TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

AGENDA ITEM REQUEST

for Adoption of State Implementation Plan Revision

AGENDA REQUESTED: February 27, 2025

DATE OF REQUEST: February 7, 2025

INDIVIDUAL TO CONTACT REGARDING CHANGES TO THIS REQUEST, IF NEEDED: Jamie Zech, Agenda Coordinator, (512) 239-3935

CAPTION: Docket No. 2023-0305-SIP. Consideration of the adoption of the Dallas-Fort Worth Moderate Area Attainment Demonstration State Implementation Plan (SIP) Revision for the 2015 Eight-Hour Ozone National Ambient Air Quality Standard (NAAQS).

As a result of the voluntary reclassification of the DFW 2015 ozone NAAQS moderate nonattainment area to serious, this SIP revision includes the following SIP elements associated with the prior moderate classification: a reasonably available control technology analysis, performance standard modeling for the vehicle inspection and maintenance program, and certain required certification statements for moderate nonattainment areas. (Rachel Melton, Terry Salem; Project No. 2022-021-SIP-NR)

Richard C. Chism
Director

Donna F. Huff
Division Deputy Director

Jamie Zech
Agenda Coordinator

Copy to CCC Secretary? NO ☒ YES ☐

Texas Commission on Environmental Quality
Interoffice Memorandum

To: Commissioners **Date:** February 7, 2025

Thru: Laurie Gharis, Chief Clerk
Kelly Keel, Executive Director

From: Richard C. Chism, Director *RCC*
Office of Air

Docket No.: 2023-0305-SIP

Subject: Commission Approval for Adoption of the Dallas-Fort Worth (DFW) Moderate Area Attainment Demonstration (AD) State Implementation Plan (SIP) Revision for the 2015 Eight-Hour Ozone National Ambient Air Quality Standard (NAAQS)

DFW 2015 Ozone NAAQS Moderate AD SIP Revision
Non-Rule Project No. 2022-021-SIP-NR

Background and reason(s) for the SIP revision:
Nine counties comprise the DFW 2015 ozone NAAQS (0.070 parts per million) nonattainment area: Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Tarrant, and Wise Counties. Based on monitoring data from 2018, 2019, and 2020, the area did not attain the 2015 eight-hour ozone NAAQS by the attainment date for areas classified as marginal, August 3, 2021, and did not qualify for a one-year attainment date extension in accordance with federal Clean Air Act (FCAA), §181(a)(5).[1] On October 7, 2022, the U.S. Environmental Protection Agency (EPA) published a final notice reclassifying the area from marginal to moderate, effective November 7, 2022 (87 *Federal Register* (FR) 60897). EPA set a January 1, 2023, deadline for states to submit AD and reasonable further progress (RFP) SIP revisions to address the 2015 eight-hour ozone moderate nonattainment area requirements.

The DFW area was subject to the moderate ozone nonattainment area requirements in FCAA, §182(b), and the Texas Commission on Environmental Quality (TCEQ) was required to submit moderate classification AD and RFP SIP revisions to EPA. On October 12, 2023, Texas Governor Greg Abbott signed and submitted a letter to EPA to voluntarily reclassify the Bexar County, DFW, and Houston-Galveston-Brazoria (HGB) 2015 eight-hour ozone NAAQS moderate nonattainment areas to serious. On October 18, 2023, EPA published a finding of failure to submit required SIP revisions for the 2015 eight-hour ozone NAAQS moderate nonattainment areas, effective November 17, 2023 (88 FR 71757), which started sanctions and federal implementation plan (FIP) clocks. SIP submittals and an EPA completeness determination are required by May 17, 2025, to prevent implementation of the first sanction, increased emission offsets. If submittals are not received and a completeness determination made by November 17, 2025, federal highway funding sanctions will apply. If complete submittals are not approved by November 17, 2025, EPA will be obligated to promulgate a FIP.

On June 20, 2024, EPA published the final reclassification of the 2015 eight-hour ozone NAAQS nonattainment areas to serious, effective July 22, 2024 (89 FR 51829). The final reclassification action provided details on moderate classification SIP elements that EPA deems to still be due despite the voluntary reclassification to serious. As a result of this action, TCEQ is no longer required to submit SIP revisions addressing a demonstration of attainment by the prior moderate attainment date, a reasonably available control measures (RACM) analysis, and contingency

[1] An area that fails to attain the 2015 eight-hour ozone NAAQS by its attainment date would be eligible for the first one-year extension if, for the attainment year, the area's 4th highest daily maximum eight-hour average is at or below the level of the standard (70 parts per billion (ppb)); the DFW area's fourth highest daily maximum eight-hour average for 2020 was 77 ppb as measured at the Grapevine Fairway monitor (C70/A301/x182). The DFW area's design value for 2020 was 76 ppb.

measures for failure to attain by the moderate attainment date. These formerly proposed, no longer required elements have been removed from this SIP revision and are indicated with strikethrough formatting. This SIP revision covers some of the remaining SIP requirements (as determined by EPA) for the prior DFW moderate nonattainment area including a reasonably available control technology (RACT) analysis, performance standard modeling for the existing vehicle inspection and maintenance (I/M) program and certification statements to confirm the areas meet I/M, nonattainment new source review (NNSR), and Stage I gasoline vapor recovery program requirements. Moderate classification elements relating to RFP are addressed in the concurrent DFW-HGB 2015 Ozone NAAQS Moderate Areas RFP SIP Revision (Non-Rule Project No. 2022-023-SIP-NR). The commission is currently litigating the issue of whether the remaining ozone nonattainment moderate elements are still required to be submitted to EPA. Since the litigation is not concluded, the executive director is submitting the remaining moderate elements to the commission for consideration for adoption and submittal to the EPA to fulfill those obligations if a court finds those elements must be submitted by the state to avoid the imposition of federal sanctions.

Scope of the SIP revision:
As a result of the voluntary reclassification of the DFW 2015 ozone NAAQS nonattainment area from moderate to serious, this SIP revision includes the following SIP elements associated with the prior moderate classification (as determined by EPA):

- a RACT analysis;
- performance standard modeling for the existing vehicle I/M program; and
- certification statements to confirm the area meets I/M, NNSR, and Stage I gasoline vapor recovery program requirements.

A.) Summary of what the SIP revision will do:
The elements included in this SIP revision meet certain FCAA SIP requirements for moderate ozone nonattainment areas that EPA determined remain following voluntary reclassification of the DFW 2015 ozone NAAQS nonattainment area to serious. Specifically, this SIP revision includes a RACT analysis, performance standard modeling for the existing vehicle I/M program, and certification statements to confirm that I/M, NNSR, and Stage I gasoline vapor recovery program requirements have been met for the DFW 2015 ozone NAAQS moderate nonattainment area.

B.) Scope required by federal regulations or state statutes:
Once adopted, this SIP revision will be submitted to EPA to address some of the remaining elements of FCAA, §182(b)(1) and EPA's *Implementation of the 2015 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements; Final Rule* (2015 eight-hour ozone standard SIP requirements rule) that EPA determined are still required after EPA's June 20, 2022, reclassification to serious. These required SIP elements include:

- a RACT analysis;
- performance standard modeling for the existing vehicle I/M program; and
- certification statements to confirm that area meets I/M, NNSR, and Stage I gasoline vapor recovery program requirements.

Remaining moderate classification elements relating to RFP are addressed in the concurrent DFW-HGB 2015 Ozone NAAQS Moderate RFP SIP Revision (Non-Rule Project No. 2022-023-SIP-NR).

As previously mentioned, the commission is currently litigating the issue of whether the remaining ozone nonattainment moderate elements are still required to be submitted to EPA. Since the

litigation is not concluded, the executive director is submitting the remaining moderate elements to the commission for consideration for adoption and submittal to the EPA to fulfill those obligations if a court finds those elements must be submitted by the state to avoid the imposition of federal sanctions.

C.) Additional staff recommendations that are not required by federal rule or state statute:
None.

Statutory authority:
The authority to propose and adopt SIP revisions is derived from the following sections of Texas Health and Safety Code, Chapter 382, Texas Clean Air Act (TCAA), §382.002, which provides that the policy and purpose of the TCAA is to safeguard the state's air resources from pollution; TCAA, §382.011, which authorizes the commission to control the quality of the state's air; and TCAA, §382.012, which authorizes the commission to prepare and develop a general, comprehensive plan for the control of the state's air. This SIP revision is required by FCAA, §110(a)(1) and is proposed and adopted under the commission's general authority under Texas Water Code, §5.102, General Powers and §5.105, General Policy. States are required to submit SIP revisions that specify the manner in which the NAAQS will be achieved and maintained within each air quality control region of the state by 42 United States Code, §§7420 *et seq.*, and implementing rules in 40 Code of Federal Regulations Part 51.

Effect on the:

A.) Regulated community:
None.

B.) Public:
This SIP revision would have no new effect on the public.

C.) Agency programs:
No additional burden on agency programs is anticipated as a result of this SIP revision.

Stakeholder meetings:
TCEQ hosted and attended multiple meetings in the DFW area related to the proposed SIP revision. Agenda topics included the status of DFW photochemical modeling development, emissions inventories and trends, ozone design values, and planning activities for the DFW 2015 Eight-Hour Ozone Moderate Classification AD SIP Revision. An additional outreach meeting was held on January 18, 2024, following the voluntary reclassification letter submitted by the governor on October 18, 2023, to discuss the reclassification, EPA's finding of failure to submit, and SIP planning requirements for serious nonattainment areas. These meetings were open to the public, but the focus was on companies and industry in the DFW area with stationary sources of pollution. Attendees included representatives from industry, county and city government, environmental groups, and the public.

Public Involvement Plan
Yes.

Alternative Language Requirements
Yes. Spanish.

Re: Docket No. 2023-0305-SIP

Public comment:
The commission opened a public comment period and offered a public hearing concerning the proposed SIP revision, which included elements that are not being considered for adoption. The public comment period opened on June 2, 2023, and closed on July 17, 2023. The commission offered a public hearing in Arlington on July 6, 2023, at 7:00 p.m. Notice of the public hearing was published in English in the *Dallas Morning News* newspaper on June 2, 2023, and in Spanish in the *Al Día* newspaper on June 7, 2023. Notices in English and Spanish were also distributed to subscribers through GovDelivery and posted to TCEQ's website, and a notice was published in English in the *Texas Register* on June 16, 2023 (48 TexReg 3340). A plain language summary was provided in both English and Spanish. TCEQ staff were present and ready to open the hearing for public comment; however, none of the attendees signed up to make comments on the record. Therefore, the public hearing was not formally opened for comment and a transcript was not prepared.

During the comment period, comments were received from the North Central Texas Council of Governments, EPA, the Sierra Club, and 43 individuals. Generally, the comments focused on the adverse health effects of ozone, modeling, contingency measures, control strategies, and the inadequacy of RACT and RACM analyses. The public comments received are summarized and addressed in this DFW AD SIP Revision.

Significant changes from proposal:
As a result of the reclassification of the 2015 eight-hour ozone NAAQS nonattainment areas to serious, effective July 22, 2024, the following elements associated with the prior moderate classification and attainment date are no longer required and have been removed from this SIP revision with strikethrough formatting:

- a demonstration of attainment by the prior moderate attainment date;
- emissions inventory;
- photochemical modeling;
- motor vehicle emissions budgets;
- a RACM analysis;
- a weight-of-evidence (WoE) analysis; and
- contingency measures for failure to attain.

Potential controversial concerns and legislative interest:
Due to the delayed EPA reclassification to moderate, TCEQ did not submit the required moderate classification SIP revisions for the 2015 ozone NAAQS by the January 1, 2023, deadline. EPA published a finding of failure to submit on October 18, 2023 (88 FR 71757). Effective November 17, 2023, this finding started 18-month and 24-month sanctions clocks and a 24-month FIP clock for the DFW 2015 ozone nonattainment area. As a result of the voluntary reclassification of the DFW area from moderate to serious nonattainment for the 2015 ozone NAAQS, an emissions inventory, photochemical modeling, MVEBs, a RACM analysis, a WoE analysis and a contingency plan for failure to attain by the moderate attainment date were determined to be no longer required. Therefore, these elements are not being submitted to EPA as part of this SIP revision. The 18-month and 24-month sanctions clocks would stop only if EPA receives, and deems complete, a submittal with all remaining required elements. The 24-month FIP clock would stop only if EPA receives and approves a submittal with all remaining required elements. The remaining SIP elements determined to still be required are addressed in this SIP revision and the concurrent DFW-HGB 2015 Ozone NAAQS Moderate RFP SIP Revision (Project No. 2022-023-SIP-NR).

Will this SIP revision affect any current policies or require development of new policies?
No.

Re: Docket No. 2023-0305-SIP

What are the consequences if this SIP revision does not go forward? Are there alternatives to the SIP revision?
The commission could choose to not comply with requirements to submit the remaining moderate classification SIP elements determined by EPA to still apply. However, the 18-month and 24-month sanctions clocks would stop only if EPA receives and deems complete a submittal with all remaining required elements. Sanctions could include transportation funding restrictions, grant withholdings, and 2-to-1 emissions offsets requirements for new construction and major modifications of stationary sources in the DFW 2015 ozone NAAQS nonattainment area. EPA would impose such sanctions until the state submitted the remaining moderate classification SIP elements for the area and EPA determined the submittals complete. The 24-month FIP clock would stop only if EPA receives and approves a submittal with all remaining required elements. Submittals and a completeness determination are required by May 17, 2025, to prevent implementation of the first sanction, increased emission offsets. If submittals are not received and a completeness determination is not made by November 17, 2025, federal highway funding sanctions will apply. If complete submittals are not approved by November 17, 2025, EPA will be obligated to promulgate a FIP.

