	Annual	2.5	0.005	<1%

(1) $PM_{2.5}$ reported as the sum of primary and secondary impacts.

(2) EPA Conclusion About Ambient Air Impacts During Construction Phase

The EPA has assessed the ambient air quality demonstration submitted by SRW and concludes that it is appropriate for its intended purpose of estimating construction period impacts from the source. Therefore, the EPA concludes that there will be no significant impacts at Class I areas resulting from construction of the source. Predicted impacts for all pollutants and averaging periods are also well below the Class I increments. Details of the modeling performed by SRW are provided in the applicant's modeling reports included in the administrative record.

2. Operational Phase

The PSD permitting regulations for proposed major new sources generally require applicants to perform an air quality impact analysis for those pollutants with significant emissions. All pollutants with emissions greater than these thresholds during both 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. Assessment of the operations and maintenance emissions was provided by the applicant in a February 2023 report "Offshore Coastal Dispersion Air Quality Impact Analysis Report" to correspond with the SRW OCS Air Permit Application submitted to EPA on February 24, 2023. The February 2023 report was supplemented by a memorandum provided by the applicant entitled "Sunrise Wind – Reduction in Wind Turbine Generator (WTG) Positions" on July 14, 2023. The February 2023 report was also supplemented by a memorandum provided by the applicant entitled "EPA Information Requests for Sunrise Wind OCS Air Permit Application" on August 4, 2023.

The following sections provide the EPA's assessment of information provided by SRW in determining whether ambient air impacts from the source are protective of air quality standards. Specifically, the sections below describe: 1) an overview of the air modeling conducted by SRW; 2) comparison of operational phase impacts against the SILs; 3) comparison of operational phase impacts against the NAAQS; 4) comparison of operational phase impacts against the PSD increments for Class I and Class II

areas; 5) assessment of operational phase impairment to visibility, soils, and vegetation; and 6) EPA's conclusion about the ambient air impacts during the operational phase of the facility.

a. Overview of the Air Modeling Conducted by SRW

To assess direct impacts within a 50-km distance, SRW selected the OCD model (Version 5), consistent with the *Guideline*. SRW prepared hourly representative onshore and offshore meteorological data for use with the OCD model based on prognostic meteorological modeling data provided by EPA. The meteorological data were extracted from the WRF prognostic model for the three-year period of 2018-2020 using the MMIF, Version 3.4.2. Prior to using the meteorological data with the OCD model, SRW submitted an evaluation to demonstrate the suitability of the prognostic meteorological data for such a purpose.[68] The EPA's assessment of the SRW evaluation of the WRF simulation is that it provides a sufficient basis for use in a modeling analysis with the OCD model for estimating CO, PM_{10}, $PM_{2.5}$, SO_2 and NO_2 impacts out to 50 km from Sunrise Wind.

Emissions included in the analysis represent the highest emitting activities anticipated for the operational period 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. Emissions associated with the transit of vessels to/from the SRW facility, which would occur along the entire transit route, were simulated as a series of point sources along the anticipated vessel route spaced 1 km apart. The transit route was assumed to extend from the project centroid towards the Rhode Island coast. Two location scenarios were modeled where non-transiting vessels would be located at either the offshore converter station (OCS-DC) platform (Scenario 1) or at the northernmost wind turbine location for planned maintenance (Scenario 2). The receptor grids consisted of a dense grid near the center of the receptor grid and less dense receptor spacing farther from the grid center out to 50 km. No receptors were excluded from analysis.

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, SRW 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. Specifically, SRW relied on the most conservative MERPs value from two hypothetical sources located within 300 km of the Project. SRW combined the maximum predicted secondary $PM_{2.5}$ impacts with the modeled primary (i.e., resulting from direct emissions) $PM_{2.5}$ impacts to calculate total $PM_{2.5}$ impacts for comparison with the SILs, NAAQS, and Class II PSD increments.

Modeling methodologies, inputs, and techniques were used consistent with the *Guideline* and EPA guidance. SRW 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

[68]The evaluation is provided as Appendix A to the April 1, 2022, Offshore Coastal Dispersion Air Quality Impact Analysis Protocol, available as part of the administrative record for the draft permit.

Standard" (EPA's March 1, 2011, Guidance). Due to the expected intermittent nature of operations of the auxiliary and emergency generators, these sources were not included in the analysis of 1-hour NO_2 impacts. The EPA agrees that SRW excluded these intermittent sources from the modeling for the 1-hour NO_2 standard in a manner consistent with EPA's March 1, 2011, Guidance. For modeling 1-hour NO_2 impacts, Sunrise Wind applied EPA's ambient ratio method 2 (ARM2) screening method consistent with Section 4.2.3.4.d of the *Guideline*. For modeling annual NO_2 impacts, Sunrise Wind assumed 100% conversion of NO_x to NO_2.The EPA has evaluated the methods and techniques included in the air quality impact analyses for the operational period provided by Sunrise Wind and determined that they are appropriate for assessing compliance with the SILs, NAAQS, and PSD increment.

