



**Draft Outer Continental Shelf Air Permit  
U.S. Environmental Protection Agency  
Region 1**

Outer Continental Shelf Air Permit:

Revolution Wind, LLC

Offshore Renewable Wind Energy Development Project

EPA Permit Number: **OCS-R1-05**

Pursuant to the provisions of Section 328 of the Clean Air Act (“CAA”) and the Code of Federal Regulations (“C.F.R.”) Title 40, Part 55, the United States Environmental Protection Agency Region 1 (“EPA”) is issuing an Outer Continental Shelf (“OCS”) air quality permit to construct and operate Revolution Wind LLC’s (“RW”) proposed offshore renewable wind energy development project. RW is authorized to construct up to 100 wind turbine generators (“WTGs”) and up to 2 Offshore Substations (“OSSs”), all of which will be located within federal waters on the OCS, specifically in the Bureau of Ocean Energy Management (“BOEM”) Renewable Energy Lease Area OCS-A 0486 in the Rhode Island-Massachusetts Wind Energy Area.

The construction and operation of the windfarm would be subject to the attached permit conditions and permit limitations. This permit is effective on October 30, 2023, unless review is requested on the permit in accordance with 40 C.F.R. § 124.19 and shall remain in effect until it is surrendered to EPA. This permit does not relieve RW from the obligation to comply with applicable state and federal air pollution control rules and regulations.

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David W. Cash  
Regional Administrator

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Date of Signature

## Acronyms and Abbreviation List

|                                    |   |                         |  |
|------------------------------------|---|-------------------------|--|
| <b>APPS</b>                        | Air to Prevent Pollution from Ships   | <b>NMHC</b>             | Non-methane hydrocarbons                                       |
| <b>AQRV</b>                        | Air Quality Related Values  | <b>NNSR</b>             | Nonattainment New Source Review                                |
| <b>BACT</b>                        | Best Available Control Technology   | <b>NSR</b>              | New Source Review  |
| <b>BOEM</b>                        | Bureau of Ocean Energy Management   | <b>N<sub>2</sub>O</b>   | Nitrous oxide  |
| <b>CAA</b>                         | Clean Air Act   | <b>NO<sub>2</sub></b>   | Nitrogen dioxide   |
| <b>CA SIP</b>                      | California State Implementation Plan  | <b>NO<sub>x</sub></b>   | Nitrogen oxides  |
| <b>CERC</b>                        | Continuous Emission Reduction Credit  | <b>OCS</b>              | Outer Continental Shelf  |
| <b>C.F.R.</b>                      | Code of Federal Regulations   | <b>OCS-DC</b>           | Offshore Converter Station                                     |
| <b>CH<sub>4</sub></b>              | Methane   | <b>OnCS-DC</b>          | Onshore Converter Station                                      |
| <b>CO</b>                          | Carbon Monoxide   | <b>OECLA</b>            | Offshore Export Cable Laying Activities                        |
| <b>COA</b>                         | Corresponding Onshore Area  | <b>OSS</b>              | Offshore Substation  |
| <b>CO<sub>2</sub></b>              | Carbon Dioxide  | <b>OSCLA</b>            | Outer Continental Shelf Lands Act                              |
| <b>CO<sub>2e</sub></b>             | Carbon dioxide equivalent   | <b>Pb</b>               | Lead   |
| <b>CZMA</b>                        | Coastal Zone Management Act   | <b>PM</b>               | Particulate Matter   |
| <b>DEIS</b>                        | Draft Environmental Impact Statement  | <b>PM<sub>10</sub></b>  | Particulate Matter with an Aerodynamic Diameter <= 10 Microns  |
| <b>DERC</b>                        | Discrete Emission Reduction Credit  | <b>PM<sub>2.5</sub></b> | Particulate Matter with an Aerodynamic Diameter <= 2.5 Microns |
| <b>EAB</b>                         | Environmental Appeals Board   | <b>PSD</b>              | Prevention of Significant Deterioration                        |
| <b>EGRID</b>                       | Environmental Protection Agency's Emissions and Generation Resource Integrated Database | <b>PTE</b>              | Potential to Emit  |
| <b>EIAPP</b>                       | Engine International Air Pollution Prevention   | <b>SER</b>              | Significant Emission Rate                                      |
| <b>EPA</b>                         | United States Environmental Protection Agency   | <b>SRW</b>              | Sunrise Wind, LLC  |
| <b>EJ</b>                          | Environmental Justice   | <b>SRWF</b>             | Sunrise Windfarm   |
| <b>ERC</b>                         | Emission Reduction Credit   | <b>SIL</b>              | Significant Impact Levels                                      |
| <b>ESA</b>                         | Endangered Species Act  | <b>SO<sub>2</sub></b>   | Sulfur Dioxide   |
| <b>ESP</b>                         | Electrical Substation Platform  | <b>TPY</b>              | Tons Per Year  |
| <b>EUG</b>                         | Emission Unit Group   | <b>U.S.C.</b>           | United States Code   |
| <b>FWS</b>                         | U.S. Fish and Wildlife Service  | <b>VOC</b>              | Volatile Organic Compounds                                     |
| <b>GCOPP</b>                       | Good Combustion and Operation Practices Plan  | <b>WDA</b>              | Wind Development Area  |
| <b>GHG</b>                         | Greenhouse Gas  | <b>WTG</b>              | Wind Turbine Generator   |
| <b>g/kW-hr</b>                     | Grams per kilowatt-hour   |                         |  |
| <b>H<sub>2</sub>SO<sub>4</sub></b> | Sulfuric acid   |                         |  |
| <b>HAP</b>                         | Hazardous Air Pollutant   |                         |  |
| <b>HC</b>                          | Hydrocarbon   |                         |  |
| <b>IAPP</b>                        | International Air Pollution Prevention  |                         |  |
| <b>ISO NE</b>                      | ISO New England   |                         |  |
| <b>KV</b>                          | Kilovolt  |                         |  |
| <b>KW</b>                          | Kilowatt  |                         |  |
| <b>LAER</b>                        | Lowest Achievable Emission Rate   |                         |  |
| <b>MassDEP</b>                     | Massachusetts Department of Environmental Protection                                    |                         |  |
| <b>MW</b>                          | Megawatt  |                         |  |
| <b>NHPA</b>                        | National Historical Preservation Act  |                         |  |
| <b>NM</b>                          | Nautical Mile   |                         |  |
| <b>NMFS</b>                        | National Marine Fisheries Service   |                         |  |

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## **SECTION I. Introduction (Informational Purposes Only)**

Revolution Wind, LLC (“Revolution” or “RW” or the “applicant”) has applied for a preconstruction permit for a new project to construct up to one hundred (100) wind turbine generators (“WTGs”), submarine cables between the WTGs (inter-array cables), OSS Link Cables, Export Cables, and up to two Offshore Substations (“OSSs”), all of which will be located within federal waters on the OCS, specifically in the Bureau of Ocean Energy Management (“BOEM”) Renewable Energy Lease Area OCS-A 0486. The project is anticipated to have a full production capacity between 704 and 880 megawatts (“MW”) of renewable energy.

The Revolution Wind project is part of the same stationary source as the South Fork Wind project, which is owned and operated by South Fork Wind, LLC (“South Fork” or “SFW”). The Revolution Wind project is a major modification to the SFW major source. The SFW project is in BOEM Lease Area OCS-A 0517 and operates under a separate preconstruction Permit No. OCS-R1-04 issued on January 18, 2022. SFW is considered a major Prevention of Significant Deterioration (“PSD”) stationary source subject to New Source Review (“NSR”) for NO<sub>2</sub> and PM<sub>2.5</sub>, and a major Nonattainment NSR (“NNSR”) for ozone (specifically the precursor NO<sub>x</sub>). The boundary between the RW and SFW projects is their respective Lease Area(s) which form the basis for determining whether a particular piece of equipment and source of emissions is considered part of the RW or SFW project and in which permit it should be addressed.

The RW project is a major PSD stationary source for NSR pollutants for which the corresponding onshore area is designated attainment or unclassifiable. This project triggers PSD review because the total emissions for the stationary source (i.e., SFW) prior to the RW project exceeds the PSD major source thresholds. Based on the emission levels for the RW project, NO<sub>2</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, and GHG are the regulated NSR pollutants that will be emitted by Revolution in quantities exceeding the respective PSD Significant Emission Rate (“SER”). The pollutants from this project subject to the best available control technology (“BACT”) are NO<sub>2</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, and GHG.