Key points in the adoption SIP revision schedule:
Anticipated agenda date: February 27, 2025

Agency contacts:
Rachel Melton, SIP Project Manager, Air Quality Division, (512) 239-1512
Terry Salem, Staff Attorney, Environmental Law Division name, (512) 239-0469
Jamie Zech, Agenda Coordinator, Air Quality Division, (512) 239-3935

cc: Chief Clerk, 2 copies
Executive Director's Office
Jessie Powell
Krista Kyle
Patrick Lopez
Office of General Counsel
Rachel Melton
Terry Salem
Abigail Adkins
Jamie Zech

REVISIONS TO THE STATE OF TEXAS AIR QUALITY
IMPLEMENTATION PLAN FOR THE CONTROL OF OZONE AIR
POLLUTION

DALLAS-FORT WORTH 2015 EIGHT-HOUR OZONE STANDARD
NONATTAINMENT AREA

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
P.O. BOX 13087
AUSTIN, TEXAS 78711-3087

DALLAS-FORT WORTH MODERATE AREA ATTAINMENT DEMONSTRATION STATE IMPLEMENTATION PLAN REVISION FOR THE 2015 EIGHT-HOUR OZONE NATIONAL AMBIENT AIR QUALITY STANDARD

PROJECT NUMBER 2022-021-SIP-NR
SFR-122/2022-021-SIP-NR

Adoption
February 27, 2025

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EXECUTIVE SUMMARY

Nine counties comprise the Dallas-Fort Worth (DFW) 2015 ozone National Ambient Air Quality Standard (NAAQS) (0.070 parts per million) nonattainment area: Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Tarrant, and Wise Counties. Based on monitoring data from 2018, 2019, and 2020, the area did not attain the 2015 eight-hour ozone NAAQS by the attainment date for areas classified as marginal, August 3, 2021, and did not qualify for a one-year attainment date extension in accordance with federal Clean Air Act (FCAA), §181(a)(5).[1] On October 7, 2022, the U.S. Environmental Protection Agency (EPA) published a final notice reclassifying the area from marginal to moderate, effective November 7, 2022 (87 *Federal Register* (FR) 60897).

The DFW 2015 ozone NAAQS nonattainment area was then subject to the requirements in FCAA, §182(b) for moderate nonattainment areas. The Texas Commission on Environmental Quality (TCEQ) was required to submit moderate ozone classification attainment demonstration (AD) and reasonable further progress (RFP) state implementation plan (SIP) revisions to EPA. ~~The attainment date for areas classified as moderate is August 3, 2024, with a 2023 attainment year (87 FR 60897).~~[2] The EPA set a January 1, 2023 deadline for states to submit AD and RFP SIP revisions to address the 2015 eight-hour ozone standard moderate nonattainment area requirements.

On October 12, 2023, Texas Governor Greg Abbott signed and submitted a letter to EPA to voluntarily reclassify the Bexar County, DFW, and Houston-Galveston-Brazoria (HGB) 2015 eight-hour ozone NAAQS moderate nonattainment areas to serious. On October 18, 2023, EPA published a finding of failure to submit required SIP revisions for the 2015 eight-hour ozone NAAQS moderate nonattainment areas, effective November 17, 2023 (88 FR 71757), which started sanctions and federal implementation plan (FIP) clocks. Submittals and an EPA completeness determination are required by May 17, 2025, to prevent the implementation of the first sanction, increased emission offsets. If submittals are not received and a completeness determination is not made by November 17, 2025, federal highway funding sanctions will apply. If complete submittals are not approved by November 17, 2025, EPA will be obligated to promulgate a FIP. On June 20, 2024, EPA published the final reclassification of the 2015 eight-hour ozone NAAQS nonattainment areas to serious, effective July 22, 2024 (89 FR 51829). The final reclassification action provided details on moderate classification SIP elements that EPA deems to still be due despite the voluntary reclassification to serious.

As specified in the final serious reclassification rule, TCEQ is no longer required to submit a SIP revision addressing a demonstration of attainment by the prior moderate attainment date, an emissions inventory, a reasonably available control measures (RACM) analysis, and contingency measures for failure to attain. These formerly

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[1] An area that fails to attain the 2015 eight-hour ozone NAAQS by its attainment date would be eligible for the first one-year extension if, for the attainment year, the area's 4th highest daily maximum eight-hour average is at or below the level of the standard (70 parts per billion (ppb)). The DFW area's fourth highest daily maximum eight-hour average for 2020 was 77 ppb as measured at the Grapevine Fairway monitor (C70/A301/x182). The DFW area's design value for 2020 was 76 ppb.

[2] ~~The attainment year ozone season is the ozone season immediately preceding a nonattainment area's attainment date.~~

proposed, no longer required elements have been removed from this SIP revision with strikethrough formatting. The remaining SIP elements for the DFW area for the prior moderate classification are addressed in this SIP revision and in the concurrent DFW-HGB 2015 Ozone NAAQS Moderate RFP SIP Revision (Non-Rule Project No. 2022-023-SIP-NR). The commission has filed a legal challenge in the Fifth Circuit Court of Appeals challenging EPA's position that these remaining ozone nonattainment moderate elements are still required to be submitted after EPA granted the commission's request that the areas be reclassified to serious. Since the litigation is not concluded, the commission is adopting and submitting the moderate elements to EPA to fulfill the obligations only if a court deems those elements must be submitted by the state to avoid the imposition of federal sanctions.

~~This DFW AD SIP revision includes the following required SIP elements for moderate ozone nonattainment areas: photochemical modeling, a reasonably available control technology (RACT) analysis, a reasonably available control measures (RACM) analysis, a weight-of-evidence (WoE) analysis, a contingency plan, attainment year motor vehicle emissions budgets (MVEB) for transportation conformity purposes, performance standard modeling for the existing vehicle inspection and maintenance (I/M) program, and certification statements to confirm that I/M, nonattainment new source review, and Stage I gasoline vapor recovery program requirements have been met for the DFW 2015 ozone NAAQS nonattainment area.~~ This DFW AD SIP revision includes the following required SIP elements for moderate ozone nonattainment areas (as determined by EPA): a reasonably available control technology (RACT) analysis, performance standard modeling for the existing vehicle inspection and maintenance (I/M) program, and certification statements to confirm that I/M, nonattainment new source review, and Stage I gasoline vapor recovery program requirements have been met for the DFW 2015 ozone NAAQS nonattainment area.

Effective July 22, 2024, Texas is no longer required to submit failure-to-attain contingency measures due to the reclassification of the DFW area from moderate to serious nonattainment for the 2015 ozone standard. ~~Contingency measures are control requirements that would take effect and result in emissions reductions if an area fails to attain a NAAQS by the applicable attainment date or fails to demonstrate RFP. EPA has interpreted recent court decisions to have invalidated key aspects of EPA's historical approach to implementing the contingency measure requirement. At the time the SIP revision was being developed, EPA had historically accepted the use of surplus emissions reductions from previously implemented control measures to fulfill the contingency measure requirements. However, EPA's new draft guidance on contingency measures, published in the *Federal Register* for public comment on March 23, 2023 (88 FR 17571), indicates that contingency measures must be conditional and prospective (not previously implemented) based on the recent court rulings. The draft guidance also establishes an entirely new scheme for determining the amount of emissions reductions necessary to address the contingency requirement.~~

~~Since EPA had not issued final guidance to states regarding contingency measures at the time this SIP revision was developed, this SIP revision relies on the historically approved approach of using surplus emissions reductions to fulfill the contingency measure requirements.~~

This DFW AD SIP revision is adopted concurrent with the DFW and Houston-Galveston-Brazoria (HGB) 2015 Eight-Hour Ozone Moderate Classification RFP SIP Revision (Non-Rule Project No. 2022-023-SIP-NR) to address remaining required SIP elements (as determined by EPA) for the 2015 ozone NAAQS moderate classification.

This DFW AD SIP revision includes a photochemical modeling analysis of reductions in nitrogen oxides (NO_x) and volatile organic compounds (VOC) emissions from existing control strategies and a WoE analysis. The peak ozone design value for the DFW 2015 ozone NAAQS nonattainment area is estimated to be 73 parts per billion (ppb) in 2023. The quantitative and qualitative analyses in Chapter 5: *Weight of Evidence* supplement the photochemical modeling analysis presented in Chapter 3: *Photochemical Modeling* to characterize 2023 future ozone conditions.

For the photochemical modeling analysis, this SIP revision includes base case modeling of an eight-hour ozone episode of April through October of 2019. This modeling episode was chosen because the period is representative of the times of the year that eight-hour ozone levels above 70 ppb have historically been monitored within the nonattainment area. The model performance evaluation of the 2019 base case indicates the modeling is suitable for use in conducting the modeling attainment test. The modeling attainment test was applied by modeling a 2019 base case year and 2023 future case modeling results to estimate 2023 eight-hour ozone design values.

Table ES-1: *Summary of 2019 Base and 2023 Future Case Anthropogenic Modeling Emissions for DFW 2015 Ozone NAAQS Nonattainment Area for the June 12 Episode Day* lists anthropogenic emissions of NO_x and VOC in tons per day (tpd) by source category for a sample episode day of June 12 in the 2019 base and 2023 future case ozone modeling. The differences in modeling emissions between the 2019 base case and the 2023 future case reflect the net of economic growth and reductions from existing controls. The existing controls include both state and federal measures that have already been adopted.

Table ES-1: Summary of 2019 Base and 2023 Future Case Anthropogenic Modeling Emissions for DFW 2015 Ozone NAAQS Nonattainment Area for the June 12 Episode Day

Emissions Source Category	2019 NO_x (tpd)	2023 NO_x (tpd)	2019 VOC (tpd)	2023 VOC (tpd)
On-Road	100.80	71.34	48.22	38.21
Non-Road	38.15	33.83	40.73	41.98
Off-Road - Airports	17.12	15.69	4.30	4.23
Off-Road - Locomotives	10.50	7.87	0.49	0.35
Area	32.93	34.18	247.47	260.32
Oil and Gas - Drilling	0.20	0.19	0.01	0.01
Oil and Gas - Production	10.39	3.42	50.33	16.56
Point - Cement Kilns	9.78	15.22	1.25	1.36
Point – EGU	6.17	7.45	0.20	0.20
Point - Non-EGU	15.00	11.20	25.48	20.61
DFW Nonattainment Area Total	**241.04**	**200.39**	**418.48**	**383.82**

The future year on-road mobile source emission inventories for this SIP revision were developed using version 3 of the EPA Motor Vehicle Emission Simulator (MOVES3) model. These 2023 attainment year inventories establish the NO_x and VOC MVEBs that, once found adequate or approved by EPA, must be used in transportation conformity analyses. The attainment MVEBs represent the 2023 on-road mobile source emissions that have been modeled for the AD and include all of the on-road control measures. The MVEBs are provided in Table 4-2: *2023 Attainment Demonstration MVEB for the DFW 2015 Ozone NAAQS Nonattainment Area.*

The eight-hour ozone design values for the 2019 base case design value (DVB) and modeled 2023 future case design value (DVF) for the regulatory ozone monitors in the DFW 2015 ozone NAAQS nonattainment area are shown in Table ES-2: *Summary of 2019 DVBs and Modeled 2023 DVFs for DFW 2015 Ozone NAAQS Nonattainment Area Monitors.* In accordance with EPA's 2018 *Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze*, the 2023 DVFs presented have been rounded to one decimal place and then truncated.[3] Based on TCEQ's modeling and available data, the DFW area is not expected to attain the 2015 ozone NAAQS by the August 3, 2024 attainment date.

Table ES-2: Summary of 2019 DVBs and Modeled 2023 DVFs for DFW 2015 Ozone NAAQS Nonattainment Area Monitors

Monitor Name	CAMS Number	2019 DVB (ppb)	Relative Response Factor	2023 DVF (ppb)
Arlington Municipal Airport	0061	70.00	0.990	69
Cleburne Airport	0077	73.33	0.985	72
Dallas Executive Airport	0402	68.33	0.997	68
Dallas Hinton	0401	69.67	0.980	68
Dallas North #2	0063	74.00	0.978	72
Denton Airport South	0056	73.00	0.968	70
Eagle Mountain Lake	0075	74.33	0.977	72
Frisco	0031	75.33	0.977	73
Ft. Worth Northwest	0013	72.00	0.982	70
Grapevine Fairway	0070	75.00	0.971	72
Kaufman	0071	63.67	1.005	64
Keller	0017	73.00	0.975	71
Midlothian OFW	0052	64.00	0.997	63
Parker County	0076	68.67	0.982	67
Pilot Point	1032	73.00	0.982	71

This DFW AD SIP revision documents a photochemical modeling analysis and a WoE assessment that meets EPA modeling guidance.

[3] https://www.epa.gov/sites/default/files/2020-10/documents/o3-pm-rh-modeling_guidance-2018.pdf

SECTION V-A: LEGAL AUTHORITY

General

The Texas Commission on Environmental Quality (TCEQ) has the legal authority to implement, maintain, and enforce the National Ambient Air Quality Standards (NAAQS) and to control the quality of the state's air, including maintaining adequate visibility.

