



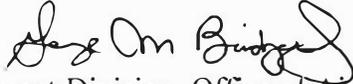
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

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OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Model Clearinghouse review of an alternative model application of AERCOARE in conjunction with AERMOD for the proposed Sea Port Oil Terminal (SPOT) Terminal Services LLC's Deepwater Port Project

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INTRODUCTION

The Sea Port Oil Terminal (SPOT) Terminal Services, LLC, a subsidiary of Enterprise Products Partners L.P., is proposing to construct a deepwater port (DWP) in the Gulf of Mexico to provide the United States with crude oil loading services on very large crude carriers and other crude oil carriers for export to the global market. The "SPOT DWP" project will consist of: (1) crude oil export pipelines; (2) a platform, including the crude oil loading pipelines and vapor recovery pipelines with associated pipeline end manifolds, and the vapor combustion units; (3) single point mooring buoys and interconnections; (4) service vessel moorings; and (5) anchorage areas and navigation. The proposed facility requires a Prevention of Significant Deterioration (PSD) construction permit.

SPOT Terminal Services has requested the use of the Coupled Ocean-Atmosphere Response Experiment (COARE) bulk flux algorithm, as implemented in the AERCOARE meteorological data preprocessor program to prepare meteorological data for use in the American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD) dispersion program in order to assess ambient impacts in a marine environment. The coupling of AERCOARE with AERMOD is considered an alternative model application requiring Regional Office approval with Model Clearinghouse concurrence per Section 3.2 of the *Guideline on Air Quality Models* (Appendix W to 40 CFR Part 51). For the SPOT DWP project, the preferred nearfield dispersion model would normally be the Offshore and Coastal Dispersion (OCD) model given its offshore location and potential for onshore impacts over coastal regions.

Additionally, AERMET is the preferred meteorological preprocessor for AERMOD, but is limited to overland applications. So, the use of AERCOARE for marine environments in lieu of AERMET must be considered as a part of the alternative model review and approval.

BACKGROUND

On October 1, 2019, SPOT Terminal Services submitted an alternative model justification package to EPA Region 6 requesting approval of a coupled AERCOARE-AERMOD approach for the compliance demonstration analysis required in the SPOT DWP project PSD application.¹ The alternative model justification included seven technical reasons, options, and/or features available in the alternative model over those of the preferred model that were necessary to adequately demonstrate compliance in their PSD application. Following the presumption that these seven technical reasons justified that the preferred OCD model was not appropriate for the SPOT DWP application, SPOT Terminal Services then provided detailed justification and/or explanation following the five required elements of Condition 3 (Appendix W, Section 3.2.2(e)) for alternative model justification and approval. The justification of these five elements is consistent with the previous May 2011, EPA Region 10 alternative model concurrence and approval for the use of AERMOD-COARE in an Arctic marine ice-free environment.²

Subsequent to the alternative model justification package submittal, EPA Region 6 conducted a thorough technical review of the SPOT Terminal Services request.³ The Regional Office review found the proposed application of the alternative model for SPOT DWP to be satisfactory under the requirements of Appendix W, Section 3.2.2(e) and also consistent with the previous Region 10 approval. EPA Region 6 intends to approve the use of the coupled AERCOARE-AERMOD approach as an alternative model to conduct the compliance demonstration analysis for the SPOT DWP project permit application and is seeking concurrence for this alternative model approval from the Model Clearinghouse consistent with the requirements of Appendix W Section 3.2.2(a).

MODEL CLEARINGHOUSE REVIEW

SPOT Terminal Services and EPA Region 6 provide a compelling justification and review for the use of a coupled AERCOARE-AERMOD approach as an alternative model to conduct the compliance demonstration analysis for the SPOT DWP project permit application. In the alternative model justification, SPOT Terminal Services provides a series of technical reasons that the OCD model is not adequate and that the coupled AERCOARE-AERMOD approach is more appropriate. Of the seven technical reasons provided, EPA Region 6 highlights the five

¹ The SPOT Terminal Services alternative model justification package is provided as reference material in the Model Clearinghouse Information Storage and Retrieval System (MCHISRS) record for this alternative model concurrence: <https://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=19-VI-01>.