Regulated NSR pollutants (and their precursors in the case of ozone) for which the Corresponding Onshore Area (“COA”) is either a designated nonattainment area or is located in the Ozone Transport Region (“OTR”) are not subject to PSD review and instead are subject to major NNSR permitting. The Revolution Wind project exceeds the NNSR SER for the ozone precursors NO<sub>x</sub> and VOC. Therefore, the ozone precursors NO<sub>x</sub> and VOC are not subject to PSD review but are instead subject to major NNSR permitting. The pollutants from this project subject to the lowest achievable emission rate (“LAER”) are NO<sub>x</sub> and VOC.

For the purposes of fulfilling requirements for pollutants below major source thresholds but above Massachusetts’s minor source permitting or plan approval thresholds, a BACT determination is made for other NSR regulated pollutants, namely sulfur dioxide (SO<sub>2</sub>).

## SECTION II. Equipment (Informational Purposes Only)

The Revolution Wind project is required to apply BACT to all the new emission units proposed in this project which emit NO<sub>2</sub>, CO, PM<sub>10</sub>, PM<sub>2.5</sub>, and GHG. State BACT requirements derived from Massachusetts’ regulations apply to all the new emission units proposed in this project which emit SO<sub>2</sub>. The Revolution Wind project is required to apply LAER to all the new emission units proposed in this project which emit NO<sub>x</sub> and VOC. The following tables are a narrative description of the proposed equipment in the permit application for the RW project. The list of equipment and descriptions are intended for informational purposes only.

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 OSSs. The medium and high-voltage gas insulated switchgears (“GISs”) on the OSS have the potential to emit SF<sub>6</sub>, which is considered a GHG. Per the permit application, the facility has stated that the WTGs will not utilize SF<sub>6</sub> within the GIS, which are typically located at the base of the turbine. Therefore, the GIS located on the OSS (Medium Voltage (MV) and High Voltage (HV)) are the only emission source of SF<sub>6</sub>.

### EUG 1 Offshore Engines on OSS(s) and WTG(s)

| EU ID                         | Description                                   | Type of Equipment                | Engine Count | Engine Rating, kW (hp) |
|-------------------------------|---|----------------------------------|--------------|------------------------|
| <b>Construction Equipment</b> |   |                                  |              |                        |
| RW-1, RW-2                    | OSS/OCS Installation & Commissioning          | Auxiliary Generator on OSS/OCS   | 2            | 597 (800)              |
| RW-3, RW-4, RW-5, RW-6        | Offshore OSS/OCS Installation & Commissioning | Temporary Generator on OSS       | 4            | 156 (209)              |
| RW-7                          | Offshore Array Cable Installation             | Generator for Cable Pull-WTG     | 1            | 37 (50)                |
| RW-8, RW-9                    | Offshore Array Cable Installation             | Generator for Cable Pull-OSS/OCS | 2            | 75 (100)               |
| RW-10, 11                     | Offshore WTG Installation & Commissioning     | Temporary Generator on WTG       | 2            | 24 (32)                |
| <b>Operating Equipment</b>    |   |                                  |              |                        |
| RW-12, 13                     | OSS/OCS Permanent Generators                  | Generator on OSS/OCS             | 2            | 597 (800)              |
| RW-14 thru RW-20              | WTG O&M Repair                                | Generator on WTG                 | 6            | 120 (160)              |

### EUG 2 Marine Engines on Vessels when Operating as Potential OCS Source(s)

A marine vessel typically has two (2) kinds of engines which could be affected units when considered an OCS source: 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, i.e., for example 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.

| <b>Marine Vessel</b>             | <b>Vessel Type</b>                               | <b>Main Engine Rating (kW)</b> | <b>Auxiliary Engine Rating (kW)</b> |
|----------------------------------|--|--------------------------------|-------------------------------------|
| Monopile Installation            | Heavy Lift Installation Vessel                   | 26,640                         | 1,100                               |
| Monopile Installation            | Heavy Lift Installation Vessel                   | 34,560                         | 1,100                               |
| Monopile Installation            | Heavy Lift Installation Vessel (Generator Small) | NA                             | 4                                   |
| Monopile Installation            | Heavy Lift Installation Vessel (Power Pack)      | NA                             | 746                                 |
| Monopile Installation            | Towing Tug (for fuel barge)                      | 11,060                         | 238                                 |
| Monopile Installation            | Anchor Handling Tug                              | 11,060                         | 238                                 |
| Monopile Installation            | Rock Dumping Vessel                              | 13,500                         | 1,692                               |
| Monopile Installation            | Vessel for Bubble Curtain                        | 11,060                         | 874                                 |
| Monopile Installation            | Vessel for Bubble Curtain (Generator (Large))    | NA                             | 358                                 |
| Monopile Installation            | Heavy Transport Vessel (Generator (Small))       | NA                             | 4                                   |
| Monopile Installation            | Heavy Transport Vessel                           | 11,952                         | 3,600                               |
| Monopile Installation            | Heavy Transport Vessel                           | 11,952                         | 3,600                               |
| Monopile Installation            | Heavy Transport Vessel                           | 11,952                         | 3,600                               |
| Monopile Installation            | Crew Transport Vessel                            | 2,352                          | 48                                  |
| Monopile Installation            | PSO Noise Monitoring Vessel                      | 11,060                         | 238                                 |
| Monopile Installation            | Platform Supply Vessel                           | 6,000                          | 874                                 |
| Monopile Installation            | Platform Supply Vessel                           | 1,825                          | 525                                 |
| OSS Topside Installation         | Heavy Transport Vessel                           | 13,000                         | 1,220                               |
| Turbine Installation             | Jack-up Installation Vessel                      | 21,000                         | 895                                 |
| Turbine Installation             | Jack-up Installation Vessel (Generator (Small))  | NA                             | 4                                   |
| Turbine Installation             | Jack-up Installation Vessel (Cherry Picker)      | NA                             | 67                                  |
| Turbine Installation             | Feeder Barge (Generator (Large))                 | NA                             | 30                                  |
| Turbine Installation             | Towing Tug (for fuel barge)                      | 11,060                         | 238                                 |
| Offshore Export Cable & OSS Link | Pre-Lay Grapnel Run                              | 12,780                         | 968                                 |
| Offshore Export Cable & OSS Link | Boulder Clearance Vessel                         | 2,803                          | 964                                 |
| Offshore Export Cable & OSS Link | Sandwave Clearance Vessel                        | 7,300                          | 964                                 |
| Offshore Export Cable & OSS Link | Cable Lay and Burial Vessel                      | 8,946                          | 2,800                               |

| <b>Marine Vessel</b>             | <b>Vessel Type</b>                | <b>Main Engine Rating (kW)</b> | <b>Auxiliary Engine Rating (kW)</b> |
|----------------------------------|-----------------------------------|--------------------------------|-------------------------------------|
| Offshore Export Cable & OSS Link | Cable Burial Vessel - Remedial    | 8,946                          | 2,800                               |
| Offshore Export Cable & OSS Link | Tug - Small Capacity              | 4,049                          | 238                                 |
| Offshore Export Cable & OSS Link | Tug - Large Capacity              | 11,060                         | 238                                 |
| Offshore Export Cable & OSS Link | Crew Transport Vessel             | 2,204                          | 201                                 |
| Offshore Export Cable & OSS Link | Guard Vessel/Scout Vessel         | 400                            | 201                                 |
| Offshore Export Cable & OSS Link | Survey Vessel                     | 1,302                          | 418                                 |
| Offshore Export Cable & OSS Link | DP2 Construction Vessel           | 12,780                         | 964                                 |
| Offshore Export Cable & OSS Link | Misc. Floating Equipment Landfall | 400                            | 201                                 |
| Offshore Export Cable            | Barge Lay (Generator (Small))     | NA                             | 75                                  |
| Offshore Export Cable            | Barge Lay (Crane Type 1)          | NA                             | 567                                 |
| Offshore Export Cable            | Barge Lay (Generator (Large))     | NA                             | 187                                 |
| Offshore Export Cable            | Barge Lay (Power Pack)            | NA                             | 373                                 |
| Offshore Export Cable            | Barge Lay (Cherry Picker)         | NA                             | 112                                 |
| Offshore Export Cable            | Barge Lay (Excavator)             | NA                             | 567                                 |
| Offshore Export Cable            | Support Barge (Generator (Large)) | NA                             | 45                                  |
| Offshore Export Cable            | Support Barge (Cherry Picker)     | NA                             | 567                                 |
| Offshore Array Cable             | Pre-Lay Grapnel Run               | 12,780                         | 964                                 |
| Offshore Array Cable             | Boulder Clearance Vessel          | 2,803                          | 964                                 |
| Offshore Array Cable             | Sandwave Clearance Vessel         | 7,300                          | 964                                 |
| Offshore Array Cable             | Cable Laying Vessel               | 8,946                          | 2,800                               |
| Offshore Array Cable             | Cable Burial Vessel               | 8,946                          | 2,800                               |
| Offshore Array Cable             | Crew Transport Vessel             | 2,204                          | 201                                 |
| Offshore Array Cable             | Walk to Work Vessel (SOV)         | 6,440                          | N/A                                 |
| Offshore Array Cable             | Survey Vessel                     | 1,302                          | 418                                 |
| Offshore Array Cable             | Construction Vessel               | 6,440                          | N/A                                 |
| Offshore Cable Transport         | Cable Laying Vessel               | 8,946                          | 2,800                               |
| Offshore Cable Transport         | Array Cable Transport Freighter   | 7,950                          | 3,026                               |