The first air pollution control act, known as the Clean Air Act of Texas, was passed by the Texas Legislature in 1965. In 1967, the Clean Air Act of Texas was superseded by a more comprehensive statute, the Texas Clean Air Act (TCAA), found in Article 4477-5, Vernon's Texas Civil Statutes. In 1989, the TCAA was codified as Chapter 382 of the Texas Health and Safety Code. The TCAA is frequently amended for various purposes during the biennial legislative sessions.

Originally, the TCAA stated that the Texas Air Control Board (TACB) was the state air pollution control agency and was the principal authority in the state on matters relating to the quality of air resources. In 1991, the legislature abolished the TACB effective September 1, 1993, and its powers, duties, responsibilities, and functions were transferred to the Texas Natural Resource Conservation Commission (TNRCC). In 2001, the 77th Texas Legislature continued the existence of the TNRCC until September 1, 2013 and changed the name of the TNRCC to TCEQ. In 2009, the 81st Texas Legislature, during a special session, amended section 5.014 of the Texas Water Code, changing the expiration date of TCEQ to September 1, 2011, unless continued in existence by the Texas Sunset Act. In 2011, the 82nd Texas Legislature continued the existence of the TCEQ until 2023. In 2023, the 88th Regular Session of the Texas Legislature continued the existence of TCEQ until 2035.

With the creation of the TNRCC (and its successor TCEQ), authority over air quality is found in both the Texas Water Code (TWC) and the TCAA. The general authority of TCEQ is found in TWC, Chapter 5 and enforcement authority is provided by TWC, Chapter 7. TWC, Chapter 5, Subchapters A - F, H - J, and L, include the general provisions, organization, and general powers and duties of TCEQ, and the responsibilities and authority of the executive director. TWC, Chapter 5 also authorizes TCEQ to implement action when emergency conditions arise and to conduct hearings. The TCAA specifically authorizes TCEQ to establish the level of quality to be maintained in the state's air and to control the quality of the state's air by preparing and developing a general, comprehensive plan. The TCAA, Subchapters A - D, also authorize TCEQ to collect information to enable the commission to develop an inventory of emissions; to conduct research and investigations; to enter property and examine records; to prescribe monitoring requirements; to institute enforcement proceedings; to enter into contracts and execute instruments; to formulate rules; to issue orders taking into consideration factors bearing upon health, welfare, social and economic factors, and practicability and reasonableness; to conduct hearings; to establish air quality control regions; to encourage cooperation with citizens' groups and other agencies and political subdivisions of the state as well as with industries and the federal government; and to establish and operate a system of permits for construction or modification of facilities.

Local government authority is found in Subchapter E of the TCAA. Local governments have the same power as TCEQ to enter property and make inspections. They also may

make recommendations to the commission concerning any action of TCEQ that affects their territorial jurisdiction, may bring enforcement actions, and may execute cooperative agreements with TCEQ or other local governments. In addition, a city or town may enact and enforce ordinances for the control and abatement of air pollution not inconsistent with the provisions of the TCAA and the rules or orders of the commission.

In addition, Subchapters G and H of the TCAA authorize TCEQ to establish vehicle inspection and maintenance programs in certain areas of the state, consistent with the requirements of the federal Clean Air Act; coordinate with federal, state, and local transportation planning agencies to develop and implement transportation programs and measures necessary to attain and maintain the NAAQS; establish gasoline volatility and low emission diesel standards; and fund and authorize participating counties to implement vehicle repair assistance, retrofit, and accelerated vehicle retirement programs.

Applicable Law

The following statutes and rules provide necessary authority to adopt and implement the state implementation plan (SIP). The rules listed below have previously been submitted as part of the SIP.

Statutes

All sections of each subchapter are included, with the most recent effective date, unless otherwise noted.

TEXAS HEALTH & SAFETY CODE, Chapter 382	September 1, 2023
TEXAS WATER CODE	September 1, 2023

Chapter 5: Texas Natural Resource Conservation Commission
- Subchapter A: General Provisions
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- Subchapter E: Criminal Offenses and Penalties: §§7.177, 7.178-7.183 only

Rules

All of the following rules are found in 30 Texas Administrative Code, as of the following latest effective dates:

Chapter 7: Memoranda of Understanding, §§7.110 and 7.119
December 13, 1996 and May 2, 2002, respectively

Chapter 19: Electronic Reporting — March 15, 2007

- Subchapter A: General Provisions
- Subchapter B: Electronic Reporting Requirements

Chapter 39: Public Notice

- Subchapter H: Applicability and General Provisions, §§39.402(a)(1) - (a)(6), (a)(8), and (a)(10) - (a)(12); §§39.405(f)(3) and (g), (h)(1)(A), (h)(2) - (h)(4), (h)(6), (h)(8) - (h)(11), (i) and (j), §39.407; §39.409; §§39.411(a), (e)(1) - (4)(A)(i) and (iii), (4)(B), (e)(5) introductory paragraph, (e)(5)(A), (e)(5)(B), (e)(6) (e)(10), (e)(11)(A)(i), (e)(11)(A)(iii) - (vi), (11)(B) - (F), (e)(13), and (e)(15), (e)(16), and (f) introductory paragraph, (f)(1) - (8), (g) and (h); §39.418(a), (b)(2)(A), (b)(3), and (c); §39.419(e), §39.420 (c)(1)(A) - (D)(i)(I) and (II), (c)(1)(D)(ii), (c)(2), (d) - (e), and (h), and Subchapter K: Public Notice of Air Quality Permit Applications, §§39.601 - 39.605 — September 16, 2021

Chapter 55: Requests for Reconsideration and Contested Case Hearings; Public Comment, all of the chapter, except §55.125(a)(5) and (a)(6) — September 16, 2021

Chapter 101: General Air Quality Rules — May 14, 2020

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Chapter 114: Control of Air Pollution from Motor Vehicles — December 21, 2023

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~~ACT~~	~~alternative control technique~~
AD	attainment demonstration
~~AEDT~~	~~Aviation Environmental Design Tool~~
~~APU~~	~~auxiliary power units~~
AQRP	Air Quality Research Program
~~AQS~~	~~Air Quality System~~
~~auto-GC~~	~~automated gas chromatography~~
$(BC)^2$	Black and Brown Carbon
~~BEIS~~	~~Biogenic Emission Inventory System~~
~~BELD5~~	~~Biogenic Emissions Land-use Database~~
~~BPA~~	~~Beaumont-Port Arthur~~
~~CAMS~~	~~continuous ambient monitoring station~~
~~CAMx~~	~~Comprehensive Air Quality Model with Extensions~~
CFR	Code of Federal Regulations
~~CMV~~	~~commercial marine vessel~~
~~CSAPR~~	~~Cross-State Air Pollution Rule~~
CTG	control techniques guidelines
D.C.	District of Columbia
DERC	Discrete Emissions Reduction Credit
~~DERI~~	~~Diesel Emissions Reduction Incentive program~~
DFW	Dallas-Fort Worth
~~DV~~	~~design value~~
~~DVB~~	~~base case design value~~
~~DVF~~	~~future case design value~~
~~ECLIPSE~~	~~Evaluating the Climate and Air Quality Impact of Short-Lived Pollutants~~
EE	energy efficiency
~~EGU~~	~~electric generating unit~~
EI	emissions inventory
~~EIA~~	~~Energy Information Administration~~
EPA	U.S. Environmental Protection Agency
~~ERC~~	~~Emission Reduction Credit~~
~~ERG~~	~~Eastern Research Group~~

ESL	Environmental Speed Limit
~~FAA~~	~~Federal Aviation Administration~~
FCAA	Federal Clean Air Act
~~FINN~~	~~Fire Inventory of National Center for Atmospheric Research~~
~~FIP~~	~~federal implementation plan~~
FR	*Federal Register*
~~GEOS-Chem~~	~~Goddard Earth Observing System~~
~~GSE~~	~~ground support equipment~~
~~HB~~	~~House Bill~~
HGB	Houston-Galveston-Brazoria
I/M	inspection and maintenance
~~IC/BC~~	~~initial and boundary conditions~~
ICI	Industrial, Commercial, and Institutional
IOP	increment of progress
~~km~~	~~kilometer~~
~~m~~	~~meter~~
~~m/s~~	~~meters per second~~
~~MDA8~~	~~maximum daily average eight-hour ozone~~
~~MODIS~~	~~Moderate-Resolution Imaging Spectroradiometer~~
MOVES	Motor Vehicle Emissions Simulator
~~MPE~~	~~model performance evaluation~~
MVEB	motor vehicle emissions budget
~~MW~~	~~megawatt~~
~~MWh~~	~~megawatt-hours~~
NAAQS	National Ambient Air Quality Standard
NCTCOG	North Central Texas Council of Governments
~~NMB~~	~~Normalized Mean Bias~~
~~NME~~	~~Normalized Mean Error~~
~~NO~~	~~nitric oxide~~
~~NO_2~~	~~nitrogen dioxide~~
NO_X	nitrogen oxides
NSR	new source review
~~NTIG~~	~~New Technology Implementation Grant~~
~~PEI~~	~~periodic emissions inventory~~

~~$PM_{2.5}$~~	~~particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers~~
~~ppb~~	~~parts per billion~~
~~ppbC~~	~~parts per billion by carbon~~
~~ppbV~~	~~parts per billion by volume~~
ppm	parts per million
PSM	performance standard modeling
RACM	reasonably available control measures
RACT	reasonably available control technology
~~RCP4.5~~	~~Representative Concentration Pathways~~
RE	renewable energy
RFP	reasonable further progress
~~RRF~~	~~relative response factor~~
RS	redesignation substitute
RVP	Reid vapor pressure
SB	Senate Bill
SIP	state implementation plan
~~SMOKE~~	~~Sparse Matrix Operation Kernel Emissions~~
~~SO_2~~	~~sulfur dioxide~~
~~SPRY~~	~~Seaport and Rail Yard Areas Emissions Reduction Program~~
~~STARS~~	~~State of Texas Air Reporting System~~
TAC	Texas Administrative Code
TACB	Texas Air Control Board
~~TAMIS~~	~~Texas Air Monitoring Information System~~
TCAA	Texas Clean Air Act
TCEQ	Texas Commission on Environmental Quality (commission)
~~TCFP~~	~~Texas Clean Fleet Program~~
TCM	transportation control measure
~~TDM~~	~~travel demand model~~
TERP	Texas Emissions Reduction Plan
~~TexN2~~	~~Texas NONROAD utility version 2~~
TIM	Technical Information Meeting
~~TNGVGP~~	~~Texas Natural Gas Vehicle Grant Program~~
~~TNMOC~~	~~total non-methane organic compounds~~

TNRCC	Texas Natural Resource Conservation Commission
~~tpd~~	~~tons per day~~
tpy	tons per year
~~TSD~~	~~technical support document~~
~~TTI~~	~~Texas Transportation Institute~~
TWC	Texas Water Code
~~TxDOT~~	~~Texas Department of Transportation~~
~~TxLED~~	~~Texas Low Emission Diesel~~
~~U.S.~~	~~United States~~
~~VMEP~~	~~Voluntary Mobile Source Emissions Reduction Program~~
~~VMT~~	~~vehicle miles traveled~~
VOC	volatile organic compounds
WoE	weight of evidence
~~WRF~~	~~Weather Research and Forecasting~~

LIST OF PREVIOUS STATE IMPLEMENTATION PLAN (SIP) REVISIONS AND REPORTS

The following list references SIP revisions and reports that were previously adopted by the commission and submitted to the U.S. Environmental Protection Agency (EPA). The list identifies how these SIP revisions are referenced in this document and contains the project number, adoption date, and full title. Copies of these SIP revisions are located on the Texas SIP Revisions webpage (https://www.tceq.texas.gov/air quality/sip/sipplans.html).

