

TCEQ Interoffice Memorandum

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Chemical Section

Thru: Chad Dumas, Team Leader
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From: Justin Cherry, P.E.
ADMT

Date: March 13, 2025

Subject: Second Air Quality Analysis Audit – Exxon Mobil Corporation (RN102574803)

1. Project Identification Information

Permit Application Number: 20211

New Source Review (NSR) Project Number: 377414

ADMT Project Number: 9690

County: Harris

Air Quality Analysis: Submitted by Trinity Consultants, February 2025, on behalf of Exxon Mobil Corporation.

This is the second modeling audit for this NSR project number, and the audit was conducted to review modeling submitted to address revised emission rates and source locations. This second modeling audit memo represents a complete summary and supersedes the first modeling audit memo dated December 20, 2024 (WCC Content ID 7480768).

2. Report Summary

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

A. Minor NSR and Air Toxics Analysis

Table 1. Project-Related Modeling Results for State Property Line

Pollutant	Averaging Time	GLCmax ¹ (µg/m ³)	De Minimis (µg/m ³)
SO ₂	1-hr	1.2	14.3

¹ Ground level maximum concentration

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Table 2. Modeling Results for Minor NSR De Minimis

Pollutant	Averaging Time	GLCmax ($\mu\text{g}/\text{m}^3$)	De Minimis ($\mu\text{g}/\text{m}^3$)
SO ₂	1-hr	1.2	7.8
PM ₁₀	24-hr	3	5
PM _{2.5}	24-hr	0.95	1.2
PM _{2.5}	Annual	0.005	0.13
NO ₂	1-hr	6.9	7.5
NO ₂	Annual	0.1	1
CO	1-hr	49	2000
CO	8-hr	39	500

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

EPA revised the secondary SO₂ National Ambient Air Quality Standard (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.

EPA intermittent guidance was relied on for the 1-hr NO₂ De Minimis analysis. Refer to the Modeling Emissions Inventory section for details.

The justification for selecting EPA's interim 1-hr NO₂ and 1-hr SO₂ De Minimis levels was based on the assumptions underlying EPA's development of the 1-hr NO₂ and 1-hr SO₂ De Minimis levels. As explained in EPA guidance memoranda^{2,3}, EPA believes it is reasonable as an interim approach to use a De Minimis level that represents 4% of the 1-hr NO₂ and 1-hr SO₂ 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

² www.epa.gov/sites/production/files/2015-07/documents/appwso2.pdf

³ www.tceq.texas.gov/assets/public/permitting/air/memos/guidance_1hr_no2naaqs.pdf

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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 memorandums⁴.

To evaluate secondary PM_{2.5} impacts, the applicant provided an analysis based on a Tier 1 demonstration approach consistent with EPA's Guideline on Air Quality Models. 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 worst-case hypothetical source, the applicant estimated 24-hr and annual secondary PM_{2.5} concentrations of 0.03 µg/m³ and 0.001 µg/m³, respectively. When these estimates are added to the GLCmax listed in the table above, the results are less than the De Minimis levels.

Table 3. Generic Modeling Results

Source ID	1-hr GLCmax (µg/m ³ per lb/hr)
FS28N	0.20
NH3FUG	7.35
MSSEQUIP	7.35
FS28M	0.04
FS31N	0.15
FS31M	0.03
NH3FUG2	5.29
MSSEQ2	5.29
BAUENG	4.25
BAUENGTK	8.34
BAUENGFG	8.34

⁴ www.tceq.texas.gov/permitting/air/modeling/epa-mod-guidance.html

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Table 4. Minor NSR Project (Increases Only) Modeling Results for Health Effects

Pollutant	CAS# ⁵	Averaging Time	GLCmax (µg/m ³)	10% ESL ⁶ (µg/m ³)
natural gas, dried	68410-63-9	1-hr	0.77	1800
oil distillate	64742-63-8	1-hr	8.28	100

Table 5. Minor NSR Production and MSS Project-Related Modeling Results for Health Effects

Pollutant	CAS#	Averaging Time	GLCmax (µg/m ³)	10% ESL (µg/m ³)
ammonia	7664-41-7	1-hr	135.86	18
ammonia	7664-41-7	Annual	5.37	9.2

The evaluation of 1-hr and annual ammonia was completed using Step 6 of the Modeling and Effects Review Applicability (MERA) guidance document. See section 3 for additional details.