As discussed earlier in this section, two location scenarios were modeled where non-transiting vessels would be located at either the OCS-DC platform (Scenario 1) or at the northernmost wind turbine location for planned maintenance (Scenario 2). In reality, the O&M vessels will be spread much more widely across the wind farm area. The assumed concentration of sources in one location will produce higher local impacts than those impacts expected from a more widely separated set of sources. Also, as discussed in Section c., SRW demonstrated that there is no overlap between the SRW significant impact area (SIA) and the SIAs for either of the two neighboring wind farms. Therefore, SRW concluded that these neighboring wind farms do not produce significant 1-hour NO_2 impact contributions in areas within the SRW SIA. Also, to conservatively determine the combined impacts from SRW and two neighboring wind farms, the EPA combined the SIL modeling impacts from the three projects with the background concentrations for comparison to the 1-hour NO_2 NAAQS. This conservative cumulative analysis for the 1-hour NO_2 NAAQS uses the maximum modeled impacts (in units of ug/m^3) from SRW and the two neighboring wind farms independent of time and physical location. Therefore, the maximum impact from each of the facilities individually were added together – even though those maximum impacts did not occur at the same location. All of these worse-case assumptions made in the modeling approach likely results in the impacts being conservative. Therefore, EPA does not feel it is necessary to include short term, hourly emission limits on any specific OCS source to support compliance with the 1-hour NO_2 NAAQS.

b. Assessment of 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.

Screening model results for SRW for CO, NO_2, SO_2, PM_{10} and $PM_{2.5}$ are presented in Table 15. This screening modeling indicates that impacts for annual NO_2, 24-hour $PM_{2.5}$, annual $PM_{2.5}$, 24-hour PM_{10}, annual PM_{10}, 1-hour SO_2, 3-hour SO_2, 24-hour SO_2, annual SO_2, 1-hour CO and 8-hour CO, were all below the Class II significance thresholds and no further analysis is warranted. Further analysis was required for 1-hour NO_2 and the sections below will provide summaries of these analyses. As discussed in section a. above, two location scenarios were modeled where non-transiting vessels would be located at either the OCS-DC platform (Scenario 1) or at the northernmost wind turbine location for

planned maintenance (Scenario 2). The OCD modeling predicted impacts greater than the 1-hour NO_2 SIL for Scenario 1 only. Therefore, EPA considers the SIA radius for 1-hour NO_2 to extend from the OCS-DC platform.

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

Pollutant	Averaging Time	Class II SIL (ug/m³)	Impact (ug/m³)(1)	Significant Impacts?	Significant Impact Area Radius
CO	1-hr	2,000	99.9	No	--
	8-hr	500	45.1	No	--
$PM_{2.5}$	Annual	0.2	0.004(3)	No	--
	24-hr	1.2	0.17 (2)	No	--
PM_{10}	Annual	1.0	0.002	No	--
	24-hr	5.0	0.25	No	--
SO_2	Annual	1.0	0.0003	No	
	24-hr	5.0	0.03	No	
	3-hr	25.0	0.09	No	
	1-hr	7.8	0.13	No	
NO_2	Annual	1.0	0.15	No	--
	1-hr	7.5	7.8	**Yes**	0.75 km

Note: Concentrations are presented in µg/m³, though for NO_2 concentrations are typically reported for non-modeling applications in parts per billion (ppb).

(1) Note that the impact shown represents the higher of the two location scenarios modeled.

(2) Includes 0.014 µg/m3 predicted secondary $PM_{2.5}$ impacts.

(3) Includes 0.0016 µg/m3 predicted secondary $PM_{2.5}$ impacts.

c. Compliance with the NAAQS

SRW completed a refined modeling analysis for 1-hour NO_2. 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. SRW selected onshore monitoring data as appropriately representative of air quality in the area. The EPA finds that this assumption is protective of air quality because it likely overestimates concentrations near the windfarm. SRW evaluated the emissions sources in the area and determined that the only potentially interactive sources were South Fork Wind and Revolution Wind, both of which were recently issued a permit.[69, 70] South Fork Wind and Revolution Wind will be

[69] *See* Final Permit for South Fork Wind, issued January 18, 2022. https://www.epa.gov/caa-permitting/south-fork-wind-llcs-south-fork-windfarm-outer-continental-shelf-air-permit.

[70] *See* Final permit for Revolution Wind, issued September 28, 2023. https://www.epa.gov/system/files/documents/2023-09/rw-ocs-air-permit-ocs-r1-05-final-permit.pdf.

located a few kilometers north of SRW (see Figure 4). The EPA concludes that the monitored background values account for all other nearby sources.

The results of South Fork Wind's O&M SIL modeling were presented in their September 2020 Outer Continental Shelf Permit – "*Air Quality Impact Modeling Report for Operations and Maintenance Emissions*." Using the OCD model, it was concluded that the O&M phase exceeded the SIL for 1-hour NO_2 with a significant impact area SIA of 4.5km. The results of Revolution Wind's O&M SIL modeling are presented in their September 2022 report "*Air Quality Impact Modeling Report – Operations and Maintenance Emissions,*" to correspond with the Revolution Wind OCS Air Permit Application submitted to EPA on August 12, 2022. The September 2022 report was supplemented by a memorandum provided by the applicant entitled "*Supplemental Information for Temporary Generators*" on February 28, 2023. Using the OCD model, it was concluded that the O&M phase exceeded the SIL for 1-hour NO_2 with an SIA of 4.5 km. Because SRW, South Fork Wind, and Revolution Wind exceeded the SIL for 1-hour NO_2, a cumulative analysis was triggered.