1999 DFW One-Hour Ozone AD SIP Revision (TCEQ Project No. 1998-046-SIP-AI, adopted February 24, 1999) Dallas-Fort Worth (DFW), One-Hour Ozone Attainment Demonstration (AD) State Implementation Plan (SIP) Revision

2000 DFW One-Hour Ozone AD SIP Revision (TCEQ Project No. 1999-055-SIP-AI, adopted April 19, 2000) Dallas-Fort Worth (DFW), One Hour Ozone Attainment Demonstration (AD) State Implementation Plan (SIP) Revision

2000 DFW One-Hour Ozone Inspection and Maintenance (I/M) SIP Revision (TCEQ Project No. 1999-055C-SIP-AI, adopted April 19, 2000) Dallas-Fort Worth (DFW), One-Hour Ozone Vehicle Inspection and Maintenance (I/M) State Implementation Plan (SIP) Revision

2001 DFW One-Hour Ozone AD SIP Revision (TCEQ Project No. 2001-025-SIP-AI, adopted August 22, 2001) Dallas-Fort Worth (DFW), One Hour Ozone Attainment Demonstration (AD) State Implementation Plan (SIP) Revision

2003 DFW One-Hour Ozone AD SIP Revision (TCEQ Project No. 2003-008-114-SIP-AI, adopted March 5, 2003) Dallas-Fort Worth (DFW), One-Hour Ozone Attainment Demonstration (AD) State Implementation Plan (SIP) Revision

2005 DFW Eight-Hour Ozone 5% IOP SIP Revision (TCEQ Project No. 2004-096-SIP-NR, adopted April 27, 2005) Dallas-Fort Worth (DFW), 5 Percent Increment of Progress (IOP) State Implementation Plan (SIP) Revision for the 1997 Eight-Hour Ozone Standard

2007 DFW Eight-Hour Ozone AD SIP Revision (TCEQ Project No. 2006-013-SIP-NR, adopted May 23, 2007) Dallas-Fort Worth (DFW), 1997 Eight-Hour Ozone Moderate Nonattainment Area, Attainment Demonstration (AD) State Implementation Plan (SIP) Revision

2007 DFW Eight-Hour Ozone RFP SIP Revision (TCEQ Project No. 2006-031-SIP-NR, adopted May 23, 2007) Dallas-Fort Worth (DFW), 1997 Eight-Hour Ozone Moderate Nonattainment Area, Reasonable Further Progress (RFP) State Implementation Plan (SIP) Revision

2008 DFW Eight-Hour Ozone AD (Contingency Measures Plan) SIP Revision (TCEQ Project No. 2008-016A-SIP-NR, adopted November 5, 2008) Dallas-Fort Worth (DFW), 1997 Eight-Hour Ozone Moderate Nonattainment Area, Attainment Demonstration (AD) Contingency Plan State Implementation Plan (SIP) Revision

2008 DFW Eight-Hour Ozone AD (DERC) SIP Revision (TCEQ Project No. 2008-016-SIP-NR, adopted December 10, 2008) Dallas-Fort Worth (DFW), 1997 Eight-Hour Ozone Standard DERC Program State Implementation Plan (SIP) Revision

2010 DFW Eight-Hour Ozone RACT, Rule, and Contingency SIP Revision (TCEQ Project No. 2009-018-SIP-NR, adopted March 10, 2010) Dallas-Fort Worth (DFW), RACT Update, 30 TAC Chapter 117 Rule, and Modified Failure to Attain Contingency Plan State Implementation Plan (SIP) Revision

2010 DFW Eight-Hour Ozone ESL SIP Revision (TCEQ Project No. 2009-026-SIP-NR, adopted August 25, 2010) Dallas-Fort Worth (DFW), Environmental Speed Limit (ESL) Control Strategy Conversion to a Transportation Control Measure (TCM) State Implementation Plan (SIP) Revision

2011 DFW Eight-Hour Ozone AD SIP Revision (TCEQ Project No. 2010-022-SIP-NR, adopted December 7, 2011) Dallas-Fort Worth (DFW) Attainment Demonstration State Implementation Plan (SIP) Revision for the 1997 Eight-Hour Ozone Standard

2011 DFW Eight-Hour Ozone RFP Revision (TCEQ Project No. 2010-023-SIP-NR, adopted December 7, 2011) Dallas-Fort Worth (DFW) Reasonable Further Progress (RFP) State Implementation Plan (SIP) Revision for the 1997 Eight-Hour Ozone Standard

2015 DFW 2008 Eight-Hour Ozone Standard AD SIP Revision (TCEQ Project No. 2013-015-SIP-NR, adopted June 3, 2015) Dallas-Fort Worth (DFW) 2008 Eight-Hour Ozone Nonattainment Area Attainment Demonstration (AD) State Implementation Plan (SIP) Revision

2015 DFW 2008 Eight-Hour Ozone Standard RFP SIP Revision (TCEQ Project No. 2013-014-SIP-NR, adopted June 3, 2015) Dallas-Fort Worth (DFW) 2008 Eight-Hour Ozone Nonattainment Area Reasonable Further Progress (RFP) State Implementation Plan (SIP) Revision

2015 DFW One-Hour and 1997 Eight-Hour Ozone RS Report (Submitted to EPA on August 18, 2015) Dallas-Fort Worth Redesignation Substitute Report for the One-Hour and 1997 Eight-Hour Ozone Standard

2016 DFW 2008 Eight-Hour Ozone Standard AD SIP Revision (TCEQ Project No. 2015-014-SIP-NR, adopted July 6, 2016) Dallas-Fort Worth (DFW) 2008 Eight-Hour Ozone Nonattainment Area Attainment Demonstration (AD) State Implementation Plan (SIP) Revision for the 2017 Attainment Year

2018 DFW RACT Update SIP Revision (TCEQ Project No. 2017-001-SIP-NR, adopted August 8, 2018) Dallas-Fort Worth (DFW) 2008 Eight-Hour Ozone Standard Nonattainment Area Reasonably Available Control Technology (RACT) Update State Implementation Plan (SIP) Revision

2019 DFW One-Hour and 1997 Eight-Hour Ozone Redesignation SIP Revision (TCEQ Project No. 2018-028-SIP-NR, adopted March 27, 2019) Dallas-Fort Worth (DFW) Redesignation Request and Maintenance Plan State Implementation Plan (SIP) Revision for One-Hour and 1997 Eight-Hour Ozone NAAQS

2020 DFW 2008 Eight-Hour Ozone Standard AD SIP Revision (TCEQ Project No. 2019-078-SIP-NR, adopted March 4, 2020) Dallas-Fort Worth (DFW) Serious Classification 2008 Eight-Hour Ozone Attainment Demonstration (AD) State Implementation Plan (SIP) Revision

2020 DFW and HGB 2008 Eight-Hour Ozone Standard RFP SIP Revision (TCEQ Project No. 2019-079-SIP-NR, adopted March 4, 2020) Dallas-Fort Worth (DFW) and Houston-Galveston-Brazoria (HGB) Serious Classification 2008 Eight-Hour Ozone Reasonable Further Progress (RFP) State Implementation Plan (SIP) Revision

2024 DFW 2008 Eight-Hour Ozone Standard AD SIP Revision (TCEQ Project No. 2023-107-SIP-NR, adopted April 24, 2024) Dallas-Fort Worth (DFW) Severe Classification 2008 Eight-Hour Ozone Attainment Demonstration (AD) State Implementation Plan (SIP) Revision

2024 DFW and HGB 2008 Eight-Hour Ozone Standard RFP SIP Revision (TCEQ Project No. 2023-108-SIP-NR, adopted April 24, 2024) Dallas-Fort Worth (DFW) and Houston-Galveston-Brazoria (HGB) Severe Classification 2008 Eight-Hour Ozone Reasonable Further Progress (RFP) State Implementation Plan (SIP) Revision

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CHAPTER 1: GENERAL

1.1 BACKGROUND

Information on the Texas State Implementation Plan (SIP) and a list of SIP revisions and other air quality plans adopted by the commission can be found on the Texas State Implementation Plan webpage (https://www.tceq.texas.gov/airquality/sip) on the Texas Commission on Environmental Quality's (TCEQ) website (https://www.tceq.texas.gov/).

1.2 INTRODUCTION

The following history of the one-hour and eight-hour ozone National Ambient Air Quality Standards (NAAQS) and summaries of the Dallas-Fort Worth (DFW) area one-hour and eight-hour ozone SIP revisions is provided to give context and greater understanding of the complex issues involved in the area's ozone challenge.

1.2.1 One-Hour Ozone NAAQS History (No change)

No change from the 2020 DFW Serious Classification Attainment Demonstration (AD) SIP for 2008 Eight-Hour Ozone NAAQS (Project Number: 2019-078-SIP-NR).

1.2.2 1997 Eight-Hour Ozone NAAQS History (No change)

No change from the 2020 DFW Serious Classification AD SIP for 2008 Eight-Hour Ozone NAAQS (Project Number: 2019-078-SIP-NR).

1.2.3 2008 Eight-Hour Ozone NAAQS History

On March 27, 2008, the U.S. Environmental Protection Agency (EPA) published a final rule revising the eight-hour ozone standard, lowering the primary and secondary eight-hour ozone NAAQS to 0.075 parts per million (ppm) or 75 parts per billion (ppb) (73 *Federal Register* (FR) 16436). On May 21, 2012, EPA published in the *Federal Register* final designations for the 2008 eight-hour ozone standard of 0.075 ppm (77 FR 30088). A 10-county DFW area including Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise Counties was designated ozone nonattainment and classified moderate under the 2008 eight-hour ozone NAAQS, effective July 20, 2012.

1.2.3.1 Moderate Classification AD for the 2008 Eight-Hour Ozone NAAQS

On May 21, 2012, EPA published the classifications approach rule for the 2008 eight-hour ozone NAAQS, establishing the air quality thresholds assigned to all nonattainment areas, as well as establishing December 31 of each relevant calendar year as the attainment date for all nonattainment area classification categories (77 FR 30160). On December 23, 2014, the District of Columbia (D.C.) Circuit Court ruled on a lawsuit filed by the Natural Resources Defense Council, which resulted in vacatur of EPA's December 31 attainment date for the 2008 eight-hour ozone NAAQS. As part of EPA's final 2008 eight-hour ozone standard SIP requirements rule, published in the *Federal Register* on March 6, 2015, EPA modified 40 Code of Federal Regulations (CFR) §51.1103 consistent with the D.C. Circuit Court decision to establish attainment dates that run from the effective date of designation, i.e., July 20, 2012, rather than the end of the 2012 calendar year (80 FR 12264). As a result, the attainment date for the DFW moderate nonattainment ozone area changed from December 31, 2018 to July 20, 2018. In addition, because the attainment year ozone season is the ozone season immediately preceding a nonattainment area's attainment date, the attainment year for

the DFW moderate ozone nonattainment area changed from 2018 to 2017. The deadline to submit AD SIP revisions for areas classified as moderate for the 2008 eight-hour ozone NAAQS was July 20, 2015, which was not altered by the change in the attainment date.

On June 3, 2015, the commission adopted the 2015 DFW 2008 Eight-Hour Ozone Standard AD SIP Revision, which was developed based on a 2018 attainment year. Due to the timing of the court's ruling and EPA's subsequent rulemaking action, it was not possible to complete all work necessary for the SIP revision to demonstrate attainment in 2017. Therefore, the SIP revision included the work completed to demonstrate that the DFW ozone nonattainment area would attain the 2008 eight-hour ozone NAAQS by 2018, as proposed, and to demonstrate progress toward attainment by the new 2017 attainment year. The 2015 DFW 2008 Eight-Hour Ozone Standard AD SIP Revision included:

- photochemical modeling and a weight of evidence (WoE) analysis to demonstrate attainment by December 31, 2018;
- two rulemakings for reasonably available control technology (RACT) requirements for all control technique guidelines (CTG) and all non-CTG major source emission source categories of volatile organic compounds (VOC) and NO_x;
- a contingency plan; and
- a commitment to develop a new SIP revision to include an AD, reasonably available control measures (RACM) analysis, and motor vehicle emissions budgets (MVEB) for the 2017 attainment year.

On July 6, 2016, the commission adopted the 2016 DFW 2008 Eight-Hour Ozone Standard AD SIP Revision, which included the following analyses to reflect the 2017 attainment year: a modeled AD, corroborative analysis, a RACM analysis, and MVEBs.

On December 21, 2017, EPA published approval of VOC RACT (82 FR 60546), and on October 23, 2017, EPA published conditional approval of NO_x RACT (82 FR 44320). The conditional approval was based on a commitment to submit specific enforceable measures (i.e., an agreed order or rule) that incorporate certain permit conditions for the Martin Marietta cement manufacturing plant in Ellis County to limit NO_x emissions to 1.95 lb. NO_x per ton of clinker. On August 8, 2018, the commission adopted the 2018 DFW RACT Update SIP Revision and a voluntary Agreed Order with TXI Operations, LP. On February 22, 2019, EPA published a final action to approve the DFW RACT Update SIP Revision (84 FR 5601).

1.2.3.2 Reclassification to Serious for the 2008 Eight-Hour Ozone NAAQS

Based on monitoring data from 2015, 2016, and 2017, the DFW area did not attain the 2008 eight-hour ozone NAAQS in 2017[4] and did not qualify for a one-year attainment date extension in accordance with the federal Clean Air Act (FCAA), §181(a)(5).[5] On

[4] The attainment year ozone season is the ozone season immediately preceding a nonattainment area's attainment date.

[5] An area that fails to attain the 2008 eight-hour ozone NAAQS by its attainment date would be eligible for the first one-year extension if, for the attainment year, the area's 4th highest daily maximum eight-hour

August 23, 2019, EPA published the final notice reclassifying the DFW nonattainment area from moderate to serious for the 2008 eight-hour ozone NAAQS, effective September 23, 2019 (84 FR 44238). As indicated in EPA's 2008 eight-hour ozone standard SIP requirements rule, the attainment date for a serious classification was July 20, 2021, with a 2020 attainment year. The EPA set an August 3, 2020 deadline for states to submit AD and reasonable further progress (RFP) SIP revisions to address the 2008 eight-hour ozone standard serious nonattainment area requirements.

On March 4, 2020, the commission adopted the 2019 DFW 2008 Eight-Hour Ozone Standard AD SIP Revision, which included the following analyses to reflect the 2020 attainment year: a modeled AD, corroborative analysis, an analysis of RACM, including RACT and contingency measures that provided additional emissions reductions. To ensure that federal transportation funding conforms to the SIP, the DFW AD SIP revision also contained 2020 attainment year MVEBs. The concurrent rulemaking to address NO_X requirements (Rule Project No. 2019-074-117-AI) revised 30 Texas Administrative Code (TAC) Chapter 117 to amend the existing DFW NO_X RACT rules applicable in Wise County to apply at a threshold of actual emissions or the potential to emit of 50 tons per year (tpy). All unit types located at major source sites in the 2017 point source emissions inventory were addressed by this RACT rulemaking. The concurrent rulemaking to address VOC requirements (Rule Project No.2019-075-115-AI) revised 30 TAC Chapter 115, Subchapter B, Division 1, Storage of VOC, to amend the existing DFW VOC RACT rules in Wise County for fixed roof oil and condensate storage tanks to apply at a threshold of 50 tpy of actual emissions.