| <b>Marine Vessel</b>        | <b>Vessel Type</b>                         | <b>Main Engine Rating (kW)</b> | <b>Auxiliary Engine Rating (kW)</b> |
|-----------------------------|--|--------------------------------|-------------------------------------|
| All Construction Activities | Safety Vessel 1                            | 400                            | 201                                 |
| All Construction Activities | Safety Vessel 2                            | 400                            | 201                                 |
| All Construction Activities | Crew Transport Vessel                      | 2,352                          | 201                                 |
| All Construction Activities | Crew Transport Vessel                      | 2,162                          | 201                                 |
| All Construction Activities | Crew Transport Vessel                      | 2,984                          | 100                                 |
| All Construction Activities | Lift Boat                                  | 6,000                          | N/A                                 |
| All Construction Activities | Supply Vessel                              | 7,530                          | N/A                                 |
| All Construction Activities | Service Operation Vessel                   | 6,920                          | 201                                 |
| Fisheries Monitoring        | for Lobster, Lease Site                    | 400                            | 201                                 |
| Fisheries Monitoring        | for Trawl Survey                           | 400                            | 201                                 |
| Fisheries Monitoring        | for Lease Site Acoustic Telemetry          | 400                            | 201                                 |
| Fisheries Monitoring        | for Lobster, Export Cable                  | 400                            | 201                                 |
| Marine Mammal Mitigation    | for Situational Awareness                  | 400                            | 201                                 |
| Marine Mammal Mitigation    | for Long Term Acoustic                     | 400                            | 201                                 |
| Marine Mammal Mitigation    | for ST Long Term Studies                   | 400                            | 201                                 |
| Planned WTGs/OSS/FOU        | Service Operation Vessel – Large Generator | NA                             | 530                                 |

### **EUG 3 Medium (MV), and High Voltage (HV) Switchgears (SWG) on the OSS**

The medium and high-voltage gas insulated switchgears (GIS) on the OSS have the potential to emit SF<sub>6</sub>, which is considered a GHG. Per the permit application, the facility has stated that the WTGs will not utilize SF<sub>6</sub> within the switchgears, which are typically located at the base of the turbine. Therefore, only the SWGs located on the OSS (MV and HV) are required to apply BACT for SF<sub>6</sub>.

| <b>EU ID</b> | <b>Description</b>            | <b>Insulating Gas Type</b> | <b>Count (# SWGs)</b> |
|--------------|-------------------------------|----------------------------|-----------------------|
| MV-SWG       | MV SWG (66kV) on OSS          | SF <sub>6</sub>            | 2                     |
| HV-SWG       | HV SWG (220 kV-400 kV) on OSS | SF <sub>6</sub>            | 2                     |



### **SECTION III. Definitions**

The following definitions shall be used for the purposes of this permit only. Terms not otherwise defined in this permit have the meaning assigned to them in the referenced Clean Air Act provisions and EPA regulations (including the Massachusetts regulations incorporated by reference into 40 C.F.R. Part 55).

*Air Pollutant* shall have the same meaning as that term has within 40 C.F.R. Part 55.

*Barge*, as this term relates specifically to Section IV(C)(5), means a vessel having a flat-bottomed rectangular hull with sloping ends and built with or without a propulsion engine.

*Category 1 Marine Engine* means the definition as contained in 40 C.F.R. § 1042.901.

*Category 2 Marine Engine* means the definition as contained in 40 C.F.R. § 1042.901.

*Category 3 Marine Engine* means the definition as contained in 40 C.F.R. § 1042.901.

*Commence* means, that an owner or operator has undertaken a continuous program of construction or modification or that an owner or operator has entered a contractual obligation to undertake and complete, within a reasonable time, a continuous program of construction or modification.

*Construction Phase* begins on the Construction Phase Start Date and ends the day when the last WTG to be constructed begins producing commercial power.

*Construction Start Date* is the first day any equipment or activity, that meets the definition of an OCS source, operates, occurs, or exists in the WDA.

*Continuous Emission Reduction Credit* (“CERC”) is equivalent to 1 ton per year of a pollutant, such as NO<sub>x</sub> or VOC. Under 310 CMR 7.00, Appendix B, a CERC is equivalent to a rate-based emission reduction credit (“ERC”).

*Crew and supply vessel*, as this term relates specifically to Section IV(C)(5), means 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).

*Domestic Flagged Vessel* means a vessel operated under the authority of the United States.

*Dredge*, as this term relates specifically to Section IV(C)(5), means 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.

*Emission Control Area (“ECA”)* means an area designated pursuant to Annex VI as an Emission Control Area that is in force.

*Emission Control Area (“ECA”) Marine Fuel* means diesel, distillate, or residual fuel used, intended for use, or made available for use in category 3 marine vessels while the vessels are operating within an ECA, or an ECA associated area.

*Emission Unit* means any part of an OCS source vessel or OCS source, including but not limited to, engines, that emit or would have the potential to emit any air pollutant.

*Engine* shall include diesel-fired compression ignition internal combustion engines, marine engines, and diesel-fired generating sets.

*Excursion vessel*, as this term relates specifically to Section IV(C)(5), means 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.

*Exempt Vessel*, as this term relates specifically to Section IV(C)(5), 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).

*Ferry*, as this term relates specifically to Section IV(C)(5), 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.

*Foreign-Flagged Vessel* means a vessel of foreign registry, or a vessel operated under the authority of a country other than the United States.

*Marine Engine* means a nonroad engine produced for any purpose that is installed or intended to be installed on a marine vessel. This includes a portable auxiliary marine engine only if it is fueling, cooling, or exhaust system is an integral part of the vessel. A fueling system is considered integral to the vessel only if one or more essential elements are permanently affixed to the vessel.

- a. Propulsion marine engine means a marine engine that moves a vessel through the water or directs the vessel's movement.
- b. Auxiliary marine engine means a marine engine not used for propulsion.

*No. 1 of the [Ringelmann] Chart* has the same meaning as 20 % opacity.

*No. 2 of the [Ringelmann] Chart* has the same meaning as 40% opacity.

*North American Emission Control Area (“ECA”)* means the area designated in Regulation 14.3.2 and Appendix VII of MARPOL Annex VI.

*OCS Facility* means the entire wind development area once the first OCS source is established in the WDA.

*OCS Source* has the same meaning as set forth in 40 C.F.R. § 55.2.

*OCS Source Vessel* is any vessel that:

- a. Emits or has the potential to emit any air pollutant.
- b. Is regulated or authorized under the Outer Continental Shelf Lands Act (“OCSLA”) (43 U.S.C. §1331 *et seq.*); and
- c. Is located on the OCS or in or on waters above the OCS.
- d. Additionally, an OCS Source Vessel must be 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 physically attached to an OCS facility, in which case only the stationary source aspects of the vessels will be regulated.

*Offshore Substations (“OSSs”)* serve as the common interconnection point for the WTGs. The WTG will interconnect with an Electrical Service Platform (“ESP”) via a 66 kV submarine cable system. The ESP will have circuit breakers and transformers (66 kV to 220 kV) to increase the voltage level and transmit electricity through the offshore cable system to the final connection point to the onshore bulk power grid.

*Operational Phase* is the period of operations which begins on the operational phase start date.

*Operational Phase Start Date* begins when the first WTG begins producing commercial power.

