TCEQ Interoffice Memorandum

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Energy Section

Thru: Chad Dumas, Team Leader
Air Dispersion Modeling Team (ADMT)

From: Ahmed Omar, P.E.
ADMT

Date: March 11, 2025

Subject: Air Quality Analysis Audit – Motiva Enterprises LLC (RN100209451)

1. Project Identification Information

Permit Application Number: 8404
New Source Review (NSR) Project Number: 372441
ADMT Project Number: 9618
County: Jefferson

Air Quality Analysis: Submitted by Trinity Consultants, October 2024, on behalf of Motiva Enterprises LLC.

2. Report Summary

The air quality analysis (AQA), as supplemented by ADMT, is acceptable for all review types and pollutants. The results are summarized below.

This project includes a retrospective review to NSR Projects 261312 and 301067. This analysis updates the permit application representations and emission rates for the refinery light and refinery heavy storage tanks. The applicant evaluated the project the same as the most recent submittal projects for the refinery light and refinery heavy storage tanks but incorporated the changes associated with this project.

A. De Minimis Analysis

The proposed project triggered PSD review for ozone. A De Minimis analysis was initially conducted to determine if a full impacts analysis would be required. The De Minimis analysis modeling results for ozone indicate that the project is below the respective de minimis concentration and no further analysis is required.

The ozone De Minimis level is the EPA recommended De Minimis level. The use of the EPA recommended De Minimis level is sufficient to conclude that a proposed source will not cause or contribute to a violation of an ozone National Ambient Air Quality Standard (NAAQS) based on the analyses documented in EPA guidance and policy memoranda[1].

[1] www.tceq.texas.gov/permitting/air/modeling/epa-mod-guidance.html

Table 1. Modeling Results for Ozone PSD De Minimis Analysis in Parts per Billion (ppb)

Pollutant	Averaging Time	GLCmax[2] (ppb)	De Minimis (ppb)
O_3	8-hr	0.07	1

The applicant performed an O_3 analysis as part of the PSD AQA. The applicant evaluated project emissions of O_3 precursor emissions (NO_X and VOC). For the project NO_X and VOC emissions, the applicant provided an analysis based on a Tier 1 demonstration approach consistent with EPA's Guideline on Air Quality Models (GAQM). Specifically, the applicant used a Tier 1 demonstration tool developed by EPA referred to as Modeled Emission Rates for Precursors (MERPs). The basic idea behind MERPs is to use technically credible air quality modeling to relate precursor emissions and peak secondary pollutants impacts from a source. Using data associated with the Harris County source, the applicant estimated an 8-hr O_3 concentration of 0.07 ppb. When the estimates of ozone concentrations from the project emissions are added together, the results are less than the De Minimis level.

B. Air Quality Monitoring

Since the project has a net emissions increase of 100 tpy or more of VOC or NO_X, the applicant evaluated ambient O_3 monitoring data to satisfy the requirements for the pre-application air quality analysis.

A background concentration for O_3 was obtained from EPA AIRS monitor 482450011 located at 623 Ellias St., Port Arthur, Jefferson County. A three-year average (2021-2023) of the annual fourth highest daily maximum 8-hr concentrations was used in the analysis (62 ppb). The use of this monitor for a background concentration of ozone is reasonable based on the proximity of the monitor to the project site (approximately one kilometer [km] to the northwest).

C. NAAQS Analysis

The De Minimis analysis modeling results indicate that 8-hr ozone is below the respective de minimis concentration and no further analysis is required.

D. Increment Analysis

The proposed project triggered PSD review for ozone. A PSD increment has not been established for ozone; therefore, an increment analysis was not conducted.

E. Additional Impacts Analysis

The applicant performed an Additional Impacts Analysis as part of the PSD AQA. The applicant conducted a growth analysis and determined that population will not significantly increase as a result of the proposed project. The applicant conducted a soils and vegetation analysis and determined that all evaluated criteria pollutant

[2] Ground level maximum concentration

concentrations are below their respective secondary NAAQS. The applicant meets the Class II visibility analysis requirement by complying with the opacity requirements of 30 Texas Administrative Code Chapter 111. The Additional Impacts Analyses are reasonable and possible adverse impacts from this project are not expected.