1.2.3.3 Reclassification to Severe for the 2008 Eight-Hour Ozone NAAQS

Based on monitoring data from 2018, 2019, and 2020, the DFW area did not attain the 2008 eight-hour ozone NAAQS in the 2020 attainment year and did not qualify for a one-year attainment date extension in accordance with FCAA, §181(a)(5).[6] On October 7, 2022, EPA published a final notice reclassifying the DFW nonattainment area from serious to severe for the 2008 eight-hour ozone NAAQS, effective November 7, 2022 (87 FR 60926). The attainment date for the severe classification is July 20, 2027, with a 2026 attainment year.

On April 24, 2024, the commission adopted the 2024 DFW 2008 Eight-Hour Ozone AD Severe Classification SIP Revision (Non-Rule Project No. 2023-107-SIP-NR). The AD SIP revision included a photochemical modeling analysis, a WoE analysis, a RACT analysis, a RACM analysis, MVEBs for the 2026 attainment year, and a contingency plan. On April 24, 2024, the commission also adopted the 2024 DFW and HGB 2008 Eight-Hour Ozone RFP Severe Classification SIP Revision (Non-Rule Project No. 2023-108-SIP-NR). The RFP SIP revision included an analysis of RFP toward attainment of the 2008 eight-hour ozone NAAQS, RFP MVEBs for the 2023 analysis year and 2026 attainment year, vehicle miles traveled growth offset requirement, and an RFP contingency plan. The SIP revisions also incorporated revisions to 30 TAC Chapter 115, Control of Air Pollution from Volatile Organic Compounds (Rule Project No. 2023-116-115-AI) and 30 TAC

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average is at or below the level of the standard (75 ppb); the DFW area's fourth highest daily maximum eight-hour average for 2017 was 77 ppb as measured at the Dallas North No. 2 monitor C63/C679). The DFW area's design value for 2017 was 79 ppb.

[6] *Id*

Chapter 117, Control of Air Pollution from Nitrogen Compounds (Rule Project No. 2023-117-117-AI). The AD and RFP SIP revisions were submitted to EPA on the May 7, 2024, due date, to address the 2008 eight-hour ozone standard severe nonattainment area requirements.

1.2.4 2015 Eight-Hour Ozone NAAQS History

On October 1, 2015, EPA lowered the primary and secondary eight-hour ozone NAAQS to 0.070 ppm (80 FR 65292), effective December 28, 2015. On June 4, 2018, EPA published final designations for areas under the 2015 eight-hour ozone NAAQS (83 FR 25766). A nine-county DFW area including Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Tarrant, and Wise Counties was designated nonattainment and classified as marginal under the 2015 eight-hour ozone NAAQS, effective August 3, 2018.

1.2.4.1 Marginal Classification for the 2015 Eight-Hour Ozone NAAQS

Under a marginal classification, the DFW area was required to attain the 2015 eight-hour ozone standard by the end of 2020 to meet an August 3, 2021 attainment date. On June 10, 2020, the commission adopted the 2015 Eight-Hour Ozone NAAQS EI SIP Revision for the HGB, DFW, and Bexar County Nonattainment Areas (Non-Rule Project No. 2019-111-SIP-NR). The SIP revision satisfies FCAA, §172(c)(3) and §182(a)(1) EI reporting requirements for nonattainment areas under the 2015 eight-hour ozone NAAQS, including the DFW area. The revision also includes certification statements to confirm that the emissions statement and nonattainment new source review requirements have been met for the HGB, DFW, and Bexar County 2015 eight-hour ozone nonattainment areas. On June 29, 2021, EPA published final approval of the EI for the DFW 2015 ozone nonattainment area (86 FR 34139). On September 9, 2021, EPA published final approval of the nonattainment new source review and emissions statement portions of the SIP revision (86 FR 50456).

1.2.4.2 Reclassification to Moderate for the 2015 Eight-Hour Ozone NAAQS

Based on monitoring data from 2018, 2019, and 2020, the DFW area did not attain the 2015 eight-hour ozone NAAQS in the 2020 attainment year and did not qualify for a one-year attainment date extension in accordance with FCAA, §181(a)(5).[7] On October 7, 2022, EPA published the final notice reclassifying the nine-county DFW nonattainment area from marginal to moderate for the 2015 eight-hour ozone NAAQS, effective November 7, 2022 (87 FR 60897). The attainment date for the moderate classification is August 3, 2024, with a 2023 attainment year. The EPA set a January 1, 2023 deadline for states to submit AD and RFP SIP revisions to address the 2015 eight-hour ozone standard moderate nonattainment area requirements.

1.2.4.3 Reclassification to Serious for the 2015 Eight-Hour Ozone NAAQS

On October 12, 2023, Texas Governor Greg Abbott signed and submitted a letter to EPA to voluntarily reclassify the Bexar County, DFW, and HGB 2015 eight-hour ozone

[7] An area that fails to attain the 2015 eight-hour ozone NAAQS by its attainment date would be eligible for the first one-year extension if, for the attainment year, the area's 4th highest daily maximum eight-hour average is at or below the level of the standard (70 ppb); the DFW area's fourth highest daily maximum eight-hour average for 2020 was 77 ppb as measured at the Grapevine Fairway monitor (C70/A301/x182). The DFW area's design value for 2020 was 76 ppb.

NAAQS moderate nonattainment areas to serious. EPA's proposal to reclassify these areas to serious in accordance with Governor Abbott's letter was published on January 26, 2024 (89 FR 5145). On June 20, 2024, EPA published the final reclassification of the 2015 eight-hour ozone NAAQS nonattainment areas to serious, effective July 22, 2024 (89 FR 51829). With the final reclassification of the DFW area to serious nonattainment for the 2015 ozone NAAQS, TCEQ is no longer required to submit the following SIP requirements for the moderate classification:

- a demonstration of attainment by the prior moderate attainment date;
- a RACM analysis tied to the prior moderate attainment date; and
- contingency measures specifically related to the area's failure to attain by the prior moderate attainment date.

EPA's October 18, 2023, finding of failure to submit no longer applies to these specific SIP elements (88 FR 71757).

1.2.5 Existing Ozone Control Strategies

Existing control strategies implemented to address the one-hour, 1997 eight-hour, and 2008 eight-hour ozone standards are expected to continue to reduce emissions of ozone precursors in the DFW 2015 ozone NAAQS nonattainment area and positively impact progress toward attainment of the ozone NAAQS. The one-hour and eight-hour ozone design values for the DFW area from 1991 through 2022 are illustrated in Figure 1-1: *Ozone Design Values and Population in the DFW Area*. Both one-hour and eight-hour design values have decreased over the past 31 years. The 2022 one-hour ozone design value of 101 ppb represents a decrease of 28%, nearly one third the 1991 one-hour design value of 140 ppb. The 2022 eight-hour ozone design value of 77 ppb represents a 27% decrease from the 1991 eight-hour ozone design value of 105 ppb. These decreases in design values occurred despite a 90% increase in area population from 1991 through 2021.

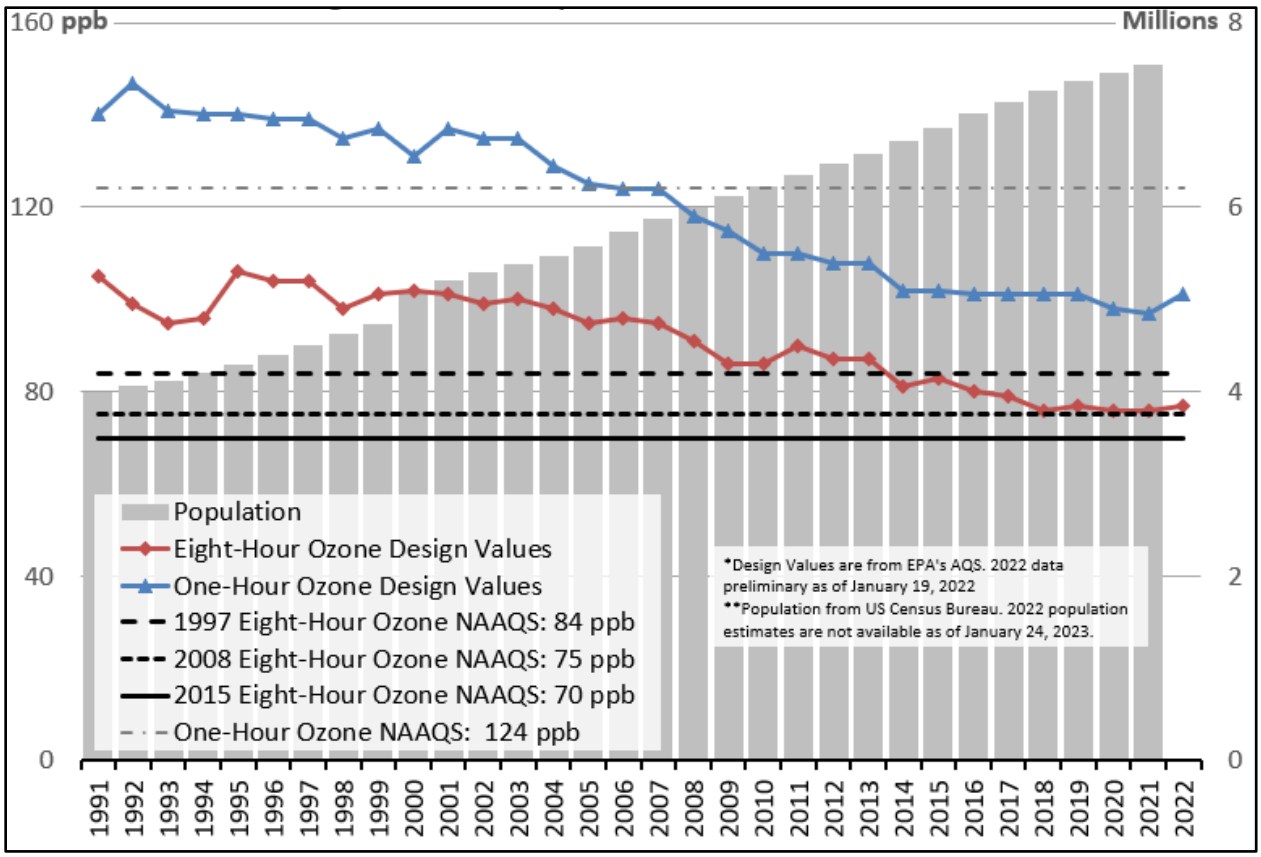

Figure 1-1: Ozone Design Values and Population in the DFW Area

1.3 HEALTH EFFECTS

In 2015, EPA revised the primary eight-hour ozone NAAQS to 0.070 ppm (70 ppb). To support the 2015 eight-hour primary ozone standard, EPA provided information that suggested that health effects may potentially occur at levels lower than the previous 0.075 ppm (75 ppb) standard. Breathing relatively high levels of ground-level ozone can cause acute respiratory problems like cough and decreases in lung function and can aggravate the symptoms of asthma. Repeated exposures to high levels of ozone can potentially make people more susceptible to allergic responses and lung inflammation.

Children are at a relatively higher risk from exposure to ozone when compared to adults since they breathe more air per pound of body weight than adults and because children's respiratory systems are still developing. Children also spend a considerable amount of time outdoors during summer and during the start of the school year (August through October) when elevated ozone levels are typically measured. Adults most at risk from exposures to elevated ozone levels are people working or exercising outdoors and individuals with preexisting respiratory diseases.

1.4 STAKEHOLDER PARTICIPATION AND PUBLIC MEETINGS

1.4.1 DFW Virtual Technical Information Meeting (TIM)

The DFW Air Quality TIMs are provided to present technical and scientific information related to air quality modeling and analysis in the DFW nonattainment area. The TCEQ

hosted virtual TIMs on July 1, 2021 and August 24, 2022. The TIMs included presentations on ozone planning, ozone design values, modeling platform updates, airport emissions inventory development, and an update from EPA. More information is available on the DFW Air Quality TIM webpage (https://www.tceq.texas.gov/airquality/airmod/meetings/aqtim-dfw.html).

1.4.2 DFW Stakeholder Meetings

The TCEQ hosted virtual stakeholder outreach meetings on September 6, 2022 and September 7, 2022 to provide an update on planning for the development of 2008 and 2015 ozone NAAQS SIP submissions. These meetings provided a brief overview of the DFW area's air quality status, the plan requirements for moderate and severe ozone nonattainment areas, and also provided an opportunity for input on existing and potential NO_x and/or VOC emission reduction measures being implemented within the point, area, and mobile emissions source sectors in the region. Presentation topics included ozone planning, ozone design values, emissions inventories and trends, emission control strategies, contingency measures, Section 185 fees, and RACT. An additional stakeholder outreach meeting was held on January 19, 2024, to discuss voluntary reclassification, EPA's finding of failure to submit, and SIP planning requirements for serious nonattainment areas. These meetings were open to the public, but the focus was on companies and industry in the DFW area with stationary sources of pollution.

1.5 PUBLIC HEARING AND COMMENT INFORMATION

The commission opened a public comment period and offered a public hearing concerning the proposed SIP revision, which included elements that are not being considered for adoption. The public comment period opened on June 2, 2023 and closed on July 17, 2023. Notice of the public hearing was published in English in the *Dallas Morning News* newspaper on June 2, 2023 and in Spanish in the *Al Día* newspaper on June 6, 2023. Notice was also distributed to subscribers in English and Spanish through GovDelivery, posted to the TCEQ's website in English and Spanish, and published in English in the *Texas Register* on June 16, 2023 (48 *TexReg* 3340). The commission offered a public hearing for this SIP revision on July 6, 2023 at 7:00 p.m. in Arlington at the City Council Chambers. TCEQ staff were present and ready to open the hearing for public comment; however, no attendees signed up to make comments on the record. Therefore, the public hearing was not opened.