To determine if the O&M emissions from South Fork Wind (SFW) or Revolution Wind (RW) could significantly contribute to the predicted pollutant concentrations within the SIA of SRW, SRW compared the SIAs of SFW and RW to the SIA for SRW. If the SIAs of SFW or RW do not overlap with the SIA of SRW, then SRW assumed that the predicted impacts of those projects cannot significantly contribute to predicted impacts from SRW. As discussed above, two location scenarios were modeled for SRW in which non-transiting vessels would be located at either the OCS-DC platform (Scenario 1) or at the northernmost wind turbine location for planned maintenance (Scenario 2). Predicted 1-hour NO_2 impacts exceeded the SIL for Scenario 1 but not Scenario 2. Therefore, the SIA for SRW was assumed to extend from the OCS-DC platform. Figure 4 below compares the SIAs for SRW, SFW and RW and represents the maximum extent of the NO_2 SIA for each. Figure 4 illustrates that the SIAs from both RW and SFW clearly do not overlap with the SIA for SRW. The O&M emissions from the RW, SFW, and SRW projects do not produce significant 1-hour NO_2 impact contributions outside of the respective SIA for each project. Since there is no overlap between the Sunrise Wind SIA with either the SFW or RW SIAs, SRW concluded that these projects do not produce significant 1-hour NO_2 impact contributions in areas within the SRW SIA. Therefore, given the absence of other major sources within 50 km that could significantly contribute to 1-hour average NO_2 concentrations, SWR used the sum of the predicted impacts from SRW plus the conservative (overland) background concentrations to represent the predicted total impacts for comparison with the NAAQS for 1-hour NO_2 impacts as shown in Table 16 below (SRW Only).

Relative Locations of Project O&M Modeling Points for Sunrise Wind, Southfork Wind, and Revolution Wind

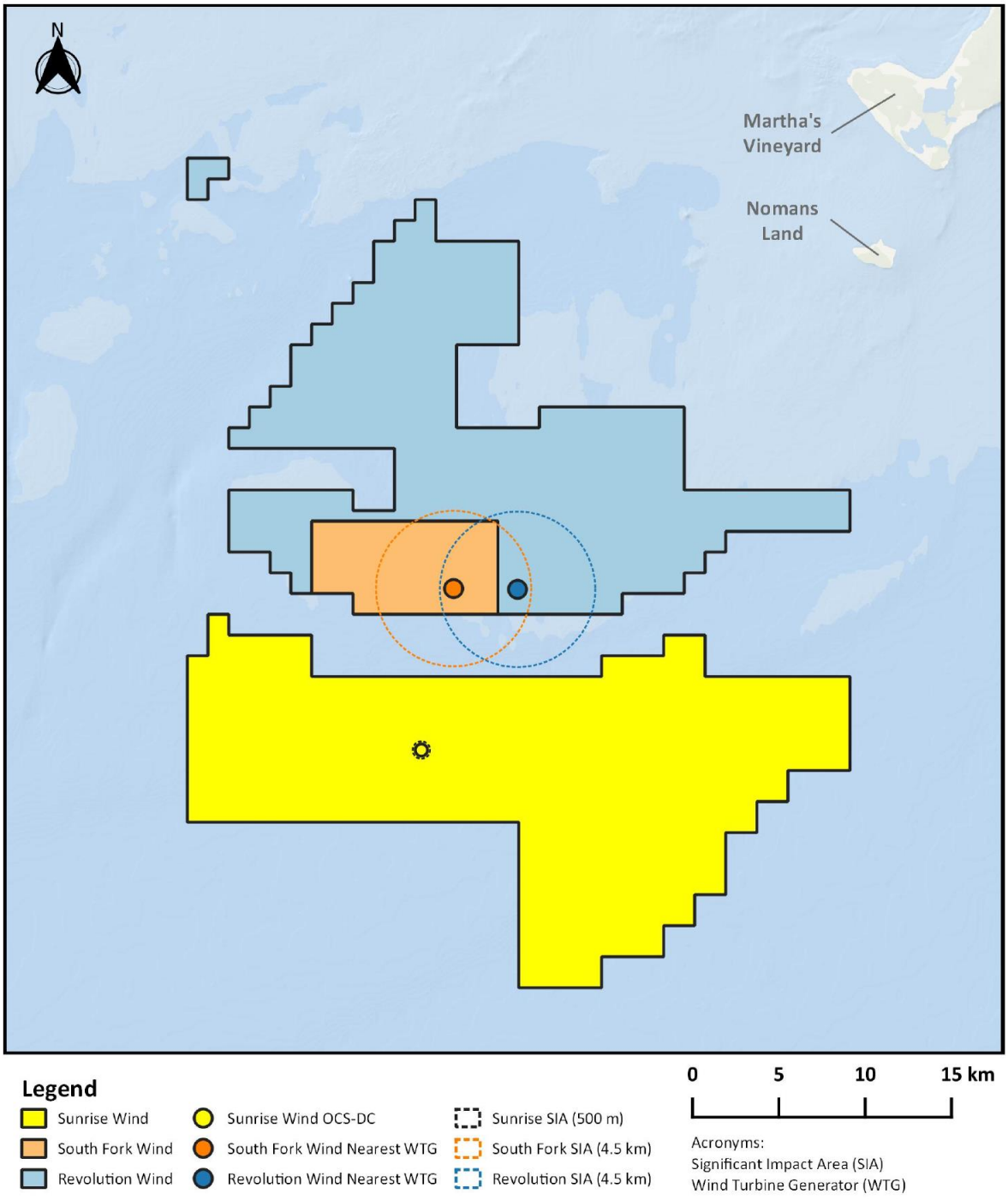

Figure 4 - Comparison of SIAs for Sunrise Wind, South Fork Wind and Revolution Wind