ADMT evaluated predicted concentrations from the proposed project to determine if emissions could adversely affect a Class I area. The nearest Class I area, Breton Wilderness, is located approximately 480 km from the proposed site.

The predicted concentrations of PM_{10}, $PM_{2.5}$, NO_2, and SO_2 for all averaging times, are all less than de minimis levels at the property line in the direction of the Breton Wilderness Class I area. The Breton Wilderness Class I area is an additional 480 km from the location where the predicted concentrations of PM_{10}, $PM_{2.5}$, NO_2, and SO_2 for all averaging times are less than de minimis. Therefore, emissions from the proposed project are not expected to adversely affect the Breton Wilderness Class I area.

F. Minor Source NSR and Air Toxics Analysis

Table 2. Project-Related Modeling Results for State Property Line

Pollutant	Averaging Time	GLCmax (µg/m^3)	De Minimis (µg/m^3)
SO_2	1-hr	0.1	16.3
H_2S	1-hr	0.02	2.16

Table 3. Modeling Results for Minor NSR De Minimis

Pollutant	Averaging Time	GLCmax (µg/m^3)	De Minimis (µg/m^3)
SO_2	1-hr	0.1	7.8
PM_{10}	24-hr	0.1	5
$PM_{2.5}$	24-hr	0.1	1.2
$PM_{2.5}$	Annual	0.01	0.13
NO_2	1-hr	1	7.5
NO_2	Annual	0.05	1
CO	1-hr	2	2000
CO	8-hr	1	500

The GLCmax are the maximum predicted concentrations associated with one year of meteorological data.

EPA revised the secondary SO_2 NAAQS from a 3-hr average to an annual average effective January 27, 2025. The applicant did not address this revision in the AQA. ADMT reviewed the proposed project and determined EPA's alternative demonstration approach summarized in a memorandum dated December 10, 2024, with a subject "Alternative Demonstration Approach for the 2024 Secondary Sulfur Dioxide National Ambient Air Quality Standard under the Prevention of Significant Deterioration Program", satisfies the annual average compliance requirement.

The justification for selecting EPA's interim 1-hr NO_2 and 1-hr SO_2 De Minimis levels was based on the assumptions underlying EPA's development of the 1-hr NO_2 and 1-hr SO_2 De Minimis levels. As explained in EPA guidance memoranda[3,4], EPA believes it is reasonable as an interim approach to use a De Minimis level that represents 4% of the 1-hr NO_2 and 1-hr SO_2 NAAQS.

The $PM_{2.5}$ De Minimis levels are EPA recommended De Minimis levels. The use of EPA recommended De Minimis levels is sufficient to conclude that a proposed source will not cause or contribute to a violation of a $PM_{2.5}$ NAAQS based on the analyses documented in EPA guidance and policy memoranda[5].

To evaluate secondary $PM_{2.5}$ impacts, the applicant provided an analysis based on a Tier 1 demonstration approach consistent with EPA's GAQM. Specifically, the applicant used a Tier 1 demonstration tool developed by EPA referred to as MERPs. Using data associated with the worst-case source, the applicant estimated 24-hr and annual secondary $PM_{2.5}$ concentrations of 0.003 µg/m^3 and 0.0001 µg/m^3, respectively. When these estimates are added to the GLCmax listed in the table above, the results are less than the De Minimis levels.

Table 4. Generic Modeling Results

Source ID	1-hr GLCmax (µg/m^3 per lb/hr)
ASTUTO	0.84
FALKY4	3.08
FASTUTO	1.57
FCDHDS2	4.43
FCRU4	1.24
FDCU1	1.25
FFCCU3	2.46

[3] www.epa.gov/sites/production/files/2015-07/documents/appwso2.pdf
[4] www.tceq.texas.gov/assets/public/permitting/air/memos/guidance_1hr_no2naaqs.pdf
[5] www.tceq.texas.gov/permitting/air/modeling/epa-mod-guidance.html