Written comments were accepted via mail, fax, or through TCEQ's Public Comment system (https://tceq.commentinput.com/). During the comment period, comments were received from the North Central Texas Council of Governments (NCTCOG), the EPA, the Sierra Club, and 43 individuals. The public comments received are summarized and addressed in the Response to Comments for this SIP revision.

1.6 SOCIAL AND ECONOMIC CONSIDERATIONS

No new control strategies have been incorporated into this DFW AD SIP revision. Therefore, there are no additional social or economic costs associated with this revision.

1.7 FISCAL AND MANPOWER RESOURCES

The state has determined that its fiscal and manpower resources are adequate and will not be adversely affected through the implementation of this plan.

CHAPTER 2: ANTHROPOGENIC EMISSIONS INVENTORY DESCRIPTION (NO CHANGE)

2.1 INTRODUCTION

The federal Clean Air Act (FCAA) requires that attainment demonstration (AD) emissions inventories (EI) be prepared for ozone nonattainment areas (April 16, 1992, 57 *Federal Register* (FR) 13498). Ground-level (tropospheric) ozone is produced when ozone precursors, volatile organic compounds (VOC) and nitrogen oxides (NO_x), undergo photochemical reactions in the presence of sunlight.

The Texas Commission on Environmental Quality (TCEQ) maintains an inventory of current information for anthropogenic sources of NO_x and VOC emissions that identifies the types of emissions sources present in an area, the amount of each pollutant emitted, and the types of processes and emissions control devices at each facility or source category. The total anthropogenic inventory of NO_x and VOC emissions for an area is derived from estimates developed for three general categories of emissions sources: point, area, and mobile (both non-road and on-road).

The EI also provides data for a variety of air quality planning tasks, including establishing baseline emissions levels, calculating emission reduction targets, developing control strategies to achieve emissions reductions, developing emissions inputs for air quality models, and tracking actual emissions reductions against established emissions growth and control budgets.

This chapter discusses general EI development for each of the anthropogenic source categories. Chapter 3: *Photochemical Modeling* details specific EIs and emissions inputs developed for the Dallas-Fort Worth (DFW) 2015 ozone National Ambient Air Quality Standard (NAAQS) nonattainment area photochemical modeling.

2.2 POINT SOURCES

Stationary point source emissions data are collected annually from sites that meet the reporting requirements of 30 Texas Administrative Code (TAC) §101.10. This rule establishes EI reporting thresholds in ozone nonattainment areas that are currently at or less than major source thresholds in the DFW 2015 ozone NAAQS nonattainment area. Therefore, some minor sources in the area report to the point source EI.

To collect the data, TCEQ provides detailed reporting instructions and tools for completing and submitting an EI. Companies submit EI data using a web-based system called the State of Texas Environmental Electronic Reporting System. Companies are required to report emissions data and to provide sample calculations used to determine the emissions. Information characterizing the process equipment, the emissions control devices, and the emission points is also required. As required by FCAA §182(a)(3)(B), company representatives certify that reported emissions are true, accurate, and fully represent emissions that occurred during the calendar year to the best of the representative's knowledge.

All data submitted in the EI are reviewed for quality assurance purposes and then stored in the State of Texas Air Reporting System (STARS) database. The TCEQ's Point Source Emissions Inventory webpage (https://www.tceq.texas.gov/airquality/point-source-ei/psei.html) contains guidance documents and historical point source

emissions data. Additional information is available upon request from TCEQ's Air Quality Division.

Stationary sources must have state implementation plan (SIP) emissions and meet other requirements to be able generate emissions credits. SIP emissions are site- or facility-specific values based on the calendar year emissions inventory data used to develop the AD SIP revision's projection-base year inventory. The projection-base year is defined in 30 TAC §101.300(23) and refers to the emissions inventory year used to forecast future year emissions for modeling point sources.

For this AD SIP revision, TCEQ has designated the projection-base year for point sources as 2019 for electric generating units (EGU) with emissions recorded in the United States Environmental Protection Agency's (EPA) database for Air Markets Program Data and 2019 for all other stationary point sources (non-EGUs) with emissions recorded in the TCEQ STARS database. For more detail on the projection-base year for point sources, please see Chapter 3, Section 3.4.2: *Emissions Inputs* and Section 3.3: *Point Sources* of Appendix A: *Modeling Technical Support Document (TSD).*

On April 9, 2021, TCEQ requested regulated entities submit any revisions to the 2019 point source EI by July 9, 2021. The point source emissions in this SIP revision reflect all updates submitted by the due date. The TCEQ provided notification to regulated entities and the public through its email distribution system and by posting the notice on TCEQ's website.[8]

2.3 AREA SOURCES

Stationary sources that do not meet the reporting requirements of 30 TAC §101.10 for point sources are classified as area sources. Area sources are small-scale industrial, commercial, and residential sources that use materials or perform processes that generate emissions of air pollutants. Examples of area sources of VOC emissions include the following: oil and gas production facilities, printing processes, industrial coating and degreasing operations, gasoline service station underground tank filling, and vehicle refueling operations. Examples of typical fuel combustion area sources that emit NO_x include the following: oil and gas production facilities, stationary source fossil fuel combustion at residences and businesses, outdoor burning, and structure fires.

Area source emissions are estimated and calculated as county-wide totals rather than as individual sources. Area source emissions are typically calculated by applying an EPA-or TCEQ-developed emissions factor (emissions per unit of activity) by the appropriate activity or activity surrogate responsible for generating emissions. Population is one of the more commonly used activity surrogates for area source calculations. Other activity data commonly used are the amount of gasoline sold in an area, employment by industry type, and crude oil and natural gas production.

The emissions data for the different area source categories are developed, reviewed for quality assurance, stored in the Texas Air Emissions Repository database, and

[8] https://wayback.archive-it.org/414/20220309051946/https://www.tceq.texas.gov/assets/public/implementation/air/ie/pseiforms/OzoneBumpUps_HGB-DFW-SAN.pdf

compiled to develop the statewide area source EI. The area source periodic emissions inventory (PEI) is reported every third year (triennially) to EPA for inclusion in the National Emissions Inventory. The TCEQ submitted the most recent PEI for calendar year 2020.

2.4 NON-ROAD MOBILE SOURCES

Non-road vehicles (non-road sources) do not normally operate on roads or highways and are often referred to as off-road or off-highway vehicles. Non-road emissions sources include agricultural equipment, commercial and industrial equipment, construction and mining equipment, lawn and garden equipment, aircraft and airport equipment, locomotives, and commercial marine vessels (CMV).

For this AD SIP revision, EIs for non-road sources were developed for the following subcategories: NONROAD model categories (as described further below), airports, locomotives, and drilling rigs used in upstream oil and gas exploration activities. The airport subcategory includes estimates for emissions from the aircraft, auxiliary power units (APU), and ground support equipment (GSE) subcategories relevant for airports. Since no commercial marine activities occur in the DFW 2015 ozone NAAQS nonattainment area, CMV EIs were not developed. The following sections describe the emissions estimate methodologies used for the non-road mobile source subcategories discussed.

2.4.1 NONROAD Model Categories Emissions Estimation Methodology

The Motor Vehicle Emission Simulator 3 (MOVES3) model is EPA's latest mobile source emissions model for estimating non-road source category emissions. The TCEQ has invested significant time and resources to develop a Texas-specific version of the non-road component of the MOVES3 model called Texas NONROAD utility version 2 (TexN2) that replaces EPA defaults used to determine emissions with county-specific activity data.[9] TCEQ uses TexN2 to calculate emissions from all non-road mobile source equipment and recreational vehicles, with the exception of airports, locomotives, and drilling rigs used in upstream oil and gas exploration activities. Because emissions for airports and locomotives are not included in either the MOVES3 model or TexN2, the emissions for these categories are estimated using other EPA-approved methods and guidance. Although emissions for drilling rigs are included in the MOVES3 model and TexN2 utility, alternate emissions estimates were developed for that source category in order to develop more accurate county-level inventories. The equipment populations for drilling rigs were set to zero in the TexN2 utility to avoid double counting emissions from these sources.

2.4.2 Drilling Rig Diesel Engines Emissions Estimation Methodology

Drilling rig diesel engines used in upstream oil and gas exploration activities are included in the MOVES3 model category "Other Oilfield Equipment," which includes various types of equipment; however, due to significant growth in the oil and gas exploration and production industry, a 2015 survey of oil and gas exploration and production companies was used to develop updated drilling rig emissions

[9] https://www.tceq.texas.gov/downloads/air-quality/research/reports/emissions-inventory/582211300fy2021-20210423-erg-texn2-update.pdf

characterization profiles.[10] The drilling rig emissions characterization profiles from this study were combined with drilling activity data obtained from the Railroad Commission of Texas to develop the emissions inventory for this source category.

2.4.3 Locomotive Emissions Estimation Methodology

The locomotive EI was developed from a TCEQ-commissioned study using EPA-accepted EI development methods.[11] The locomotive EI includes line haul and yard emissions activity data from all Class I and Class III (currently, there are no Class II operators in Texas) locomotive activity and emissions by rail segment.

2.4.4 Airport Emissions Estimation Methodology

The airport EI was developed from a TCEQ-commissioned study using the Federal Aviation Administration's (FAA) Aviation Environmental Design Tool (AEDT) model.[12] AEDT is the most recent FAA model for estimating airport emissions and has replaced the FAA's Emissions and Dispersion Modeling System. The airport emissions categories used for this DFW AD SIP revision included aircraft (commercial air carriers, air taxis, general aviation, and military), APU, and GSE operations.

2.5 ON-ROAD MOBILE SOURCES

On-road mobile emissions sources consist of automobiles, trucks, motorcycles, and other motor vehicles traveling on public roadways. On-road mobile source ozone precursor emissions are usually categorized as combustion-related emissions or evaporative hydrocarbon emissions. Combustion-related emissions are estimated for vehicle engine exhaust. Evaporative hydrocarbon emissions are estimated for the fuel tank and other evaporative leak sources from the vehicle. To calculate emissions, both the rate of emissions per unit of activity (emissions factors) and the number of units of activity must be determined.

This SIP revision includes preliminary on-road EIs developed using MOVES3. Updated on-road EIs and emissions factors were developed using EPA's mobile emissions factor model, MOVES3. The MOVES3 model may be run using national default information or the default information may be modified to simulate data specific to the DFW 2015 ozone NAAQS nonattainment area, such as the control programs, driving behavior, meteorological conditions, and vehicle characteristics. The TCEQ parameters reflect local conditions to the extent that local values are available; these local values are reflected in the emissions factors calculated by the MOVES3 model. The localized inputs used for the on-road mobile EI development include vehicle speeds for each roadway link, vehicle populations, vehicle hours idling, temperature, humidity, vehicle age distributions for each vehicle type, percentage of miles traveled for each vehicle

[10] https://wayback.archive-it.org/414/20210527185246/https://www.tceq.texas.gov/assets/public/implementation/air/am/contracts/reports/ei/5821552832FY1505-20150731-erg-drilling_rig_2014_inventory.pdf

[11] https://www.tceq.texas.gov/downloads/air-quality/research/reports/emissions-inventory/5822111027-20211015-tti-texas-locomotive-railyard-2020-aerr-trend-ei.pdf

[12] https://www.tceq.texas.gov/downloads/air-quality/research/reports/emissions-inventory/5822111196-20211015-tti-texas-airport-2020-aerr-trend-ei.pdf

type, type of inspection and maintenance program, fuel control programs, and gasoline vapor pressure controls.

To estimate on-road mobile source emissions, emissions factors calculated by the MOVES3 model must be multiplied by the level of vehicle activity. On-road mobile source emissions factors are expressed in units of grams per mile, grams per vehicle (evaporative), and grams per hour (extended idle); therefore, the activity data required to complete the inventory calculation are vehicle miles traveled (VMT) in units of miles per day, vehicle populations, and source hours idling. The level of vehicle travel activity is developed using travel demand models (TDM) run by the Texas Department of Transportation or by the local metropolitan planning organizations. The TDMs are validated against a large number of ground counts, i.e., traffic passing over counters placed in various locations throughout a county or area. For SIP EIs, VMT estimates are calibrated against outputs from the federal Highway Performance Monitoring System, a model built from a different set of traffic counters. Vehicle populations by source type are derived from the Texas Department of Motor Vehicles' registration database and, as needed, national estimates for vehicle source type population.

In addition to the number of miles traveled on each roadway link, the speed on each roadway type or segment is also needed to complete an on-road EI. Roadway speeds, required inputs for the MOVES3 model, are calculated by using the activity volumes from the TDM and a post-processor speed model.

2.6 EI IMPROVEMENT

The TCEQ EI reflects years of emissions data improvement, including extensive point and area source inventory reconciliation with ambient emissions monitoring data. Reports detailing recent TCEQ EI improvement projects are located on TCEQ's Air Quality Research and Contract Projects webpage (https://www.tceq.texas.gov/airquality/airmod/project/pj.html).