To conservatively determine the combined impacts from SRW, RW and SFW, the EPA combined the SIL modeling impacts from the three projects with the background concentrations for comparison to the 1-hour NO_2 NAAQS. This method is conservative because it takes worst-case impacts for the projects and combines them without consideration of temporal or spatial alignment. The results of the total pollutant concentrations using this conservative method indicates that the total impact from the three

facilities plus background are below the 1-hour NO_2 NAAQS as shown in Table 16**Error! Reference source not found.** below (SRW+SFW+RW).

All refined modeling was performed in accordance with the *Guideline* and in consultation with the EPA. Assessment of 1-hour NO_2 impacts predicted by OCD were post-processed with the ARM2 equation tier 2 screening method in a manner consistent with the *Guideline*. Sunrise Wind applied this as a post-processing step because OCD does not have capabilities to implement this approach directly or include more refined techniques for NO_2 impact screening. The EPA concludes that the modeling performed by Sunrise Wind was appropriate to assess impacts for these pollutants. A summary of the refined modeling, which demonstrates compliance with the 1-hr NO_2 NAAQS, is presented in Table 16 below.

Table 16 NAAQs Assessment Results for 1-Hour NO_2

	SRW Impact ($\mu g/m^3$)	Background Level ($\mu g/m^3$) (1)	RW Impact ($\mu g/m^3$)	SFW Impact ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	Exceeds NAAQS? (Yes/No)
SRW Only	6.9(2)	65.6 (3)	N/A	N/A	72.5	188.0	No
SRW + SFW (6) + RW (7)	7.8 (4)	73.2 (5)	40.3 (4)	44.9 (4)	166.2	188.0	No

Note: Concentrations are presented in µg/m3, though NO_2 concentrations are typically reported for non-modeling applications in parts per billion (ppb).

(1) Background Levels are based on 2019-2021 data from the East Providence, RI, NO_2 monitor.

(2) 3-year average of 98th percentile impacts during 3-year period from Sunrise Wind Only.

(3) Background Level projected using seasonal hourly background concentrations consistent with the US EPA memo, "Additional Clarification Regarding Application of Appendix W, Modeling Guidance for the 1-Hour NO2 National Ambient Air Quality Standard," March 1, 2011.

(4) Impact from SIL modeling – Highest 1-hour modeled concentration averaged over 3 years.

(5) Background Level based on the average concentration of the 98th percentile over 3 years.

(6) South Fork Wind

(7) Revolution Wind

The EPA concludes that SRW's assessment sufficiently demonstrates that air quality impacts will not violate the NAAQS for any pollutant.

d. Compliance with Class II PSD Increment

SRW is required to demonstrate compliance with the PSD increment for PM_{10}, $PM_{2.5}$, SO_2 and NO_2 because the project is a major source for these pollutants. The significance analysis presented in Table 15 above demonstrates compliance with the PSD increments for 24-hour and annual PM_{10}, annual NO_2, 24-hour and annual $PM_{2.5}$ and 3-hour, 24-hour and annual SO_2. There is no PSD increment for 1-hour NO_2 or 1-hour SO_2, so no PSD increment analysis is required.

e. Significance at Class I areas

SRW assessed the significance levels at Class I areas by assessing the maximum impacts predicted by the OCD model at a distance of 50 km from the source. Table 17 presents these results. As shown in Table 17, all predicted impacts are well below the respective Class I SILs. The EPA has reviewed the modeling assessment for Class I area significance and concludes that the analysis was performed appropriately.

Table 17 Class I PSD Significance Assessment

Pollutant	Averaging Time	Class I PSD SIL (ug/m^3)	Impact (ug/m^3)	Significant Impacts?
$PM_{2.5}$	Annual	0.05	0.0001 (1)	No
	24-hr	0.27	0.015 (1)	No
PM_{10}	Annual	0.20	0.00005	No
	24-hr	0.30	0.012	No
SO_2	Annual	0.10	0.00001	No
	24-hr	0.20	0.001	No
	3-hr	1.0	0.004	No
NO_2	Annual	0.10	0.002	No

(1) This value includes both primary and secondary $PM_{2.5}$ impacts.

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

SRW provided an analysis consistent with the requirements of 40 C.F.R. § 52.21(o) to assess air quality impacts and impairment to visibility, soils, and vegetation due to operational period emissions of the OCS Source and general commercial, residential, industrial, and other growth associated with the operational period of the windfarm. The EPA has evaluated SRW's analysis to address these requirements.

