To: Andre Turner, Lead Permit Writer for the SouthCoast Wind Energy OCS PSD Permit

From: Jay McAlpine, Acting Region 1 Permit Modeler

Subject: Record of EPA design value calculations for the SouthCoast Wind Energy OCS PSD permit.

Date: August 22, 2024

This memo was developed to provide a record of EPA Region 1 (EPA) evaluation of the Outer Continental Shelf (OCS) PSD Air Permit Application for the SouthCoast Wind Energy LLC (*the applicant*) project. The fact-sheet developed to support the EPA permit decisions summarizes design values based on modeling submitted by the applicant. In some cases, the design values calculated by the EPA differ from those reported in the permit application modeling report. This memo provides an explanation of why and how the EPA's calculated design values vary from those provided in the applicant's modeling report. Please note, the EPA confirmed modeling results demonstrate the project will not cause or contribute to violation of a NAAQS or PSD increment, in all cases.

The modeling approach used for this project relied on a conservative and sophisticated set of screening analyses. The approach was used to simplify the modeling since project emissions will be highly variable and transient. Highly refined modeling would require the input of a large number of hourly-varying sources to simulate the movement of each emission source during construction and operations phases of the project, since AERMOD is configured to model stationary and not mobile sources.

In the modeling protocol development process, the applicant developed a highly conservative screening technique. It was agreed upon that refined modeling would be necessary in the case the simplified conservative screening techniques could not show compliance with NAAQS or PSD increments. Given the complexity of the screening techniques, some details of the approach were not pre-determined during the modeling protocol process. All of the necessary modeling scenarios were conducted and submitted, but calculation of final design values depended on selection of precise values from the modeling outputs. The EPA's calculations differ in a few circumstances because the EPA opted to select more conservative values to determine final design concentrations to compare to the standards.

A list of the cases where EPA computed different design concentrations than those provided in the modeling report are described below.

Construction Phase SIL analysis

For the construction phase significant impact analysis, all values reported in the application (Table 5-1 of the modeling report) were found to be correct and correspond to respective modeling files. The EPA used a value of 0.13 $\mu g/m^3$ as the annual $PM_{2.5}$ SIL (vs. 0.2 $\mu g/m^3$), applying the updated value released

in EPA guidance on April 30, 2024[1]. The annual $PM_{2.5}$ modeling already resulted in an exceedance of the original SIL, such that a cumulative analysis was required in any case.

Operations Phase SIL analysis

For the operations and maintenance (O&M) phase significant impact analysis, all values reported in the application (Table 5-2 of the modeling report) were found to be correct and correspond to respective modeling files also. The EPA used a value of 0.13 µg/m^3 as the annual $PM_{2.5}$ SIL, applying the updated value released in EPA guidance on April 30, 2024[2]. The maximum annual $PM_{2.5}$ modeled concentration was found to be 0.085 µg/m^3, below the revised SIL of 0.13 µg/m^3, demonstrating the project would not cause or contribute to a violation of the annual $PM_{2.5}$ standard.

Construction phase cumulative analyses for NAAQS and PSD increment

For the construction phase cumulative NAAQS assessment, several of the design values calculated by the EPA varied from those reported in the permit application modeling report. These cases are discussed below:

- 24-hour $PM_{2.5}$ NAAQS:
    - The application provided a design concentration of 22 µg/m^3, while the EPA calculated a more conservative value of 24.8 µg/m^3. In both cases, the results demonstrate the project will not cause or contribute to a violation of the 24-hour $PM_{2.5}$ NAAQS.
    - The applicant calculated the design value assuming maximum first-year construction impacts of 8.3 µg/m^3, second-year maximum impacts of 8.9 µg/m^3, and an impact of 0.0 µg/m^3 for the third year (since construction will only last two years, and the design value is based on a 3-year average).
    - The refined approach of assuming no construction impact for a third year was approved by the EPA in the modeling protocol, based on the applicant's plan that construction at any WTG/OSP node and surrounding nodes will be completed within two years. The EPA determined that a worst-case O&M concentration should have been used for a third year instead of the impact of 0.0 µg/m^3 used by the applicant.
    - However, the EPA found compliance could be shown using a more conservative, less refined approach, ignoring the two-year construction schedule. The EPA calculated a design concentration using a three-year average of maximum construction impacts, as shown in Table 1 below. Emissions scenario 2, with contribution from an adjacent emissions scenario 3 at a nearby node, resulted in the maximum design concentration:

[1] https://www.epa.gov/system/files/documents/2024-04/supplement-to-the-guidance-on-significant-impact-levels-for-ozone-and-fine-particles-in-the-psd-permitting-program-4-30-2024.pdf
[2] https://www.epa.gov/system/files/documents/2024-04/supplement-to-the-guidance-on-significant-impact-levels-for-ozone-and-fine-particles-in-the-psd-permitting-program-4-30-2024.pdf

Table 1: EPA calculation of 24-hr $PM_{2.5}$ construction phase design value

Model year	98th percentile (8th high) (µg/m³)	Max. contribution from adjacent scenario (1st high) (µg/m³)	Secondarily formed $PM_{2.5}$ (µg/m³)	Total	Background (µg/m³)	3-yr. avg. design conc. (µg/m³)
2018	4.4	4.8	0.033	9.2	16.2	24.8
2019	3.4	4.6	0.033	8.0		
2020	4.4	4.3	0.033	8.7		