CHAPTER 3: PHOTOCHEMICAL MODELING (NO CHANGE)

3.1 INTRODUCTION

This chapter describes attainment demonstration (AD) modeling conducted in support of this state implementation plan (SIP) revision. The Texas Commission on Environmental Quality (TCEQ) followed procedures recommended for AD modeling for the eight-hour ozone National Ambient Air Quality Standard (NAAQS) in the United States Environmental Protection Agency's (EPA) November 2018 *Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze* (EPA, 2018; referred to as the EPA modeling guidance).[13]

Results of the 2019 base case and the 2023 future case photochemical modeling runs are presented, which were used to estimate the 2023 attainment year design value. Base case modeling was used to evaluate the photochemical model's ability to replicate measured ozone and precursor concentrations for a past timeframe with monitored high-ozone concentrations. Future case modeling estimates the change in ozone concentrations due to changes in anthropogenic emissions in a future year while keeping the meteorological and natural emissions (biogenic and wildfires) inputs from the base case constant. Future case modeling answers the question: what would the ozone concentrations be in the future if the same meteorological conditions (that resulted in a high ozone episode in the past) were to repeat?

This chapter summarizes the components of the AD modeling, such as episode selection, modeling domain, and model inputs. A detailed description of the various modeling elements can be found in Appendix A: *Modeling Technical Support Document (TSD).*

3.2 MODELING EPISODE

The AD modeling used TCEQ's 2019 modeling platform, which has a modeling episode of April 1 through October 31, 2019. The EPA modeling guidance provides recommendations for choosing a modeling episode that will be appropriate for the modeled attainment test for eight-hour ozone AD SIP revisions. The recommendations are intended to ensure that the selected episode is representative of area-specific conditions that lead to exceedances of the eight-hour ozone NAAQS. This section provides an overview of the April through October 2019 ozone season in the Dallas-Fort Worth (DFW) 2015 eight-hour ozone NAAQS moderate nonattainment area (DFW 2015 ozone NAAQS nonattainment area).

One of the recommended criteria for selecting a modeling episode is that the episode be in the recent past and that it contains a sufficient number of exceedance days. Exceedance days are defined as days when at least one regulatory monitor in the area had a Maximum Daily Eight-Hour Average (MDA8) ozone concentration that exceeded the 2015 ozone NAAQS of 70 parts per billion (ppb). Figure 3-1: *Exceedance Days in the DFW 2015 Ozone NAAQS Nonattainment Area by Year from 2012 through 2021* shows the number of DFW area exceedance days for the 2015 ozone standard NAAQS over a

[13] https://www.epa.gov/sites/default/files/2020-10/documents/o3-pm-rh-modeling_guidance-2018.pdf

10-year period. The year 2019 had 29 days with MDA8 ozone above 70 ppb, which is a sufficient number of exceedance days for a modeling episode.

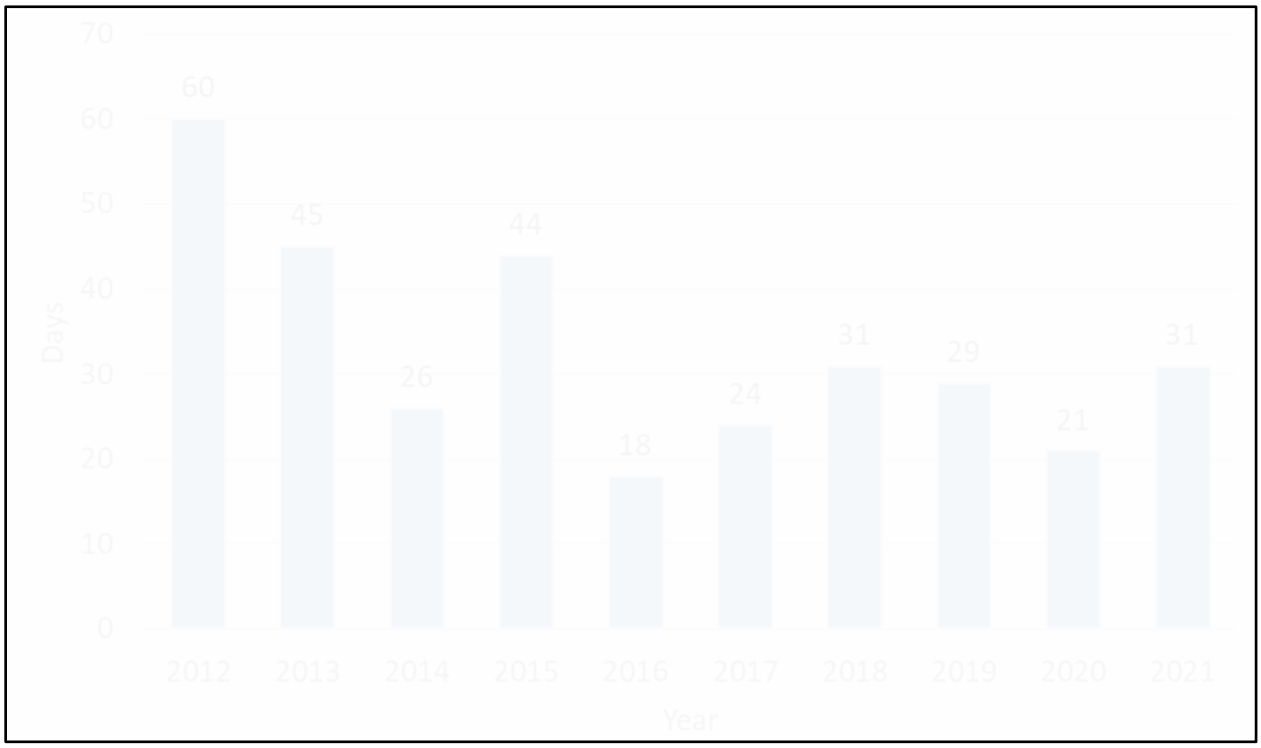

Figure 3-1: Exceedance Days in the DFW 2015 Ozone NAAQS Nonattainment Area by Year from 2012 through 2021

In selecting a modeling episode, EPA recommends that the exceedance days follow historically observed temporal trends. Figure 3-2: *Exceedance Days by Month from 2012 through 2021 in the DFW 2015 Ozone NAAQS Nonattainment Area* shows the exceedance days per month during the 2012 through 2021 10-year period. Over the 10-year period, exceedances occurred from March through October, with the greatest number of exceedances during the months of May through September.

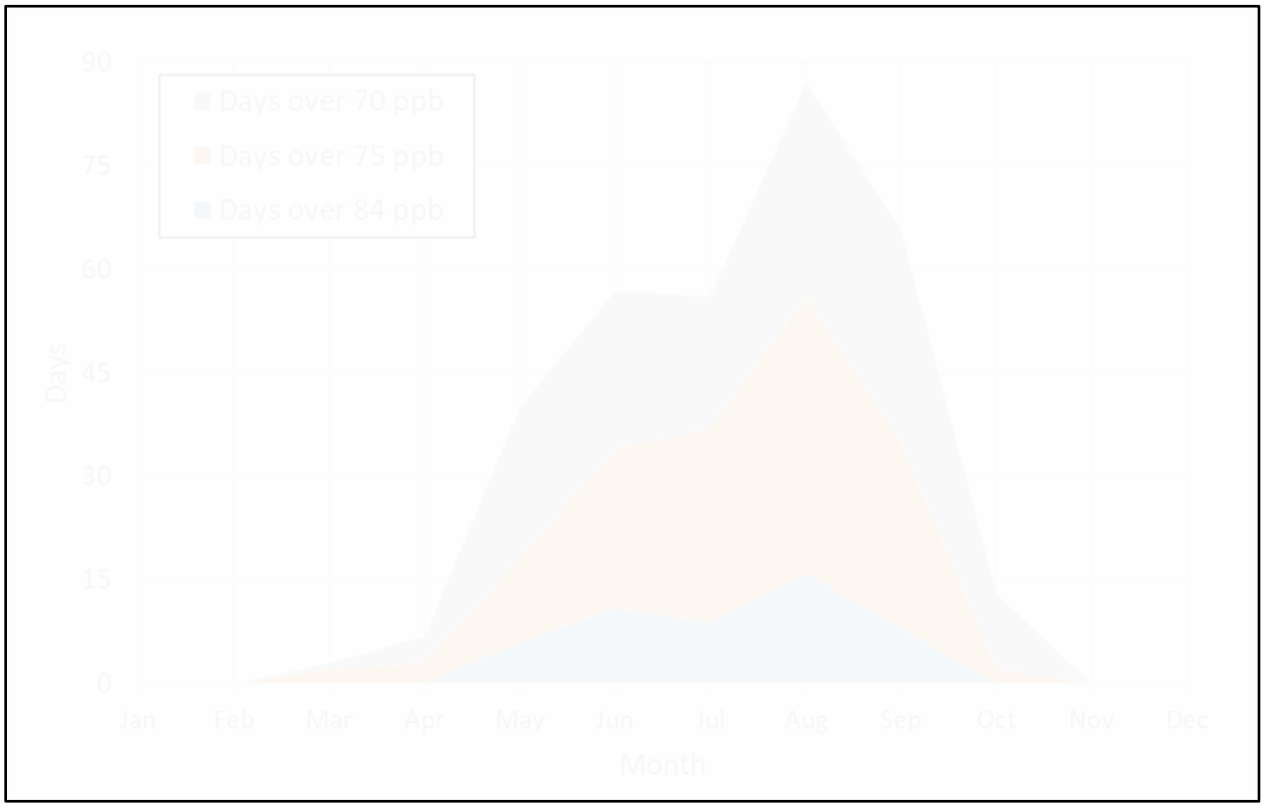

Figure 3-2: Exceedance Days by Month from 2012 through 2021 in the DFW 2015 Ozone NAAQS Nonattainment Area

Another recommendation from the EPA modeling guidance is to choose an episode when each regulatory monitor within the nonattainment area has at least five days during the episode when the MDA8 ozone concentration exceeded 60 ppb, the threshold for being included in the future year attainment test. There are 16 monitors that measure ozone concentrations within the DFW area, shown in Figure 3-3: *Regulatory Monitors that Measure Ozone in the DFW 2015 Ozone NAAQS Nonattainment Area*, labeled with their name and Continuous Ambient Monitoring Station (CAMS) number.[14] Each of the 16 monitors is a regulatory monitor, meaning it is used to determine the regulatory eight-hour ozone design value (DV) and will be included in the attainment test. Table 3-1: *Exceedance Days and Ozone Conditions from April through October 2019 Modeling Episode at Regulatory Monitors* summarizes the exceedances and ozone conditions at each regulatory monitor during the modeling episode. Only one monitor in the DFW 2015 ozone NAAQS nonattainment area did not have at least five days when MDA8 ozone exceeded 60 ppb, the Italy monitor, which had only two days that met that criterion. Historically, the Italy monitor has recorded low ozone monitoring values. The highest recorded MDA8 value at the Italy monitor in

[14] Maps in this document were generated by the Air Quality Division of the Texas Commission on Environmental Quality. The products are for informational purposes and may not have been prepared for or be suitable for legal, engineering, or surveying purposes. They do not represent an on-the-ground survey and represent only the approximate relative location of property boundaries. For more information concerning these maps, contact the Air Quality Division at 512-239-1459.

2019 was 62 ppb, which was the lowest of all of DFW area monitors. The 2019 DV at the Italy monitor was 65 ppb, attaining the 2015 ozone NAAQS.

Figure 3-3: Regulatory Monitors that Measure Ozone in the DFW 2015 Ozone NAAQS Nonattainment Area

Table 3-1: Exceedance Days and Ozone Conditions from April through October 2019 Modeling Episode at Regulatory Monitors

Monitor Name	CAMS Number	Highest MDA8 Ozone (ppb)	Number of Days Above 60 ppb	Number of Days Above 70 ppb	2019 Eight-Hour Ozone DV (ppb)
Arlington Municipal Airport	0061	76	8	2	70
Cleburne Airport	0077	83	16	7	76
Dallas Executive Airport	0402	74	23	1	68
Dallas Hinton	0401	70	7	0	73
Dallas North #2	0063	83	22	5	77
Denton Airport South	0056	79	28	5	73
Eagle Mountain Lake	0075	82	27	10	73
Frisco	0031	88	24	8	72

Monitor Name	CAMS Number	Highest MDA8 Ozone (ppb)	Number of Days Above 60 ppb	Number of Days Above 70 ppb	2019 Eight-Hour Ozone DV (ppb)
Ft. Worth Northwest	0013	75	19	2	76
Grapevine Fairway	0070	81	17	4	75
Italy	1044	62	2	0	65
Kaufman	0071	68	5	0	63
Keller	0017	84	25	4	74
Midlothian OFW	0052	69	5	0	66
Parker County	0076	70	18	0	69
Pilot Point	1032	80	23	7	71

From Table 3-1, the monitors with the highest number of exceedance days in the April through October 2019 episode were at the following monitors: Eagle Mountain Lake (10 days), Frisco (8 days), Cleburne Airport (7 days), and Pilot Point (7 days).

The EPA modeling guidance also recommends that the episode include meteorological patterns that represent a variety of conditions that correspond to high ozone. An assessment of the meteorological conditions in the DFW area in 2019 showed that the year was not atypical, and therefore was reasonable for modeling ozone. Details of the episode selection process for TCEQ's 2019 modeling platform are provided in Section 1.2: *Modeling Episode* of Appendix A.

3.3 PHOTOCHEMICAL MODELING

TCEQ used the Comprehensive Air Quality Model with Extensions (CAMx) version 7.20 for this AD modeling. The model software and the CAMx user's guide are publicly available (Ramboll, 2022). TCEQ's choice of CAMx is in line with the criteria specified in the EPA modeling guidance for model selection.