² Reference the following MCHISRS record for more information on the May 2011, EPA Region 10 alternative model concurrence: <https://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=11-X-01>.

³ The EPA Region 6 technical review document is also provided as reference material in the MCHISRS record for this alternative model concurrence: <https://cfpub.epa.gov/oarweb/MCHISRS/index.cfm?fuseaction=main.resultdetails&recnum=19-VI-01>.

reasons that are most relevant and specific to the SPOT DWP project permit application as summarized in this passage from the EPA Region 6 technical review document,

“The following limitations are of particular importance to the SPOT DWP project: (1) OCD does not provide for the multi-tiered screening approach for NO₂ modeling (specifically the Tier 2 or Tier 3 screening approaches); (2) OCD does not contain options to generate outputs in the statistical forms consistent with current NAAQS; (3) OCD does not account for calm wind conditions when calculating predicted pollutant concentrations ; (4) OCD cannot be used to model volume sources; and (5) OCD does not account for current advancements in dispersion theory.”

While these technical reasons provide a justifiable basis for seeking the alternative model approach for the SPOT DWP project, there are still a couple of key dispersion formulation features of the preferred OCD model that are not provided through any application of the AERMOD Modeling System at the current time. Specifically, the AERMOD Modeling System does not account for platform downwash or shoreline fumigation. EPA Region 6 addresses both of these model formulation limitations of the AERMOD Modeling System with an adequate justification that these dispersion formulation features of OCD are not important or of significant concern for the SPOT DWP project. Here is the relevant passage from the EPA Region 6 technical review document,

“In addition, the key features of OCD not provided in AERCOARE/AERMOD are either not applicable to the SPOT DWP project, or AERCOARE/AERMOD provides a more appropriate and conservative approach. Based on the proposed location of the SPOT DWP being approximately 50 km off shore and the fact that the controlling concentrations will occur close to the facility at overwater receptors, OCD’s feature regarding shoreline fumigation is not of concern. Additionally, the shoreline distance from the proposed facility of 50 km occurs at the upper distance limit of a near-field model, such as OCD. Therefore, the applicant has stated that the use of the OCD model to accurately simulate conditions at the shoreline is questionable. Regarding downwash features, while OCD accounts for platform downwash, SPOT Terminal Services’ proposed use of AERCOARE/AERMOD as an alternative model will utilize the PRIME downwash algorithm, which will provide conservative results by treating the proposed platform structure as a solid structure that extends downward to the sea surface. In addition, the PRIME downwash algorithm allows for the more appropriate treatment of downwash from other solid portions of the platform that cannot be accounted for in OCD.”

From here, SPOT Terminal Services follows a Condition 3 pathway for alternative model justification per Appendix W, Section 3.2.2(e) in their alternative model justification package. As noted in the Background Section of this concurrence memorandum, this approach parallels and is consistent with the previous May 2011, EPA Region 10 alternative model concurrence and approval for the use of AERMOD-COARE in an Arctic marine ice-free environment. EPA Region 6 performed a thorough review of each of the five elements of the Condition 3 alternative model justification. For brevity, the Model Clearinghouse will refrain from individually citing each of these five elements and the respective SPOT DWT project justification and will direct

the reader to the Regulatory Analysis and Background subsection of the EPA Region 6 technical review document.