Regarding visibility, SRW submitted an analysis of impacts from construction and operations and maintenance emissions on Class I areas. This analysis is presented in the Class I Air Quality and Visibility Impact Analysis Report, submitted by SRW and dated February 2023. The visibility modeling was performed at the request of the U.S. Forest Service (USFS). *See* Section IV.C.2.fD. This analysis demonstrates acceptable visibility impacts from construction emissions as well as operations and maintenance emissions at the Lye Brook Wilderness Area. In addition, SRW applied the EPA VISCREEN model to assess visibility impacts from operations and maintenance emissions at nearby Class II area vistas and found that visibility impacts were below significance criteria. The EPA finds that the SRW analysis is appropriate to identify impacts on visibility and that impacts are below the screening thresholds. Therefore, the EPA concludes that operational emissions from the windfarm will not impair visibility.

SRW assessed impacts on soil and vegetation by comparing the maximum concentrations predicted by OCD against screening values derived from EPA's December 12, 1980 "Screening Procedure for the Impacts of Air Pollution Sources on Plants, Soils, and Animals: Final Report." The EPA finds that the Sunrise analysis is appropriate to identify impacts to vegetation and that impacts are well below the screening thresholds. EPA expects that impacts to soil will be similarly low based on the presented emissions levels and distance to land areas from the source. Therefore, EPA concludes that operational emissions from the windfarm will not impair soil or vegetation.

SRW described projected growth resulting from the operation of the windfarm and stated that no new significant emissions would be associated with population, economic, and employment growth due to the source.

Based on the results of the analyses and the EPA's evaluation, the EPA finds that the operational period emissions and associated impacts from commercial, residential, industrial, and other growth will not result in an impairment to visibility, soils, or vegetation.

g. EPA Conclusion About Ambient Air Impacts During Operational Phase

The EPA has assessed the analyses submitted by SRW related to ambient air impacts during the operational period. Based on this information and the EPA's assessment, as described above, the EPA concludes that the operational period emissions will not cause or contribute to violations of the NAAQS or PSD increment. Therefore, the ambient air impact requirements of the PSD regulations for the operational period 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 the 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 using its discretion not to exercise its authority to require additional modeling for the operational phase of the Project.

3. Consultation with Federal Land Managers

For sources impacting Federal Class I areas, 40 C.F.R. § 52.21(p) requires the EPA to consider any demonstration by the Federal Land Manager that emissions from the proposed source would have an adverse impact on air quality related values, including visibility impairment. If EPA concurs with the demonstration, the rules require that the EPA shall not issue the PSD permit.

The USFS requested that a Class I visibility analysis be performed for construction emissions using the CALPUFF Model. In response to this request, SRW performed a visibility analysis for the Lye Brook Wilderness Area located in southern Vermont approximately 273 km northwest of the Project. This analysis is presented in Section 5.2 of the Class I Air Quality and Visibility Impact Analysis Report, submitted by SRW, and dated February 2023. The February 2023 report was supplemented by a report "Class I Air Quality and Visibility Supplemental Analysis Report, Revision 1", dated October 2023. The

visibility analysis demonstrates acceptable visibility impacts at the Lye Brook Wilderness Area from construction emissions as well as O&M emissions. The USFS has concurred[71] with the results of the visibility modeling analysis.

[71] *See* November 28, 2023, email from Ralph Perron, U.S. Forest Service, available as part of the administrative record for the draft permit.

V. Nonattainment New Source Review (NNSR)

Within Massachusetts, Dukes County is currently designated as a marginal Nonattainment area for the 2008 ozone NAAQS. *See* 40 C.F.R. § 81.322. However, portions of the OCS source are closer to Bristol County, Massachusetts, than they are to Dukes County, and Bristol County is not a Nonattainment area for ozone. Nevertheless, because Massachusetts is part of the Ozone Transport Region (OTR),[72] 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 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[73] is an existing major 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 significant emissions rate of *Appendix A* (see *Table 18*). 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 18 *below for a summary of these applicable thresholds.*

Table 18 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

[72] 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.

[73] EPA issued an OCS permit to Vineyard Wind 1, LLC on August 19, 2022.

NNSR Regulated Pollutant	NNSR Significant Emission Rate (SER)
	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.

A. Major Source Applicability

"Major Modification" means any physical change in or change in the method of operation of a major stationary source that would result in a significant net emission increase of any pollutant, for which the existing source is major, subject to regulation under the Act: (a) Any net emissions increase that is considered significant for VOCs shall be considered significant for ozone; and (b) For the purpose of applying the requirements of 310 CMR 7.00: *Appendix A* to major stationary sources of NO_x, any significant net emissions increase of NO_x is considered significant for ozone, in addition to any separate requirements for NO_x under part C or D of Title I of the Act.[74]

1. Emission Increase Calculation (Potential to Emit)

As shown in Table 19, 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 increases from the Project are calculated pollutant by pollutant for each regulated NSR pollutant.

Table 19 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)	2,165	50	**Y**
VOC	113.4	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 SRW, the significant emissions increase is the new emissions unit's PTE.[75] For a new emission unit, the baseline actual emissions (BAE) for purposes of determining the emissions increase that will result from the initial

[74] Per 310 CMR 7.00, Appendix A, "Major Stationary Source" also specifies that OCS sources shall include fugitive emissions in determining, for any of the purposes of 310 CMR 7.00: Appendix A, whether the stationary source is a major stationary source. Therefore, fugitive emissions are considered in evaluating LAER and ambient impacts due to the regulations not distinguishing between stack and fugitive emissions for these purposes.

[75] 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.