*The Permittee* includes Revolution Wind, LLC; its successor(s) in operating the permitted project; its contractors; and any agents or parties acting on its behalf that conduct activities regulated by this permit, including but not limited to vessel, barge, and equipment operators.

*Primary Crew Transport Vessel*, as this term relates specifically to Section IV(C)(4), means the one crew transport vessel that will be needed on an almost daily basis during both the construction and operational phases.

*Towboat or push boat*, as this term relates specifically to Section IV(C)(5), means 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.

*Tugboat*, as this term relates specifically to Section IV(C)(5), 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.

*Responsible Official* means a president, secretary, treasurer, or vice-president of the Permittee in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the Permittee, or a duly authorized representative of such person if the representative is responsible for the overall operation of one or more manufacturing, production, or operating facilities applying for or subject to a permit and either:

- a. The facilities employ more than 250 persons or have gross annual sales or expenditures exceeding \$25 million (in second quarter 1980 dollars); or
- b. The delegation of authority to such representatives is approved in advance by the EPA.

*Smoke* means the visible aerosol, which may contain fly ash, resulting from combustion of materials but does not mean condensed water vapor.

*Ultra-low sulfur diesel ("ULSD")* means diesel fuel that is certified to meet the standards in 40 C.F.R. §1090.305.

*Vessel* means:

- a. self-propelled vessels; and
- b. barges or other non-self-propelled vessels that must be towed by another vessel. It includes vessels with or without systems that attach, either permanently or temporarily, to the seabed.

*Wind Development Area ("WDA")* is the Bureau of Ocean Energy Management ("BOEM") Lease Area OCS-A 0486, located on the OCS. The Project lease area is about 13 nautical miles ("NM") wide and 19 NM long, located in federal waters off the Massachusetts coast. At its nearest points, the WDA is approximately 7.5 NM southwest of Nomans Land Island, Massachusetts. The WDA is 98 square nm. Note that the term WDA is used before an individual OCS source is established. Once the first OCS source is established in the WDA, the entire WDA is considered the OCS Facility.

*Wind Turbine Generator ("WTG")* means equipment used to generate electricity from wind.

**SECTION IV. Emission Limits**

**A. Facility Wide Emission Limitations**

1. The Permittee shall not cause, suffer, allow, or permit the emission of smoke from any OCS Source which has a shade, density, or appearance equal to or greater than No. 1 of the [Ringelmann] Chart for a period, or aggregate period of time in excess of six minutes during any one hour, provided that at no time during the said six minutes shall the shade, density, or appearance be equal to or greater than No. 2 of the [Ringelmann] Chart.  
 [310 CMR 7.06(1)(a)]
2. The Permittee shall not cause, suffer, allow, or permit the operation of any OCS Source to emit any contaminant(s), exclusive of uncombined water or smoke subject to Section IV(A)(1) above, that exceed 20% opacity for a period or aggregate period of time in excess of two minutes during any one hour provided that, at no time during the said two minutes shall the opacity exceed 40%.  
 [310 CMR 7.06(1)(b)]
3. All diesel-fueled compression ignition internal combustion engines subject to Subpart III with a displacement of less than 30 liters per cylinder shall be fired with diesel fuel not to exceed a maximum sulfur content of 15 ppm.  
 [40 C.F.R. 60.4207(b)]
4. All diesel-fueled compression ignition internal combustion engines subject to Subpart III with a displacement of greater than or equal to 30 liters per cylinder shall be limited to using diesel fuel not to exceed a maximum per-gallon sulfur content of 1,000 parts per million (ppm).  
 [40 C.F.R. 60.4207(d)]
5. Emissions from the RW project will be limited by, and contribute to, the facility-wide emission limits on NO<sub>x</sub> and VOC identified in Section IV(A)(5). For purposes of compliance with the Facility-wide emission limits in Section IV(A)(5), actual emissions of NO<sub>x</sub> and VOC shall include emissions during operation from the following: engines located on the OSS and/or WTG(s), engines on vessels that meet the definition of an OCS source, and engines on vessels servicing or associated with the OCS Facility when those vessels are at the OCS Facility, or en route to or from the OCS Facility and are within 25 NM of the OCS Facility’s centroid.

[40 C.F.R. Part 55 (§55.1–55.15, Appendix A to Part 55), 40 C.F.R. Part 124 (§124.1–124.21, Subpart A; §124.41–124.42, Subpart C)] **Facility-Wide Emission Limits (tons)<sup>1</sup>**

|                       |     |
|-----------------------|-----|
| <b>NO<sub>x</sub></b> | 211 |
| <b>VOC</b>            | 6   |

<sup>1</sup> **Daily rolling, 365-day total.** Note that the limits apply immediately upon commencement of the Operational Phase Start Date.

- i) Beginning at the Operational Phase Start Date, each operating day, the Permittee shall calculate emissions of NO<sub>x</sub> and VOC from the emission sources defined in Specific

Condition No. VI (A)(5) using the equation below. Note that for diesel fired engines operating between 0%–20% engine load, the Permittee shall utilize guaranteed emission factors from engine manufacturer’s specifications (or engine specific test data) which indicate a representative emission factor for the lower load intervals for each engine type; or the maximum guaranteed emission factor in units of g/hp-hr (or g/kW-hr) multiplied by the engine-specific load adjustment factors based on known engine mfg. data; or for C3 propulsion engines the maximum guaranteed emission factor in units of g/hp-hr (or g/kW-hr) multiplied by the most representative low load adjustment factors (LLAFs) for the specific pollutant as contained in Table 3.10 of the Port Emissions Inventory Guidance (EPA-420-b-22-011, April 2022). The LLAFs shall be applied separately for each pollutant (and applied to the equation separately for NO<sub>x</sub> and HC (if HC used as a surrogate for VOC)).

- a. Emissions of NO<sub>x</sub> and VOC shall be calculated by taking the product of the brake specific emission factor, the usage in hours (hours per day), the power available (rated power), and the load factor (the power used divided by the power available).

For OCS sources, if actual fuel usage data and engines hours are not recorded for that operating day, Permittee shall assume 100% load (full rated hp (kW)) for the emission calculations. For transit emissions from support vessels servicing or associated with the OCS sources [or facility...], if actual fuel usage data and engines hours are not recorded for that operating day, Permittee can utilize the most representative load factors contained in the Port Emissions Inventory Guidance (EPA-420-b-22-011, April 2022) ”

$$E_{NOx} = BSEF_{NOx} \times U \times P_A \times \frac{P_U}{P_A}$$

$$E_{VOC} = BSEF_{VOC} \times U \times P_A \times \frac{P_U}{P_A}$$

Where:

**E<sub>NO<sub>x</sub></sub>** = Emissions of NO<sub>x</sub> per operating day (grams(g)/day)

**E<sub>voc</sub>** = Emissions of VOC per operating day (grams(g)/day)

**BSEF<sub>NO<sub>x</sub></sub> (or VOC)** = NO<sub>x</sub> (or VOC Brake Specific Emission Factor (g/kW-hr or g/hp-hr), specific to each engine type and shall be based on one (1) of the following:

**U** = Engine usage in hours (hours per day)

**P<sub>A</sub>** = Power Available (maximum rated brake power (hp or kW))

$$P_U = \text{Power Used (hp or kW)} = \frac{m}{BSFC}$$

$$m = \text{fuel flow rate} = \frac{(\text{volume of fuel consumed during operating day, gal})}{(\text{engine operating time during operating day, hours})}$$

**BSFC** = Brake specific fuel consumption (gal-fuel/kW-hr), value is specific for each engine and located on the issued engine specifications.