Source ID	1-hr GLCmax (µg/m^3 per lb/hr)
FGR_1	1.47
FHTU2	1.22
FHTU3	1.36
FHTU4	1.14
FHTU5	1.30
FLCDU	1.10
FLHCU	1.20
FMPU3	2.85
FPH27	3.52
FPH57	4.32
FSPS3	3.16
FVPS2	2.12
FVPS4	2.75
FWSGP	1.13
TK1415	4.02
TK1475	3.84
TK1510	4.26
TK1552	5.80
TK1679	11.92
TK1691	85.03
TK1712	14.42
TK1718	3.96
TK1787	4.88

Source ID	1-hr GLCmax (µg/m^3 per lb/hr)
TK1885	2.94
TK1893	14.10
TK1894	90.81
TK1913	6.67
TK1920	14.66
TK1932	9.93
TK1933	7.54
TK1934	7.65
TK2127	1.93
TK21657	5.74
TK21774	18.27
TK21775	76.42
TML1254	2.83
TML1524	6.55
TML1525	6.93
TML1526	14.51
TML1767	2.11
TML1768	2.16

Table 5. Minor NSR Production Project-Related Modeling Results for Health Effects since Most Recent Site-Wide Modeling

Pollutant & CAS#[6]	Averaging Time	GLCmax (µg/m^3)	25% ESL[7] (µg/m^3)
heavy coker gas oil 64741-81-7	1-hr	66	250

[6] Chemical abstract service number
[7] Effects screening level

Table 6. Minor NSR Production Project-Related Modeling Results for Health Effects

Pollutant & CAS#	Averaging Time	GLCmax (µg/m^3)	10% ESL (µg/m^3)
heavy coker gas oil 64741-81-7	1-hr	66	100

Table 7. Retrospective Minor NSR Site-Wide Modeling Results for Health Effects

Pollutant	CAS#	Averaging Time	GLCmax (µg/m^3)	GLCmax Location	GLCni[8] (µg/m^3)	GLCni Location	ESL (µg/m^3)
heavy coker gas oil	64741-81-7	1-hr	3187	S Property Line	2647	25m S	1000

Table 8. Minor NSR Hours of Exceedance for Health Effects

Pollutant	Averaging Time	1 X ESL GLCni	2 X ESL GLCmax
heavy coker gas oil	1-hr	4	1

The GLCmax and the GLCni locations are listed in Table 5 above. The applicant did not report a GLCni concentration but stated that the road along the southern property line was the nearest non-industrial land. ADMT reviewed the model predicted results along this road and supplemented the maximum predicted concentration in Table 7 and the hours of exceedance in Table 8 above. The exceedance occurs only at the northern and southern property line or the road along the northern and southern property line. Predicted concentrations at all other areas are less than the ESL.

The hours of exceedance were refined using operational limitations. See section 3 below for a detailed discussion on the operational limitations at the project site.

[8] Ground level non-industrial concentration

3. Model Used and Modeling Techniques

AERMOD (Version 23132) was used in a refined screening mode.

A unitized emission rate of 1 lb/hr was used to predict generic short-term impacts for each source. The generic impact was multiplied by the proposed pollutant specific emission rates to calculate a maximum predicted concentration for each source. The maximum predicted concentration for each source was summed to get a total predicted concentration for each pollutant. These concentrations were used in step 3 of the Modeling and Effects Review Applicability (MERA) analysis. Pollutants which did not meet the criteria of step 3 were further evaluated at step 4 (1-hr heavy coker gas oil).

According to the applicant, only three of the following refinery heavy tanks will be filled in the same hour: EPNs TST01691, TST01712, TST01719, TST01893 and TST21657. The three worst-case tanks, determined from the generic modeling, were included in the MERA Step 4 modeling (Tables 5 and 6 above).

For the retrospective analysis of the refinery light storage tanks, the electronic MERA analysis submitted for NSR Project No. 261312 was updated with the proposed new hourly emission rates and refinery lights screened out in step 3 the MERA analysis.

For the retrospective heavy coker gas oil analysis, source groups were used to determine the worst-case operating scenario. The scenarios consisted of different combinations of routine and planned MSS activities, which can last for various amounts of time. The maximum predicted concentrations from the worst-case scenario are reported in Table 7 above.