3. Model Used and Modeling Techniques

AERMOD (Version 23132) was used in a refined screening mode, which is consistent with the first modeling audit. The latest version of AERMOD (Version 24142) is now available and should be used for future submittals.

For the health effects analysis, a unitized emission rate of 1 lb/hr was used to predict a generic short-term impact 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. The total predicted concentrations were compared to 10 percent of their respective ESLs (Step 3 of the Modeling and Effects Review Applicability [MERA] guidance). All pollutants fell out by Step 3.

The applicant did not evaluate ammonia at MERA Step 3 but rather provided pollutant specific project-wide modeling. The applicant evaluated production and MSS project emissions together rather than following Step 4 of the MERA guidance, which reviews production and MSS emissions separately. In addition, the applicant did not address all criteria related to Step 4 of the MERA guidance; however, as noted above, the applicant relied on Step 6 of the MERA to complete the review of 1-hr and annual ammonia.

⁵ Chemical Abstract Service Number

⁶ Effects Screening Level

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Three operational scenarios were evaluated as it relates to the flares. Scenario 1 (source group 28N31M) represents flare 28 (EPN FS28) controlling routine emissions and flare 31 (EPN FS31) controlling startup and shutdown emissions. Scenario 2 (source group 28M31N) represents flare 28 (EPN FS28) controlling startup and shutdown emissions and flare 31 (EPN FS31) controlling routine emissions. Scenario 3 (source group 28N31N) represents both flares controlling routine emissions. Only the results associated with the worst-case scenario were reported in the tables above. All applicable emissions/scenarios were accounted for in the annual demonstrations.

The applicant conducted the 1-hr and annual NO₂ 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. The population chosen was 118,231 people. The applicant followed EPA guidance from Section 5 of the AERMOD Implementation Guide.

B. Meteorological Data

Surface Station and ID: Houston, TX (Station #: 12918)
Upper Air Station and ID: Lake Charles, LA (Station #: 3937)
Meteorological Dataset: 2020
Profile Base Elevation: 14.3 meters

C. Receptor Grid

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

A single property line designation (SPLD) exists between Exxon Mobil Corporation and Air Products LLC (RN100222215). The single property line boundary was used in the modeling demonstration for the property line receptors, as well as all other parts of Exxon Mobil Corporation property.

D. Building Wake Effects (Downwash)

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

Buildings west of Model IDs ANA2_B and FS31M/N and north of ANA2_G were not included in the downwash analysis. According to the applicant, these buildings will be removed.

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.

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

For the 1-hr NO₂ De Minimis analysis, emissions from the emergency generator (Model ID BAUENG) were modeled with an annual average emission rate, consistent with EPA guidance for evaluating intermittent emissions. Emissions from the emergency generator were represented to occur for no more than 100 hours per year.

For the 24-hr PM_{2.5} and PM₁₀ De Minimis analyses, the modeled emission rates for the emergency generator (Model ID BAUENG) were based on 18 hours of operation in a 24-hr period.

Since the project is located in the Houston-Galveston-Brazoria (HGB) ozone nonattainment area, the emergency engines cannot be tested between the hours of 6:00 am and 12:00 pm (30 Texas Administrative Code Chapter 117.2030(c) or 117.310(f), as applicable). These operational restrictions were considered in the calculations of the average emission rates discussed above; however, the applicant did not apply these restrictions in the modeling (i.e. all hours of the day were modeled). This is conservative.

For the PM₁₀, PM_{2.5}, and ammonia analyses, the project emissions were evenly divided among the number of cells for each of the two cooling towers (Model IDs CT_1 thru CT_6 and CT2_1 thru CT2_6).

As noted above, a SPLD exists between Exxon Mobil Corporation and Air Products LLC. Emissions of ammonia from Air Products LLC were included in the MERA Step 6 review.

Except as noted above, 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.