- For OCS sources, permittee shall utilize emission factors from: EPA issued Certificate of Conformity (COC) for each applicable engine containing the emission standards in 40 C.F.R. Part 60, NSPS III, Tier Marine Engine Standards at 40 C.F.R. Part 1042, or Nonroad Engine Standards at 40 C.F.R. Part 1039, engine manufacturer specifications, or site-specific testing derived factors. *Note that the engine emission standards may be presented as NO<sub>x</sub> + HC or NO<sub>x</sub> and HC separately. If the Tier level combines both NO<sub>x</sub> and either HC or THC into one emission limit, then that emission limit shall be multiplied by 0.976 for NO<sub>x</sub> and 0.024 for either HC or THC (to determine the VOC ratio of the emissions which shall be calculated as 1.053 times the HC emission factors). Manufacturers specifications that indicate specific NO<sub>x</sub>/HC ratios, or specific HC or VOC emission factors shall supersede any general assumptions presented here for purposes of the emission calculation demonstration.*
- For purposes of calculating 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, the permittee shall utilize emission factors from: an applicable Engine International Air Pollution Prevention (“EIAPP”) or International Air Pollution Prevention (“IAPP”) certificate, issued by EPA, containing associated engine Annex VI NO<sub>x</sub> standards, engine manufacturers specifications, or engine manufacturers testing data.
- For purposes of calculating 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 without a Certificate of Conformity, EIAPP certificate, or IAPP certificate, the Permittee shall utilize the most representative NO<sub>x</sub> and VOC emission factors for the vessel utilized as contained in the EPA Port Emissions Inventory Guidance (EPA-420-B-22-011, April 2022). *Note that when engine manufacturers specifications contain specific HC or VOC emission factors, they shall supersede any general assumptions presented here for purposes of the emission calculation demonstration. If the engine manufacturers’ specifications do not contain HC or VOC emission factors, Permittee shall then utilize the most representative VOC emissions factors for the vessel utilized as contained in the EPA Ports Emissions Inventory Guidance (EPA-420-B-22-011, April 2022).*

- ii) Beginning at the Operational Phase Start Date, at the end of each operating day, the Permittee shall incorporate daily emissions calculated in Section IV(A)(5)(i) into the 365-day total (in units of tons) for NO<sub>x</sub> and VOC. These emissions shall be summed for all from the emission sources defined in Section IV(A)(5) for determining compliance with the facility-wide emissions cap.

**B. Emission Unit Group (EUG) 1—OCS Generator Engine(s) on the OSS(s) and/or WTG(s):** The requirements in Section IV(B) apply to all OCS generator engines located on the OSS(s) and/or WTG(s). This includes OCS generator engines utilized in both construction and operation phases on the OSS(s) and/or WTG(s).

1. EUG 1 - OCS Generator Engine(s) on the OSS(s) and/or WTG(s) shall not exceed the emission standards ( in terms of g/kW-hr) for the highest applicable EPA Tier Marine Engine Standards (i.e., Tier 3 or 4, dependent on the final selected engine size and associated displacement) contained in 40 C.F.R. Part 1042, or the EPA Tier 4 Nonroad Engine Standards contained in 40 C.F.R. Part 1039 (dependent on the final selected engine size and associated displacement).  
[40 C.F.R. Part 60 Subpart IIII (§60.4200–60.4219, Table 1–Table 8), 40 C.F.R. Part 52.21, 310 CMR 7.00 Appendix A]
2. EUG 1 - OCS Generator Engine(s) on the OSS(s) and/or WTG(s) shall be operated in accordance with the Good Combustion and Operating Practices (“GCOP”) Plan (the “plan”) for the facility. The plan shall be incorporated into the facility standard operating procedures (“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 LAER/BACT and verification that designs were implemented in the final construction.

[40 C.F.R. Part 52.21, 310 CMR 7.00 Appendix A]

**C. EUG 2—Marine Engines on Vessels when Operating as OCS Source(s):** The following requirements in Section IV(C) apply to all Marine Engines on Vessels when operating as OCS Source(s). This includes propulsion and auxiliary generator engines utilized in the construction and operation phases of the project when operating as OCS Source(s).

1. EUG 2 - Marine Engines on Vessels when Operating as OCS Source(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 LAER/BACT and verification that designs were implemented in the final construction. [40 C.F.R. Part 52.21, 310 CMR 7.00 Appendix A]

2. The Marine Engines on the Charybdis Vessel(s) while operating as an OCS source, which is indicated to be used (but not limited to) the WTG installation activities, shall be EPA certified to the Marine Tier 3 (Category 3 Marine Engines) NO<sub>x</sub>, HC, and CO emission standards specified within 40 C.F.R. Part 1042. Note that the final NO<sub>x</sub> emission standard will depend on the specific engines and associated maximum test speed of the engine in revolutions per minute (rpm).  
[40 C.F.R. Part 60 Subpart IIII (§60.4200–60.4219, Table 1–Table 8), 40 C.F.R. Part 52.21, 310 CMR 7.00 Appendix A]
3. The Marine Engines on the Eco Edison Vessel, while operating as an OCS source, shall be EPA certified to the Marine Tier 3 (Category 3 Marine Engines) NO<sub>x</sub>, HC, and CO emission standards or Marine Tier 4 (Category 2 Marine Engines) NO<sub>x</sub>, HC, and CO emission standards specified within 40 C.F.R. Part 1042. Note that the applicable emission standards will depend on the specific engines and associated maximum test speed of the engine in rpm. Tier 4 emission standards apply to engine(s) at or above 600 kW, and Tier 3 emission standards apply to engine(s) below 600 kW.  
[40 C.F.R. Part 60 Subpart IIII (§60.4200–60.4219, Table 1–Table 8), 40 C.F.R. Part 52.21, 310 CMR 7.00 Appendix A]
4. The Marine Engines on Primary Crew Transfer Vessel, while operating as an OCS source, shall be EPA certified to the Marine Tier 3 (Category 3 Marine Engines) NO<sub>x</sub>, HC, and CO emission standards or Marine Tier 4 (Category 2 Marine Engines) NO<sub>x</sub>, HC, and CO emission standards specified within 40 C.F.R. Part 1042. Note that the applicable emission standards will depend on the specific engines and associated maximum test speed of the engine in rpm. Tier 4 emission standards apply to engine(s) at or above 600 kW, and Tier 3 emission standards apply to engine(s) below 600 kW.  
[40 C.F.R. Part 60 Subpart IIII (§60.4200–60.4219, Table 1–Table 8), 40 C.F.R. Part 52.21, 310 CMR 7.00 Appendix A]
5. Engines on vessels while operating as OCS sources that satisfy the definition of a *tugboat, towboat, push boat, crew and supply vessel, dredge, or barge* (as defined in Section III and which do not meet definition of an “*exempt vessel*” (as defined in Section III) shall be certified by the manufacturer to meet or emit less than the highest applicable EPA Tier Marine Engine Standards (i.e., Tier 3 or 4, depending on engine size) as contained within 40 C.F.R. Part 1042, except if one of the conditions in subparagraph (5)(i) or (5)(ii), below, is met, in which case the Permittee may use the next lower Tier engine (i.e., Tier 3). Similarly, if one of the conditions in Section IV(C)(5)(i) or (ii),

below, is met regarding the use of a Tier 4 engine, the Permittee may use a Tier 3 engine in lieu of a Tier 4 engine. If one of the conditions in Section IV(C)(5)(i) or (ii) is met regarding the use of a Tier 3 engine, the Permittee may use a Tier 2 engine in lieu of a Tier 3 engine. To use a lesser Tier engine, as described above, the Permittee shall ensure one of the following conditions is met:

- i. A vessel with a higher Tier engine is not available within two hours of when the vessel must be deployed; or
- ii. 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). For purposes of this subparagraph, when determining the total emissions associated with the use of a vessel with a particular engine, the Permittee shall 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.

At a minimum, all applicable engines subject to this condition shall comply with emission standards (in terms of g/kW-hr) equal to or cleaner than EPA Tier 2 marine engine emission standards contained within 40 C.F.R. Part 1042.

[40 C.F.R. Part 60 Subpart IIII (§60.4200–60.4219, Table 1–Table 8), 40 C.F.R. Part 52.21, 310 CMR 7.00 Appendix A]

6. All applicable engines on U.S.-flagged vessels when operating as OCS source(s), and otherwise not subject to Section IV(C)(2)-(5), shall be certified to the highest applicable EPA Tier Marine Engine Standards (i.e., Tier 3 or 4, depending on engine size) as contained within 40 C.F.R. Part 1042, except if one of the conditions in subparagraph (6)(i). or (6)(ii)., below, is met, in which case the Permittee may use the next lower Tier engine (i.e., Tier 3). Similarly, if one of the conditions in Section IV(C)(6)(i) or (ii), below, is met regarding the use of a Tier 4 engine, the Permittee may use a Tier 3 engine in lieu of a Tier 4 engine. If one of the conditions in Section IV(C)(6) (i) or (ii) is met regarding the use of a Tier 3 engine, the Permittee may use a Tier 2 engine in lieu of a Tier 3 engine. If one of the conditions in Section IV(C)(6) (i) or (ii) is met regarding the use of a Tier 2 engine, the Permittee may use a Tier 1 engine in lieu of a Tier 2 engine. To use a lesser Tier engine, as described above, Permittee shall ensure one of the following conditions is met:
  - i. A vessel with a higher Tier engine is not available within two hours of when the vessel must be deployed; or
  - ii. 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). For purposes of this subparagraph, when determining the total emissions associated with the use of a vessel with a particular engine, the Permittee shall 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.