The following operational limitations apply:

- All routine and planned MSS activities can take place simultaneously except for the following tanks undergoing maintenance; only one can undergo maintenance at a time: model IDs MSSVFT02 (TK1524), MSSVFT03 (TK1526), MSSVFT05 (TK1600), MSSVFT06 (TK1617), MSSVFT07 (TK1679), MSSVFT08 (TK1681), MSSVFT10 (TK1712), MSSVFT22 (TK1873), MSSVFT24 (TK1887), MSSVFT25 (TK1893), MSSVFT26 (TK1894), MSSVFT33 (TK1938), MSSVFT34 (TK1939), MSSVFT36 (TK2075), MSSVFT37 (TK2076), MSSVFT38 (TK2077), MSSVFT39 (TK2078), MSSVFT40 (TK2093), MSSVFT41 (TK2094), MSSVFT46 (TK21657), MSSVFT47 (TK21774), MSSVFT48 (TK21755), MSSVFT50 (TK8323), MSSFRT04 (2073), MSSFRT05 (TK2074), and MSSFRT06 (TK2075).

For each analysis involving a source group, the hours of exceedances were refined according to the length of the specific tank MSS activity reported by the applicant. The following limitations represent the refined hours of exceedance reported in Table 8 above:

At GLCmax location, the 2X ESL exceedance occurs for one scenario, the worst-case scenario, source group ID HV11, which contains MSS activity for tank 1894 (model ID MSSVFT26). This activity is limited to occur for no more than one hour per year.

At GLCni location, the 1X ESL exceedance occurs for four scenarios, source group IDs H10, H11, H21, and H22, which contain MSS activities for tanks 1893, 1894, 21774, and 21755, respectively (model IDs MSSVFT25, MSSVFT26, MSSVFT47, and MSSVFT48, respectively). Each activity is limited to occur for no more than one hour per year.

The applicant conducted the 1-hr and annual NO_2 NAAQS analyses using the Ambient Ratio Method – 2 model option following EPA guidance.

A. Land Use

Medium roughness and elevated terrain were used in the modeling analysis. These selections are consistent with the AERSURFACE analysis, topographic map, digital elevation models, and aerial photography. The selection of medium roughness is reasonable.

The urban option was used in AERMOD to account for enhanced night-time dispersion due to heat island effects associated with the urban area and heat generated from nearby industrial sources. For the retrospective heavy coker gas oil analysis, the population chosen was 102,292 people. For all other analyses, the population chosen was 89,000 people. The applicant should be consistent between the modeling analyses regarding the populations; however, this inconsistency will not affect the overall modeling conclusions. The applicant followed EPA guidance from Section 5 of the AERMOD Implementation Guide.

B. Meteorological Data

Surface Station and ID: Port Arthur, TX (Station #: 12917)
Upper Air Station and ID: Lake Charles, LA (Station #: 3937)
Meteorological Dataset: 2012 for retrospective heavy coker gas oil, 2020 for all other analyses
Profile Base Elevation: 4.9 meters

The 2020 meteorological data set should have been used for the retrospective heavy coker gas oil analysis; however, it is unlikely the overall modeling conclusion will be affected by using the 2012 meteorological data set.

C. Receptor Grid

The grid modeled was sufficient in density and spatial coverage to capture representative maximum ground-level concentrations.

D. Building Wake Effects (Downwash)

Input data to Building Profile Input Program Prime (Version 04274) are consistent with the aerial photography, plot plan, and modeling report.

4. Modeling Emissions Inventory

The modeled emission point and volume source parameters and rates were consistent with the modeling report. The source characterizations used to represent the sources were appropriate.

For the retrospective heavy coker gas oil analysis, for several volume sources, the applicant did not update the source parameters in the retrospective analysis to be consistent with current source parameters reported in EMEW; however, ADMT conducted test modeling using the current sources parameters and verified that the modeling conclusions will not be affected.

The computation of the effective stack diameters for the flares is consistent with TCEQ modeling guidance.

Maximum allowable hourly emission rates were used for the short-term averaging time analyses, and annual average emission rates were used for the annual averaging time analyses.