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 SRW 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 20 Emission Increase from the Sunrise Wind Project

Sunrise Wind Project Emission Increase	Regulated NNSR Pollutant (TPY)	
	NO_x	VOC
BAE	0	0
PTE	2,165	113.4
Δ (PTE-BAE)	+2,165	+ 113.4

As shown in Table 21 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 21 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	2,165	25	**Y**
VOC	113.4	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 change in the method of operation at a stationary source [(i.e.,

Emission Increase Calculation ()]; 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.

SRW 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 21, 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."

SRW 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., SRW). 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[76] 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 is the most stringent emissions limitation for the project. Furthermore, the LAER analysis is on a per pollutant basis, like PSD, but the regulated NSR pollutants that are evaluated are only the NAAQS for each emission unit that could emit a NAAQS in a nonattainment area. In the case of this SRW permit application, NO_X and VOC are 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*.

2. LAER Analysis for the Sunrise Wind Project

[76] 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.

a. Emission Unit Applicability

The Project is required to apply LAER to all emission units which meet the definition of an OCS source. See Section IV.B.2.a.

b. Pollutant Applicability

A LAER analysis is required for each new emission unit for each pollutant which exceeds the NNSR SER. Based on the emission levels for the project, as presented in *Table 21,* NO_X and VOC are the precursors for the Nonattainment NSR regulated pollutant ozone which will be subject to LAER.

(1) Step 1 – Eligible LAER Controls

EUG 1—OCS Generator Engine(s) Installed on the OCS-DC 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 IV.B.2.a(1).

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 IV.B.2.a(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 aware of several vessels that are identified to become an OCS source and will be "newly acquired" by SRW. Therefore 17 CCR § 93118.5(e)(3) and 17 CCR § 93118.5(e)(4) 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.[77] 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.

[77] 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.

(2) 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 OCS-DC 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).

(3) Step 3 – Rank remaining control technologies.

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

Nitrogen Dioxide (NO_x)

SRW-1, 2

- The NO_X emission standard for C1 engines (Tier 4) ranges based on the specific power of the engine. For C1 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.

The NO_X emissions standards within 40 C.F.R. part 1042 are the most stringent limits that would apply to the SRW-1 and SRW-2

SRW-3

- The Tier 4 emission standards for C1 engines are only applicable to emission units with a maximum power rating greater than or equal to 600 kW. The applicant has identified SRW-3 have a maximum power rating of 37 kW. The emission standard for C1 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 4.7–5.8 (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) between 37 ≤ kW < 56, the NO_X + NMHC emission standard (Tier 4) of 4.7 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

SRW-4, 5

- The Tier 4 emission standards for C1 engines are only applicable to emission units with a maximum power rating greater than or equal to 600 kW. The applicant has identified SRW-4, 5 have a maximum power rating of 120 kW but has not identified the specific displacement (L/cylinder) of the engine. The emission standard for C1 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) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) between 75 ≤ kW < 130, 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.

SRW-6 – SRW-13

- The applicant has identified SRW-6 through SRW-13 to have a maximum power rating of 120 kW with ≤ 35 kW/L power density but has not identified the specific displacement (L/cylinder) of the engine. The emission standard for C1 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) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) between 75 ≤ kW < 130, 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.

The NO_X emissions standards within 40 C.F.R. part 1039 that would apply to the SRW-6 through SRW-13 are more stringent than 40 C.F.R. part 1042.

VOC (HC or NMHC)

SRW-1, 2

- The emission standard for C1 engines (Tier 4) ranges based on the specific power of the engine. The Tier 4 emission standards for C1 engines are only applicable to emission units with a maximum power rating greater than or equal to 600 kW. Therefore, for C1 engines, the Tier 4 HC emission standard range of 0.19 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

Therefore, the VOC (HC) emissions standards within 40 C.F.R. part 1042 are the most stringent limits that would apply to the SRW-1 and SRW-2

SRW- 3

- The Tier 4 emission standards for C1 engines are only applicable to emission units with a maximum power rating greater than or equal to 600 kW. The applicant has identified SRW-3

have a maximum power rating of 37 kW. The emission standard for C1 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 4.7–7.5 (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 37 ≤ kW < 56, the NO_X +NMHC emission standard (Tier 4) of 4.7 (g/kW-hr) represents the most stringent level of emissions control required by 40 C.F.R. part 1039.

SRW-4, 5

- The applicant has identified SRW-4, 5 have a maximum power rating of 120 kW but has not identified the specific displacement (L/cylinder) of the engine. The emission standard for C1 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) represents the most stringent level of emissions control required by 40 C.F.R. part 1042.

- For engines with a power rating (kW) between 75 ≤ kW < 130, 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.

SRW-6 – SRW-13

- The applicant has identified SRW-6 – SRW-13 to have a maximum power rating of 120 kW with ≤ 35 kW/L power density but has not identified the specific displacement (L/cylinder) of the engine. The emission standard for C1 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 of 5.4 (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 75 ≤ kW < 130, 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 NMHC emissions standards within 40 C.F.R. part 1039 that would apply to the SRW-6 through SRW-13 are more stringent than 40 C.F.R. part 1042.

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.

(4) 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.