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 contained within 40 C.F.R. Part 1042.

[40 C.F.R. Part 60 Subpart IIII (§60.4200–60.4219, Table 1–Table 8), 40 C.F.R. Part 52.21, 310 CMR 7.00 Appendix A]

7. All applicable engines on U.S.-flagged or foreign-flagged vessels while those vessels are operating as an OCS source within the ECA (and otherwise not subject to Section IV (C)(2)-(6), shall be certified to meet or emit less than the MARPOL Annex VI Tier III NO<sub>x</sub> emission standards (in terms of g/kW-hr), except if one of the conditions in Section IV(C)(7)(i) or (ii) below, is met, in which case the Permittee may use the next lower Tier engine (i.e., Tier II). Similarly, if one of the conditions in Section IV(C)(7)(i) or (ii), below, is met regarding the use of a Tier II engine, the Permittee may use a Tier I engine in lieu of a Tier II engine. To use a lesser Tier engine, as described above, Permittee shall ensure one of the following conditions is met:
  - i. A vessel with a higher Tier is not available within two hours of when the vessel must be deployed; or
  - ii. 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). For purposes of this subparagraph, when determining the total emissions associated with the use of a vessel with a particular engine, the Permittee shall 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.

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 MARPOL Annex VI Tier I NO<sub>x</sub> emission standards contained within 40 C.F.R. Part 1043.

[40 C.F.R. Part 1043 (§1043.1–1043.100), 40 C.F.R. Part 52.21, 310 CMR 7.00 Appendix A]

**D. EUG 3—MV and HV GIS on the OSS:** The following requirements in Section IV(D) apply to the MV and HV GISs on the OSS.

1. Permittee shall install sealed leak detection systems on the MV, and HV GIS on the OSS equipment with alarms. Compliance shall be demonstrated with a copy of the manufacturer's specifications onsite and periodic alarm testing procedures in the frequency specified within those specifications. [40 C.F.R. Part 52.21]
2. Leak detection shall be repaired within five (5) days of discover. Permittee shall document and maintain records of the equipment repaired including but not limited to the estimated time of leakage and volume of gas leaked during that time. [40 C.F.R. Part 52.21]

3. Leak rate of SF<sub>6</sub> shall not exceed 0.5% per year from the MV and HV SWGs on the OSS. The facility shall demonstrate compliance with this requirement by mass balance and account for leakage periods. [40 C.F.R. Part 52.21]
4. Permittee must maintain emissions of sulfur hexafluoride (SF<sub>6</sub>) emissions from GIS below 1.0% maximum annual leak rate. Permittee may demonstrate compliance with this requirement by complying with Section IV(D)(3) (the more stringent requirement). [310 CMR 7.72(4)(a)]
5. Permittee shall comply with any manufacturer-recommended maintenance procedures or industry best practices that have the effect of reducing leakage of SF<sub>6</sub>. Permittee may demonstrate compliance with this requirement by complying with Section IV(D)(1) and (2). [310 CMR 7.72 (4)(b)]
6. The facility will be required to comply with all annual reporting requirements, including but not limited, the number of pounds of SF<sub>6</sub> 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 (and provided below). Note that Nameplate Capacity refers to the full and proper charge of equipment rather than to the actual charge, which may reflect leakage. [310 CMR 7.72 (6)]

$$\text{User Emissions} = (\text{Decrease in SF}_6 \text{ inventory}) + (\text{Acquisitions of SF}_6) - (\text{Disbursement of SF}_6) \\ - (\text{Net Increase in Total Nameplate Capacity of Equipment Operated})$$

Where:

*Decrease in SF<sub>6</sub> Inventory* = (pounds of SF<sub>6</sub> stored in containers, but not in energized equipment, at the beginning of the year) – (pounds of SF<sub>6</sub> stored in containers, but not in energized equipment, at the end of the year).

*Acquisitions of SF<sub>6</sub>* = (pounds of SF<sub>6</sub> purchased from chemical producers or distributors in bulk) + (pounds of SF<sub>6</sub> purchased from equipment manufacturers or distributors with or inside equipment, including hermetically sealed-pressure switchgear) + (pounds of SF<sub>6</sub> returned to facility after off-site recycling).

*Disbursements of SF<sub>6</sub>* = (pounds of SF<sub>6</sub> in bulk and contained in equipment that is sold to other entities) + (pounds of SF<sub>6</sub> returned to suppliers) + (pounds of SF<sub>6</sub> sent off site for recycling) + (pounds of SF<sub>6</sub> 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).

## **SECTION V. NNSR Offsets**

A. The Permittee shall obtain a minimum of 265.86 tons per year of NO<sub>x</sub> CERCs and 6.43 tons per year of VOC CERCs prior to the beginning of the Operational Phase Start Date for CERCs shall be obtained in accordance with Section V(A)(1). The Permittee shall obtain a minimum of 253.2 tons per year of NO<sub>x</sub> CERCs and 6.12 tons per year of VOC CERCs prior to the beginning of the Operational Phase for CERCs obtained in accordance with Section V(A)(2) or (3) below.

[40 C.F.R. § 55.5(d), 310 CMR 7.00 Appendix A, 310 CMR 7.0 Appendix B]

1. Rate-based emission reduction credits certified under the Massachusetts trading bank regulations codified at 310 CMR 7.00, Appendix B.
2. The Permittee may enter into a third-party agreement that requires the third-party to create CERCs. Such an agreement must be federally enforceable prior to the Permittee using said CERCs.
3. 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. CERCs based on a facility shutdown are required to be memorialized in a document from the Commonwealth of Massachusetts to ensure the CERCs from such a shutdown are fully in compliance with the CAA and have not been relied on by Massachusetts to meet other CAA requirements.
4. The Permittee shall demonstrate that any NO<sub>x</sub> and VOC CERCs used for compliance are surplus, quantifiable, enforceable, and permanent. The Permittee shall submit the demonstration to the EPA prior to the Operational Phase Start Date. The demonstration shall include, at a minimum: 1) the source where the CERCs were generated; 2) the time used to determine the CERCs; and 3) whether the CERCs have been adjusted to consider the CAA and the Commonwealth's requirements in effect as of October 7, 2022 (the date RW's application was deemed complete).

## **SECTION VI. Operating Requirements and Work Practice Standards**

A. EUG 1—OCS Generator Engine(s) on the OSS(s) and/or WTG(s) and EUG 2—Marine Engines on Vessels when Operating as OCS Source(s)

The Permittee must install, operate, and maintain all engines to achieve the emissions standards at 40 C.F.R. § 60.4204(b) over the entire life of the engine.

[40 C.F.R. §60.4206]

1. The Permittee shall install and operate all engines that are certified by the manufacturer to meet or surpass the emission standards in 40 C.F.R. § 60.4204(b) or § 60.4205(b) as specified in this permit. [40 C.F.R. § 60.4211(c)]
2. The Permittee shall meet the following requirements:
  - i. The Permittee shall install, operate, and maintain all engines and control devices according to the manufacturer's emission-related written instructions; [40 C.F.R. § 60.4211(a)(1)]
  - ii. The Permittee shall only change emission-related settings on the engines that are permitted by the manufacturer. [40 C.F.R. § 60.4211(a)(2)]
  - iii. The Permittee shall install and operate the engines configured according to the manufacturer's emission-related specifications; [40 C.F.R. § 60.4211(c)]
3. The Permittee shall comply with all applicable requirements of 40 C.F.R. Part 60 Subpart IIII, New Source Performance Standards for Stationary Compression Ignition Internal Combustion Engines (CI ICE), including but not limited to, the following. [40 C.F.R. Part 60 Subpart IIII (§§60.4200–60.4219, Table 1–Table 8)]
4. The Permittee shall comply with all applicable requirements of 40 C.F.R. 63 Subpart ZZZZ, National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (CI ICE), including but not limited to, the following. [40 C.F.R. Part 63 Subpart ZZZZ (§§63.6580–63.6675, Table 1–Table 8, Appendix A to Subpart ZZZZ)]