- 1-hour NO_2 NAAQS:
  - The application provided a design concentration of 183.1 µg/m³, while the EPA calculated a more conservative value of 186.3 µg/m³. In both cases, the result demonstrated the project will not cause or contribute to a violation of the 24-hour $PM_{2.5}$ NAAQS.
  - The applicant calculated the design value assuming max. first year construction impacts of 272.9 µg/m³, second-year maximum impacts of 248.1 µg/m³, and an impact of 28.2 µg/m³ for the third year, based on the highest background concentration (since construction will only last two years, and the design value is based on a 3-year average).
  - The refined approach of assuming no construction impact for a third year was approved by the EPA in the modeling protocol, but the EPA determined that a worst-case O&M concentration should have been used for a third year instead of a background value.
  - The EPA calculated a design concentration using a three-year average of maximum construction impacts, as shown in Table 2 below. The maximum three-year average at a receptor was selected as the representative value for each year of construction. The approach relies on the assumption that foundation installation (highest emitting activities) will occur the first year of construction only. Impacts selected for the third year are based on a maximum impact from the O&M phase of the project.

Table 2: EPA calculation of 1-hr NO_2 construction phase design value

Model year	98th percentile (8th high) max. daily 1-hr concentration[1] (µg/m³)			3-year average to form representative scenario year (µg/m³)	Emission scenario	3-year average design concentration (µg/m³)
	2018	2019	2020			
Year 1	257.7	283.7	277.4	272.9	Scen. 2	186.3
Year 2	255.0	253.0	236.2	248.1	Scen. 3	
Year 3	37.5	38.4	37.8	37.9	Scen. 12	

[1] Background conc. and adjacent node contribution directly modeled in the AERMOD domain

  - The screening approach relies on the assumption that the maximum emissions scenario (Scenario 2A: foundation installation, pin pile, with hammer/bubble curtain and no adjacent vessels operating) must only occur at a single WTG/OSP location in the first calendar year of construction. The foundation installation scenario cannot occur at any

single WTG/OSP node point across two calendar years for these modeling assumptions to qualify.

- Annual $PM_{2.5}$ PSD increment:
  - The application provided a design concentration of 0.68 µg/m^3, while the EPA calculated a more conservative value of 0.80 µg/m^3. In both cases, the result demonstrated the project will not cause or contribute to a violation of the annual $PM_{2.5}$ PSD increment (4 µg/m^3).
  - The EPA remodeled Scenarios 14 and 15 (both with Scenario 4, 5, and 16 in the same vicinity) to confirm the annual PM2.5 design concentration.
  - The maximum scenario modeled was a WTG node configuration with contributions from an adjacent OSP node. The contribution from the adjacent node was multiplied by eight to account for each direction a possible adjacent node could exist. This highly conservative approach results in a design concentration that demonstrates the project will not cause or contribute to an annual $PM_{2.5}$ PSD increment violation.
  - The EPA calculation is shown below in Table 3:

Table 1: EPA calculation of 24-hr $PM_{2.5}$ construction phase design value

Model year	Max. annual (µg/m^3)	Max. contribution from adjacent sources (µg/m^3)	Secondary component (µg/m^3)	Total (µg/m^3)	Design value (µg/m^3)
2018	0.476	0.22	0.006	0.70	0.80
2019	0.372	0.17	0.006	0.55	
2020	0.547	0.25	0.006	0.80	

Operations and maintenance phase cumulative analyses for NAAQS and PSD increment

For the O&M phase cumulative NAAQS assessment, several of the design values calculated by the EPA varied from those reported in the permit application modeling report. These cases are discussed below:

- 1-hour NO2 NAAQS:
  - The applicant derived a design concentration of 36.85 µg/m^3 using a 3-year average nearby node contribution. The EPA calculated a design concentration of 37.9 µg/m^3 using the maximum nearby node contribution per year. Both approaches showed compliance with the 1-hour NO2 NAAQS.
- 24-hr PM10 NAAQS:
  - The applicant derived a design concentration of 36.6 µg/m^3 using a maximum contribution from adjacent node activity of 1.4 µg/m^3, based on the high 2nd high concentration contributed. The EPA preferred the maximum contribution from adjacent node activity be based on the high 1st high concentration per year for the screening process; the maximum contribution of 1.9 µg/m^3 was selected for the EPA-calculated design concentration of 37.1 µg/m3.
- 1-hr and 3-hr SO_2 NAAQS:

- The applicant derived a 1-hour average design concentration of 174.2 µg/m^3 using a maximum contribution from adjacent node activity of 16.5 µg/m^3, based on the high 4th high concentration contributed. The EPA preferred the maximum contribution from adjacent node activity be based on the high 1st high concentration for the screening process; The EPA calculated a design concentration of 179 µg/m3.
- The same issue was apparent for the 3-hour average design concentration, where the applicant used a high second-high concentration for contribution from an adjacent node rather than the EPA-preferred maximum concentration for contribution. The EPA found a 3-hour SO2 design concentration of 179 µg/m^3 versus the applicant's 174 µg/m^3. Both approaches demonstrated compliance with the NAAQS.