(5) 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 OCS-DC and WTG(s)

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

EUG-1 LAER Limits	
SRW-1, 2	
NO_x	1.8 g/kW-hr
VOC	0.19 g/kW-hr
SRW-3	
NO_x + HC	4.7 g/kW-hr
VOC (NO_x + HC)	4.7 g/kW-hr
SRW-4, 5	
NO_x + HC	0.40 g/kW-hr
VOC (NO_x + HC)	0.19 g/kW-hr
SRW-6 – SRW-13	
NO_x	0.40 g/kW-hr
VOC (NMHC)	0.19 g/kW-hr

OCS Generator Engine(s) Installed on the OCS-DC 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*"[78] 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 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*"[79] 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*"[80] 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

[78] 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).
[79] 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).
[80] 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).

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

C. Offset Requirements

EPA has applied the offset requirements in the NNSR program on the OCS only to emissions associated with the operation 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. [81] 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 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.

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

Table 22 Maximum NO_X Offsets Needed for Operational Phase of Project (assuming a 1.26:1 offset ratio)

Project Phase	**NO_X Emissions**	**NO_X Offsets Needed**	**Units**
Operation and Maintenance	108.4	136.58*	tons per year

* 130.08 tpy (adjustment factor of 1.2:1)

Table *23* Maximum VOC Offsets Needed for Operational Phase of Project (assuming a 1.26:1 offset ratio)

Project Phase	**VOC Emissions**	**VOC Offsets Needed**	**Units**
Operation and Maintenance	10.5	13.23**	tons per year

[81] 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.

** 12.6 tpy (adjustment factor of 1.2:1)

The permittee can obtain rate-based offsets through any of the following:

- 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.[82] Thus, ERCs in the Massachusetts ERC bank are federally enforceable;

- Entering into a third-party agreement that requires the third-party to lower its emissions. Such an agreement would need to be made federally enforceable prior to issuance of the final permit; 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.

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). Based on 2014 emission data from the EPA's National Emission Inventory database, total anthropogenic NO_X emissions in Dukes County were 1,034 tons. Due to the lack of availability of potential NO_X offsets (i.e., ERCs) within the Dukes County 2008 ozone nonattainment area, the EPA anticipates that SRW will obtain NNSR offsets using ERCs from another classified area. 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.[83] 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.[84] The second criterion requires a demonstration that emissions from the other area contribute to a violation of the ozone standard within Dukes County.[85] Based on recent air dispersion modeling that EPA conducted to assist states with their ozone transport analysis for the 2015 ozone NAAQS, sources within Massachusetts are projected to contribute 10.54 ppb ozone in Dukes County in 2023.[86] Therefore, with both criteria met, the EPA is determining that SRW can obtain offsets from anywhere within Massachusetts.

If offsets were 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 22 and Table 23 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-R1-06.

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.

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[83] *See* 40 C.F.R. § 81.322.

[84] 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 being in a serious nonattainment area.

[85] 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).

[86] *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.

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) (08/22) for the Project. EPA finds that SRW 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. SRW is a new facility and has not begun activities subject to its OCS air permit. Issuance of the permit for SRW is recommended, contingent on public review.

VI. Other COA Emission Control Requirements

As previously stated, the COA for SRW is the Commonwealth of Massachusetts. Thus, the project 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 Appendix A apply to SRW, 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-R1-06.

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.[87] Therefore, the source is not subject to Massachusetts minor NSR permitting and/or State BACT requirements for lead and sulfuric acid mist.[88]

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 subpart when operating in the manner specified. All engines installed on WTGs or OSSs are also subject

[87] 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).

[88] 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.

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 OCS-DC(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 7.12: Source Registration

310 CMR 7.12 requires owners/operators of facilities to submit an annual source registration to Massachusetts. Per 310 CMR 7.12(1), the regulations apply to any owner/operator of a facility if such

facility meets any of the criteria in 310 CMR 7.12(1)(a)1 through 11. This facility meets criteria 6, 7, and 11 and is subject to the requirements of this section. All requirements contained in this regulation have been incorporated into the permit.

F. 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 SRW 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.

G. 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 0.5%, 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 may be 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 5 - 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. The following subsections include information on how EPA and NEW1 propose to comply with these regulatory requirements.

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[89] 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.[90] 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[91] to the Tier standards in part 1042 for marine engines, instead of the more stringent emission standards in part 1039.[92] 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 NOx 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[93]. 40 C.F.R. part 1042 contains emission standards and certification requirements for Category 1 and Category 2 marine diesel engines on vessels[94] 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.

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

[92] 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).
[93] *See* 40 C.F.R. § 60.4201(f)(2).
[94] 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[95]. However, EUG 2 engines that have a displacement greater than or equal to 30 L/cylinder, are subject to NOx and PM emissions standards as described in 40 C.F.R. § 60.4204(c) and other requirements in Subpart IIII. The specific NOx 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.

SRW 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).

[95] 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 24 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-R1-06, 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-R1-06, 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 nautical miles 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 SRW is also a federal action for BOEM. BOEM's regulations at 30 C.F.R. part 585 require SRW 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 SRW. Accordingly, the EPA has designated BOEM as the lead Federal agency for purposes of fulfilling statutory obligations under the statutes mentioned previously.[96] BOEM has accepted the designation as lead Federal agency.[97]

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 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

[96] 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.

[97] 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.