## **SECTION VII. Testing Requirements**

- A. The Permittee shall, upon request by the EPA, conduct emission test(s), including visible emissions, of any operating emission unit subject to an emission limit in Section IV of this permit, including any engine on any vessel while that vessel is an OCS source. The Permittee shall perform the tests using the procedures and reference in 40 C.F.R. part 60, Appendix A, as applicable. [40 C.F.R. Part 52.21]
- B. For each engine operating on the Main WTG Installation Vessel, the Permittee shall conduct a visible emission test for 30 consecutive minutes using the EPA test method 22 when the vessel is operating as an OCS source, once per operating day. If during the method 22 test visible emissions are observed for more than 3 consecutive minutes, within 14 calendar days the Permittee shall conduct a visible emission test using the EPA method 9. An operating day is defined as any calendar day in which the vessel operated as an OCS source. All visible emission tests for this specific permit condition shall be conducted in accordance with the EPA test requirements specified in 40 C.F.R. part 60, appendix A, methods 9 and 22. [40 C.F.R. Part 52.21]

## **SECTION VIII. Recordkeeping Requirements**

- A. The Permittee shall keep records of all required information necessary to submit annual Source Registration / Emissions Statements to the Massachusetts Department of Environmental Protection (MassDEP) as required by Section IX.(I) of this permit. [310 CMR 7.12]
- B. The Permittee shall maintain records as listed below. These records should be retained for a period of at least five years from the date of recording, inspection, testing, or repair, and shall be made available to regulatory representatives upon request. The records shall be maintained during pre-construction, construction, and operation activities.  
[40 C.F.R. Part 55 (§55.1–55.15, Appendix A to Part 55), 40 C.F.R. Part 52.21, 310 CMR 7.00 Appendix A]
1. Per Section IV(A)(3) and (4), for all engines operating on OCS sources (including engines on vessels meeting the definition of an OCS source), the Permittee shall keep the following records:
    - i. the name of the vessel and/or engine;
    - ii. the daily fuel consumption of ECA Marine Fuel or ULSD for each vessel and/or engine (i.e., starting and ending fuel volume per each operating day taking into consideration any refueling) This record is only required if the applicant is using fuel use as a surrogate to power used for purposes of documenting actual engine load when operating).
    - iii. the name of the fuel supplier; Permittee shall keep records for each supplier (if multiple refueling operations with different suppliers are utilized);
    - iv. the sulfur content of the fuel;
    - v. the method used to determine the sulfur content of the fuel (compliance may be shown by supplier's receipt at refueling indicating % sulfur content); and
    - vi. the location of the fuel when the sample was drawn for analysis to determine the sulfur content of the fuel; specifically including whether the fuel was sampled as delivered to the emission sources at the RW facility or whether the sample was drawn from fuel in storage at the fuel supplier's or fuel refiner's facility or another location. If the fuel was not sampled as delivered, a statement that the sampling was performed according to either the single tank composite sampling procedure or the all-levels sampling procedure in ASTM D4057-88, "Standard Practice for Manual Sampling of Petroleum and Petroleum Products" and that no additions have been made to the supplier's tank since sampling.
  2. Records of the construction start date and operational phase start date.
  3. Per Section IV(A)(5)(i), records of the NO<sub>x</sub> and VOC emissions each operating day.
  4. Per Section IV(A)(5)(ii), records of the daily rolling, 365-day total of NO<sub>x</sub> and VOC emissions.
  5. Records of the date and time (rounded to the nearest hour) that any equipment, activity, or vessel is considered an OCS source, and associated date and time (rounded to the nearest hour) that any equipment, activity, or vessel ceases to be an OCS source.

6. Records documenting the make, model, maximum rated horsepower, engine displacement (L/cylinder), and manufacturing date of: engine(s) located on the OSS and WTG(s), all engines on vessels that meet the definition of an OCS source, and all engines on vessels servicing or associated with the OCS facility when those vessels are at the OCS facility, or en route to or from the OCS facility and are within 25 NM of the OCS facility's centroid. This includes domestic and/or foreign-flagged vessels. The records should be maintained during pre-construction, construction, and operation activities.
7. Per Section IV(B)(1), records of the EPA-issued certificates of conformity ("COC") or manufacturer's certifications which demonstrate which tier standard each applicable OCS Generator Engine(s) on the OSS(s) and/or WTG(s) has been certified to meet. Permittee should include a list of the design choices determined to be LAER/BACT and verification that designs were implemented in the final construction and operation.
8. Per Section IV(B)(2) and Section IV(C)(1), a copy of the GCOP Plan for the facility.
9. Per Section IV(C)(2), records of the EPA-issued COC for the Charybdis Vessel. Permittee should include verification that the designs proposed in the preconstruction permit application were implemented in the final construction and operation.
10. Per Section IV(C)(5), records of the EPA-issued COC for engines on vessels while operating as OCS sources 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.*" Permittee shall include verification that Section IV(C)(5) requirements for LAER and BACT were implemented in the final construction and operation of the project, including any supplemental documentation for a lower tier vessel (no lower than Tier II) being used per Section IV(C)(5)(i) or (ii).
11. Per Section IV(C)(6), records of the EPA-issued COC for applicable engines on U.S.-flagged vessels when operating as OCS source(s), and otherwise not subject to Section IV(C)(2)-(5). Permittee shall include verification that Section IV(C)(6) requirements for LAER and BACT were implemented in the final construction and operation of the project, including any supplemental documentation for a lower tier vessel (no lower than Tier I) being used per Section IV(C)(6)(i) or (ii).
12. Per Section IV(C)(7), records of the EIAPP certificate, issued by EPA, to document that the engine meets Annex VI NO<sub>x</sub> standards for each regulated diesel engine in U.S.-flagged vessels when operating as OCS source(s) within the ECA, and otherwise not subject to Section IV(C)(2)-(6). Ship operators must also maintain records on board regarding their compliance with the emission standards, fuels requirements, and other provisions of Annex VI. Permittee shall include verification that Section IV(C)(7) requirements for LAER and BACT were implemented in the final construction and operation of the project, including any supplemental documentation for a lower tier vessel (no lower than Tier I) being used per Section IV(C)(7)(i) or (ii).
13. Per Section IV(C)(7), records of the IAPP certificate to document that the engine meets Annex VI NO<sub>x</sub> standards for each regulated diesel engine in foreign-flagged vessels when operating as OCS source(s) within the ECA, and otherwise not subject to Section IV(C)(2)-(6). Ship operators must also maintain records on board regarding their compliance with the emission standards, fuels requirements, and other provisions of Annex VI. Permittee shall include verification that Section IV(C)(7)



- requirements for LAER and BACT were implemented in the final construction and operation of the project, including any supplemental documentation for a lower tier vessel (no lower than Tier I) being used per Section IV(C)(7)(i) or (ii).
14. Per Section IV(D)(1)–(5), records that the requirements for LAER and BACT were implemented in the final construction and operation of the project.
  15. Per Section IV(D)(6), records of  $SF_6$  user emissions (including the *Decrease in  $SF_6$  Inventory, Acquisitions of  $SF_6$ , Disbursements of  $SF_6$ , and Net Increase in Total Nameplate Capacity of Equipment Operated*).
  16. Records as required by NSPS III and NESHAP ZZZZ.

## SECTION IX. Reporting Requirements

- A. The Permittee shall notify the EPA, in writing, at least 30 days, but no more than 90 days, prior to locating the first OCS source within the WDA.  
  
[40 C.F.R. Part 55 (§ 55.1–55.15, Appendix A to Part 55), 40 C.F.R. Part 52.21, 310 CMR 7.00 Appendix A]
- B. The Permittee shall notify the EPA, in writing, at least 30 days prior to installing and/or operating an engine on each WTG and ESP. The notification shall include, for each engine, the make, model, maximum rated power output, engine displacement, and manufacturing date.  
  
[40 C.F.R. Part 55 (§ 55.1–55.15, Appendix A to Part 55), 40 C.F.R. Part 52.21, 310 CMR 7.00 Appendix A]
- C. The Permittee shall provide written notification to the EPA at least 7 days prior to the first WTG entering first power.
- D. The Permittee shall provide written notification to the EPA when the construction phase ends before the last WTG produces commercial power.
- E. When requested by the EPA, the Permittee shall furnish any information required by law which is needed to determine compliance with the permit. If the Permittee becomes aware that relevant facts were not submitted or were incorrect in the permit application or in any report to the EPA, the Permittee shall, upon becoming aware of such facts or corrected information, promptly submit to the EPA such facts or corrected information.  
  