The Model Clearinghouse will, however, highlight one noteworthy aspect of the SPOT Terminal Services alternative model justification package. One of the tracer studies used to justify the application of the COARE algorithm for the previous EPA Region 10 alternative model concurrence and approval was from Cameron, Louisiana. This location is within 300 km of the SPOT DWT project location and is absolutely representative of the marine environment surrounding the project. As stated by EPA Region 6 in their review,

“Like in the Region 10 approval, EPA Region 6 finds that the databases associated with these three experiments are representative of the atmospheric conditions in the Gulf of Mexico. In fact, we find that the availability of the Cameron, Louisiana tracer experiment dataset, in particular, is even more representative of the atmospheric conditions occurring in the Gulf where the SPOT DWP is proposed to be located compared to the Arctic environment in the Region 10 approval... ..The tracer gas experiment in Cameron, Louisiana included tracer releases from both a boat and a low profile platform. The study’s receptors were located in flat terrain near the shoreline. The dataset contains both very stable and fairly unstable conditions. The terrain and offshore conditions are expected to mimic those found at the proposed DWP location since both are located in the Western Gulf of Mexico.”

EPA Region 6 offers a final set of thoughts that further act as a weight of evidence justification for the approval of the SPOT DWP project alternative model request. In particular, EPA Region 6 cites a 2016 model performance study published in the Journal of the Air & Waste Management Association.⁴ In this study, the same tracer studies that had been used to examine individual model performance using the COARE bulk flux algorithm were used to directly compare the performance of a AERCOARE-AERMOD modeling approach to OCD using statistical procedures and measures. The study concluded that the model performance for the AERCOARE-AERMOD modeling approach was comparable to OCD for the overwater field tracer studies, including the relatively close Cameron, Louisiana dataset. While the evaluation and comparison presented in the 2016 study do not meet the full requirements of a Condition 1 (Appendix W, Section 3.2.2(c)) or Condition 2 (Appendix W, Section 3.2.2(d)) alternative model justification, the results of the study provide a level of additional confidence that the application of a coupled AERCOARE-AERMOD approach to conduct the compliance demonstration analysis for the SPOT DWP project permit application is appropriate and approvable.

MODEL CLEARINGHOUSE CONCURRENCE SUMMARY

In summary, the Model Clearinghouse fully concurs with EPA Region 6 proposed approval of a coupled AERCOARE-AERMOD approach for the compliance demonstration analysis required in the SPOT DWP project PSD application based on the alternative model justification package

⁴ June 2016 Article from Journal of the Air & Waste Management Association, *AERCOARE: An overwater meteorological preprocessor for AERMOD*. Herman Wong, Rob Elleman, Eric Wolvovsky, Ken Richmond & James Paumier (2016) AERCOARE: An overwater meteorological preprocessor for AERMOD, Journal of the Air & Waste Management Association, 66:11, 1121-1140, DOI: 10.1080/10962247.2016.1202156.

provided by SPOT Terminal Services and the technical review documentation provided by EPA Region 6. The Model Clearinghouse encourages EPA Region 6 to respond to SPOT Terminal Services and to the docket of this federal permitting action with a letter of alternative model approval, as appropriate. The information associated with the EPA Region 6 alternative model approval and the Model Clearinghouse concurrence should be available for comment during the appropriate public comment period for this permit action.

Given the possible importance of platform downwash and shoreline fumigation, the Model Clearinghouse recommends caution and careful review before additional alternative model considerations of the coupled AERCOARE-AERMOD approach in other projects. As similarly stated in the May 2011, EPA Region 10 concurrence response, this case-specific Model Clearinghouse concurrence does not constitute a generic approval of a coupled AERCOARE-AERMOD approach for other applications elsewhere. However, the scope of the technical assessment submitted with this EPA Region 6 Model Clearinghouse and the previous EPA Region 10 requests provide a good basis for such considerations.

For any future projects considering the use of a coupled AERCOARE-AERMOD approach, early consultation with the appropriate reviewing authority and EPA Regional Office is strongly recommended. The Model Clearinghouse will briefly note that there may be other possible alternative model pathways using prognostic meteorological data (*e.g.*, WRF via the MMIF meteorological preprocessor) for projects in marine environments. No matter the pathway, any alternative model application other than the preferred OCD model approach for a similar project requires Regional Office approval with Model Clearinghouse concurrence per Appendix W, Section 3.2.2.

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