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 SRW. Should the result of BOEM's consultation under one or more of these statutes identify any conditions or restrictions on air emissions for inclusion in the OCS air permit, the EPA will include those conditions or restrictions in the final permit as necessary. The EPA will also 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.[98]

[98] 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 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.[99] 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."[100] 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 V.C of this document for a detailed analysis of the ambient air impact analysis of the project.

[99] *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.

[100] 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[101] 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.[102]

In the Draft Environmental Impact Statement (DEIS) for SRW, BOEM analyzed potential air quality impacts as a result of the construction and operation of the Project.[103] EPA finds BOEM's analysis helpful in identifying potential EJ areas of concern. Indirect air quality impacts[104] 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 DEIS for SRW. 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.[105] Of the estimated 8,120

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[101] 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.

[102] *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.

[103] A copy of BOEM's December 2022 DEIS for the Sunrise Wind project can be found in the administrative record for this action.

[104] 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 SRW. 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.

[105] BOEM (2022). Sunrise Wind Draft EIS, 3.6.4.

block groups, approximately 49.2% were identified as EJ areas of concern.[106] 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[107] during the construction phase of the Project are temporary, occurring over less than two years. Direct air quality impacts from ongoing Project activities regulated by this permit are localized around the WDA (which is 13 NM south of Nomans Land, Massachusetts) and insignificant in all onshore areas.

Many of the air emitting activities analyzed by BOEM's DEIS 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 SRW's application, the potential port facilities to be used to support construction of the Project include existing ports in New York, Rhode Island, Connecticut, Massachusetts, Virginia, Maryland, and New Jersey. During O&M, the potential ports to be used to support the Project include existing ports in New York, Connecticut, and Rhode Island. 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.[108] See below Figure 6 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.

[106] BOEM (2022). Sunrise Wind Draft EIS, 3.6.4.

[107] 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.

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

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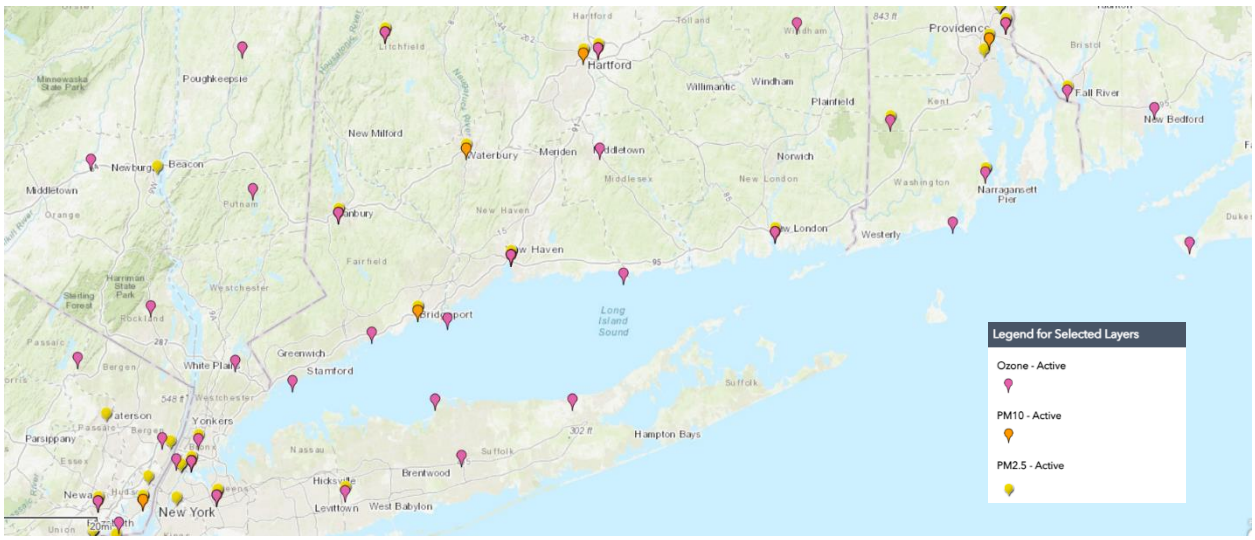

Figure 6 Map of Ozone and PM Air Monitoring Stations

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. SRW estimates avoided emissions of offshore wind displacing fossil fuel generators for the project are 1,179 to 2,178 tons NO_X per year, 1,227 to 2,266 tons SO_X per year, and 2,078,554 to 3,838,239 tons CO_{2e} per year.[109] 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.[110]

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. These emissions would add a small amount to the current vessel traffic emissions in the area, and given their very low-level and very short duration, would have minor (if any) human health or environmental effects on the overall population, including any minority or low-income population.[111]

[109] Sunrise Wind 2/24/2023 Application, Table 5-5.
[110] BOEM (2022). Sunrise Wind Draft EIS, Table 2.4-1.
[111] BOEM (2022). Sunrise Wind Draft EIS, Table 2.4-1.

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 the 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.[112] 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:
Morgan M. McGrath, P.E.
Email: mcgrath.morgan@epa.gov

Comments may also be submitted electronically through https://www.regulations.gov (Docket ID **#EPA-R01-OAR-2023-0525**)

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

U.S. EPA Region 1
Air and Radiation Division

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

Air Permits, Toxics and Indoor Programs Branch
Attn. Morgan McGrath, P.E.
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:

Pujarini (Rini) Maiti
Telephone: (617) 918-1625
Email: maiti.pujarini@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-2023-0525**)