[40 C.F.R. Part 55 (§ 55.1–55.15, Appendix A to Part 55), 40 C.F.R. Part 52.21, 310 CMR 7.00 Appendix A]
- F. The Permittee shall furnish to the EPA, within a reasonable time, any information that the EPA may request in writing to determine whether cause exists for modifying, revoking, reissuing, or terminating the permit, or to determine compliance with the permit. Upon request, the Permittee shall also furnish to the EPA copies of records that are required to be

maintained by this permit, including information claimed to be confidential. Information claimed to be confidential must be accompanied by a claim of confidentiality according to the provisions of 40 C.F.R. Part 2, Subpart B.

[40 C.F.R. Part 55 (§ 55.1–55.15, Appendix A to Part 55), 40 C.F.R. Part 52.21, 310 CMR 7.00 Appendix A]

- G. The Permittee shall comply with all applicable requirements of 40 C.F.R. 60 Subpart IIII, New Source Performance Standards for Stationary Compression Ignition Internal Combustion Engines (CI ICEs), including but not limited to, the following.  
[40 C.F.R. Part 60 Subpart IIII (§§ 60.4200–60.4219, Table 1–Table 8)]
- H. The Permittee shall comply with all applicable requirements of 40 C.F.R. Part 63 Subpart ZZZZ, National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines (RICES), including but not limited to, the following.  
[40 C.F.R. Part 63 Subpart ZZZZ (§§ 63.6580–63.6675, Table 1–Table 8, Appendix A to Subpart ZZZZ)]
- I. In accordance with 310 CMR 7.12, the Permittee shall report annually to the MassDEP, all information as required by the Source Registration/Emission Statement Form. The Responsible Official for the Permittee shall sign and submit a Source Registration to the MassDEP every year by May 1. The Permittee shall note therein any minor changes (under 310 CMR 7.02(2)(e), 7.03, 7.26, etc.), which did not require Plan Approval.  
[310 CMR 7.12]

## **SECTION X. General Conditions**

- A. Pursuant to 310 C.M.R. 7.01(3) and 7.02(3)(f) and 40 C.F.R. 55.6(a)(4), the Permittee shall comply with all conditions contained in this permit. Should there be any differences between provisions contained in the General Conditions of this permit and any provisions contained elsewhere in this permit, the latter shall govern. [310 CMR 7.01(3)(f), 40 C.F.R. 55.6(a)(4)]
- B. The ability to construct an OCS source under this permit shall become invalid if construction is not commenced within 18 months after the effective date of this Permit (OCS-R1-05). If construction is discontinued for a period of 18 months or more, or if construction is not completed within a reasonable time, the 18-month period may be extended upon a showing satisfactory to the EPA or the delegated agency that an extension is justified. Sources obtaining extensions are subject to all new or interim requirements and a reassessment of the applicable control technology when the extension is granted. This requirement shall not supersede a more stringent requirement under 40 C.F.R. §§ 55.13 or 55.14.  
[40 C.F.R. § 55.6(b)(4), 40 C.F.R. § 52.21(r)(2)]
- C. This permit may be suspended, modified, or revoked by the EPA if the EPA determines that any condition or part of this permit is being violated.

- D. The Permittee shall notify all other owners and operators, contractors, and the subsequent owners and operators associated with emissions from the permitted activities of the conditions of the permit. [40 C.F.R. § 55.6(a)(4)(iv)]
- E. OCS sources shall comply with all requirements of 40 C.F.R. Part 55 and all permits issued pursuant to 40 C.F.R. Part 55. Failure to do so shall be considered a violation of section 111(e) of the CAA. All enforcement provisions of the CAA, including, but not limited to, the provisions of sections 113, 114, 120, 303, and 304 of the CAA shall apply to the permitted activities. [40 C.F.R. § 55.9(a) and (b)]
- F. If the Permittee is ordered to cease operation of any piece of equipment due to enforcement action taken by EPA, the shutdown will be coordinated by the EPA with the Department of Interior's *Bureau of Ocean Energy Management (BOEM)*, Bureau of Safety and Environmental Enforcement (BSEE), and the United States Coast Guard, to assure that the shutdown will proceed in a safe manner. No shutdown action will occur until after the EPA's consultation with these entities, but in no case will initiation of the shutdown be delayed by more than 24 hours. [40 C.F.R. §§ 55.9(c)]
- G. If requested in writing by the EPA, the Permittee shall have up to 30 days to submit to the EPA, an Emission Reduction Plan that meets the requirements of 310 CMR 8.08. [310 CMR 8.08(1) – (6)]
- H. The Permittee shall construct all equipment regulated herein in compliance with all other applicable provisions of federal and state air regulations. [40 C.F.R. § 55.6(a)(4)(iii)]
- I. In the case of a safety issue, engine failure, or a storm at sea that requires a vessel to attach temporarily to the seabed, the vessel will not be considered an OCS source because of that attachment.

## **SECTION XI. Right of Entry**

- A. The Permittee shall allow all authorized representatives of EPA, upon presentation of credentials, to enter upon or through any OCS source permitted by this permit and to enter upon or through any location where records required under this permit are maintained. The Permittee shall allow such authorized representatives, at reasonable times:
- [Section 114 of the Clean Air Act, 42 U.S.C. § 7414; 40 C.F.R. §§ 55.8(a)-(b)]
1. to access and copy any records that must be maintained under this permit;
  2. to inspect any OCS source, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under this permit; and
  3. to monitor substances or parameters and sample emissions for purposes of assuring compliance with this permit.

## **SECTION XII. Transfer of Ownership**

- A. In the event of any changes in control or ownership of the Project, this permit shall be binding on all subsequent owners and operators. The Permittee shall notify the succeeding owner and operator of the existence of this permit and its conditions before such change, if possible, but in no case later than 14 days after such change. Notification shall be sent by letter with a copy forwarded within five (5) days to the EPA.

## **SECTION XIII. Severability**

- A. For the purpose of establishing whether the Permittee has violated or is in violation of any provision of this permit, the methods used in this permit shall be used, as applicable. However, nothing in this permit shall preclude the use, including the exclusive use, of any credible evidence or information, relevant to whether the Permittee would have been in compliance with applicable requirements if the appropriate performance or compliance test procedures or methods had been performed.

## **SECTION XIV. Permit Fees**

- A. The Permittee shall submit the permit application fee of \$24,305 for a major comprehensive plan approval for the OCS permit. [40 C.F.R. § 55.10(1)– (3), 310 CMR 4.10(2)(c)(4)]
- B. The Permittee shall submit the application fees to the EPA within 60 days from receipt of written notice by the EPA of the fee amount due.
- C. The Permittee shall submit all fee-related payments and supporting documentation to the following address:
- U.S. EPA  
Fees and Collections Branch  
1300 Pennsylvania Ave NW  
Mail Code 2733R  
Washington, DC 20004
- D. When submitting the payment, the Permittee shall include a cover letter containing the following supporting documentation with the payment:

Permittee's name  
Permittee Address (including City, State, Zip-Code)  
Permittee Contact Name and Phone Number  
EPA Permit Number: OCS-R1-05  
EPA Contact: Patrick Bird, Manager, Air Permits, Toxics, and Indoor Programs  
Branch

Revolution Wind, LLC  
Outer Continental Shelf Preconstruction Air Permit No. OCS-R1-05

Reason for payment: "Miscellaneous Receipts Payment for OCS Air Permit Fee under 40 C.F.R. Part 55"

If applicable, all emissions information used to calculate the fee.

- E. Permittee shall send a photocopy of each fee payment check (or other confirmation of actual fee paid) and a copy of the supporting documentation for the application fee to:

Manager, Air Permits, Toxics, and Indoor Programs Branch  
Air and Radiation Division  
U.S. EPA Region 1  
5 Post Office Square, 5-MO  
Boston, MA 02109-3912

- F. Agency Address

Subject to change, except for prompt reporting of permit deviations and fee payments, all correspondence required by this permit including, but not limited to, all records, reports, or other information requested by EPA shall be forwarded to the following address below

Director, Enforcement and Compliance Assurance Division  
U.S. EPA Region I  
5 Post Office Square, Suite 100  
Mail Code 4-WO  
Boston, MA 02109-3912  
Attn: Air Compliance Clerk

Alternatively, the Permittee may submit reports electronically upon written notification by EPA of an approved electronic reporting procedure.

- G. Prompt reporting of permit deviations shall be sent electronically to the Air Compliance Clerk, Sandra Schwarz via email at [schwartz.sandra@epa.gov](mailto:schwartz.sandra@epa.gov).