3.3.1 Modeling Domains

CAMx was configured with three nested domains: a 36-kilometer (km) grid resolution domain (named na_36km) covering most of North America, a 12 km grid resolution domain (named us_12km) covering the continental United States, and a four km grid resolution km domain (named txs_4km) covering central and east Texas. Dimensions of the CAMx domains are shown in Table 3-2: *CAMx Horizontal Domain Parameters*. The geographical extent of each domain is mapped in Figure 3-4: *CAMx Domains.* The DFW 2015 ozone NAAQS nonattainment area is contained within txs_4km, the finest resolution domain, as shown in Figure 3-5: *DFW 2015 Ozone NAAQS Nonattainment Area and the CAMx 4 km Modeling Domain.* In the vertical direction, each CAMx domain reaches up to over 18 km. The resolution of layers decreases with increasing distance from the surface, details of which are presented in Section 3.4.1: *Meteorological Inputs* of this chapter.

Table 3-2: CAMx Horizontal Domain Parameters

Domain Name	Range West to East (km)	Range South to North (km)	Number of Cells West to East	Number of Cells South to North	Cell Size (km)
na_36km	-2,952 to 3,240	-2,772 to 2,556	172	148	36
us_12km	-2,412 to 2,340	-1,620 to 1,332	396	246	12
txs_4km	-324 to 432	-1,584 to -648	189	234	4

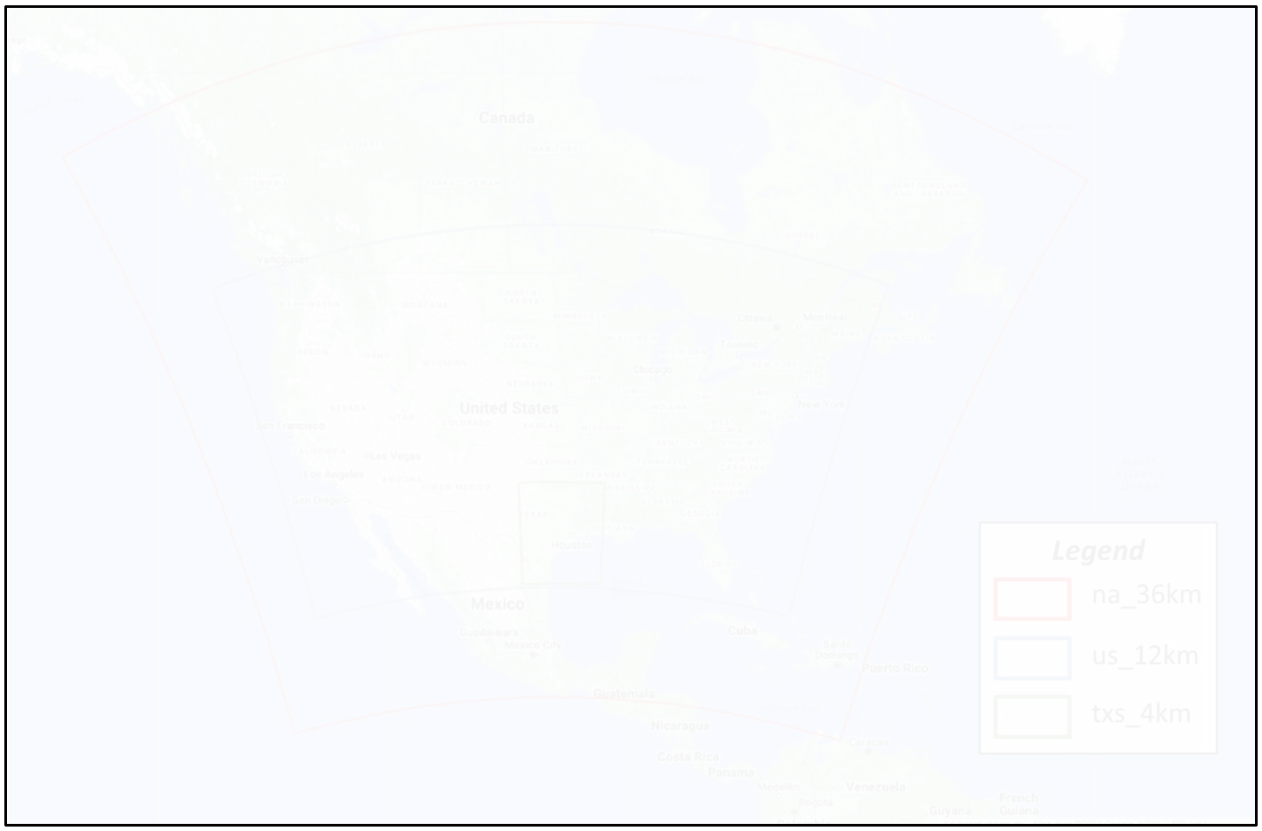

Figure 3-4: CAMx Domains

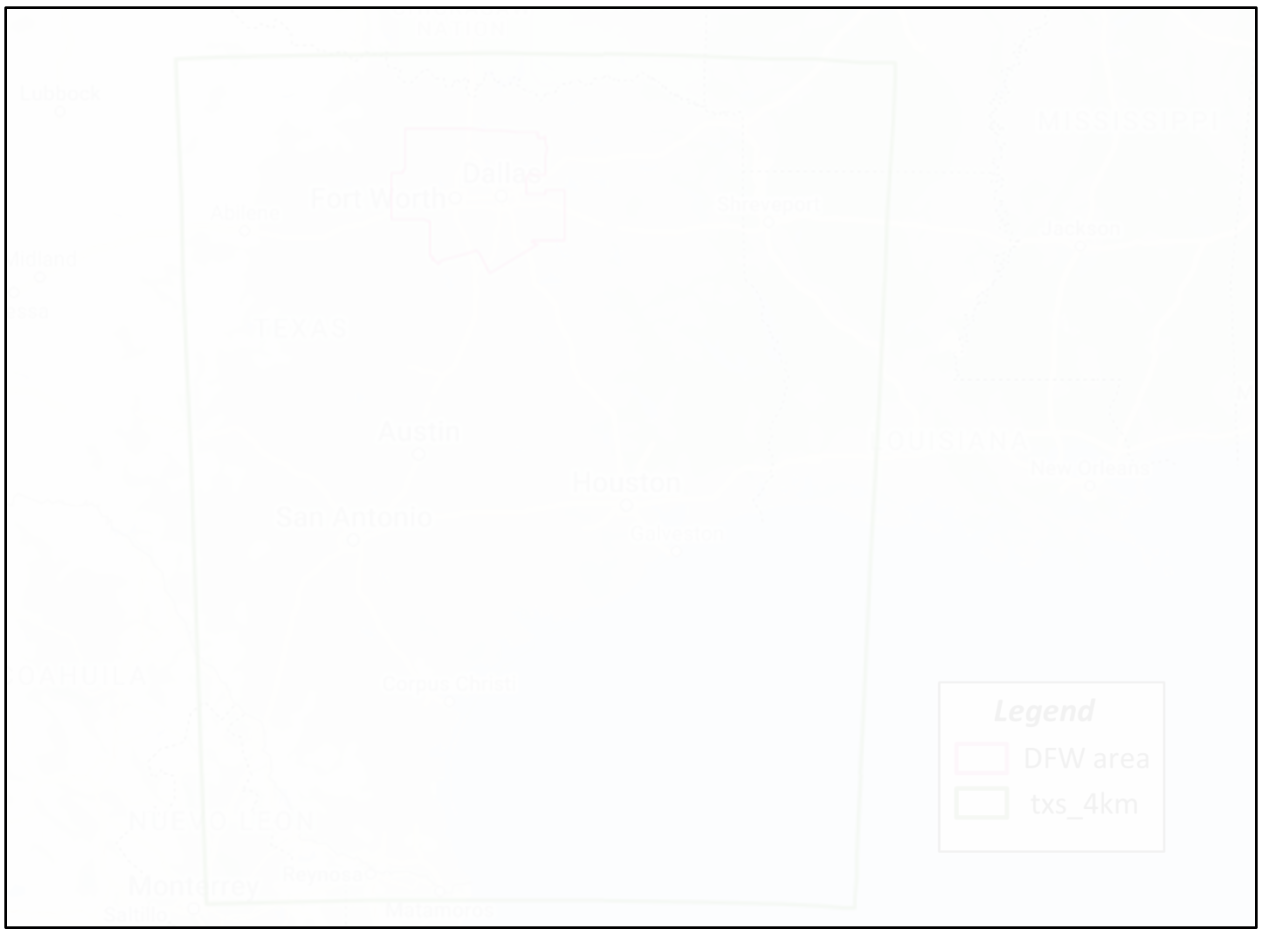

Figure 3-5: DFW 2015 Ozone NAAQS Nonattainment Area and CAMx 4 km Modeling Domain

3.3.2 CAMx Options

TCEQ used the CAMx options summarized in Table 3-3: *CAMx Configuration Options* for this SIP revision. Details regarding the configuration testing conducted by TCEQ to determine the dry deposition and vertical diffusion schemes is provided in Section 5.1.4: *Evaluation of CAMx Configuration Options* of Appendix A.

Table 3-3: CAMx Configuration Options

CAMx Option	Option Selected
Version	Version 7.20
Time Zone	Coordinated Universal Time
Chemistry Mechanism	Carbon Bond version 6 revision 5 gas-phase mechanism (CB6r5)
Photolysis Mechanism	Tropospheric Ultraviolet and Visible radiative transfer model, version 4.8, with Total Ozone Mapping Spectrometer ozone column data
Chemistry Solver	Euler-Backward Iterative
Dry Deposition Scheme	Zhang03
Vertical Diffusion	K-theory

CAMx Option	Option Selected
Iodine Emissions	Oceanic iodine emission computed from saltwater masks

3.4 MODELING INPUTS

A photochemical air quality model requires several inputs to be able to simulate chemical and physical processes leading to ozone formation. The main inputs are meteorological parameters, emissions inputs, and initial and boundary conditions. The sections below provide an overview of the inputs used in this modeling. More details are provided in Section 2*: Meteorological Modeling* and Section 3*: Emissions Modeling* of Appendix A.

3.4.1 Meteorological Inputs

The TCEQ used the Weather Research and Forecasting (WRF) model version 4.1.5 to generate the meteorological inputs for the photochemical modeling supporting this SIP revision. The WRF modeling was conducted for March 15 to November 1, 2019 to cover ramp-up and ramp-down days needed by CAMx.

WRF was configured with a 12 km horizontal grid resolution domain that covered most of North America, as depicted in Figure 3-6*: WRF and CAMx Domains*. A second 4 km fine grid domain covering the eastern half of Texas, which includes the 2015 ozone NAAQS nonattainment areas of Bexar County, DFW, and Houston-Galveston-Brazoria, was also modeled. Each WRF domain embeds a corresponding CAMx domain of the same horizontal resolution. The WRF domains are larger than the corresponding CAMx domains as seen in Figure 3-6, to ensure that the effects of boundary conditions are minimized, and large-scale meteorological conditions are better captured. The na_36km and us_12km CAMx domains are centered at the same location as the 12 km WRF domain. The txs_4km CAMx domain is centered at the same point as the 4 km WRF domain. All domains use the Lambert Conformal map projection.

~~Figure 3-6: WRF and CAMx Domains~~

~~The WRF domains have 42 vertical layers extending to over 20 km from the Earth's surface to better capture tropospheric meteorological conditions and vertical mixing that are essential for chemical transport mechanisms. The lowest CAMx layer corresponds to the first two WRF layers. CAMx layers 2 through 21 align with the WRF domain. Layers 22 through 30 of the CAMx domain encompass multiple WRF layers as displayed in Figure 3-7: *WRF and CAMx Vertical Layers for the txs_4km Domain*.~~

~~Figure 3-7: WRF and CAMx Vertical Layers for the txs_4km Domain~~

~~Details of the grid boundaries, horizontal and vertical grid cell geometry, land surface data, meteorological parameterizations, and WRF model performance evaluation are provided in Section 2: *Meteorological Modeling* of Appendix A.~~

3.4.2 Emissions Inputs

Model-ready hourly speciated emissions were developed for the April through October episode for the 2019 base case and the 2023 future case. This section provides an overview of the emission inputs used in this AD SIP revision's modeling. Details about emissions inventory development are included in Section 3: *Emissions Modeling* of Appendix A.

Emissions inputs, or modeling emissions inventories (EI), include emissions sources from anthropogenic sectors such as point sources (e.g., electric generating units (EGU), mobile sources (e.g., on-road vehicles), area sources (e.g., population-based emissions estimates), and natural emissions sources (e.g., fires). EI for each sector were developed using various datasets, models, and estimation techniques. The data sources and models used to develop the 2019 base case EI that were used in this SIP revision are listed in Table 3-4: *EI Data Sources for TCEQ 2019 Base Case*. A variety of datasets and interpolation techniques were used to develop the EI for the 2023 future case, which are described in Appendix A.

Table 3-4: EI Data Sources for TCEQ 2019 Base Case

EI Source Category	Sector/Geographic Area	Datasets/Models used for 2019 EI
Point	EGU	2019 Clean Air Market Program Data[15]
Point	Non-EGU, TX	2019 State of Texas Air Reporting System[16]
Point	Non-EGU, Non-TX	EPA 2016v1 Modeling Platform[17]
Non-Point	Oil & Gas, TX	2019 Railroad Commission of Texas
Non-Point	Oil & Gas, Non-TX	EPA 2017 Modeling Platform[18]
Non-Point	Off-Shore	2017 Bureau of Ocean Energy Management[19]
Mobile	On-Road, TX nonattainment areas	Motor Vehicle Emission Simulator (MOVES3)[20] - link-based
Mobile	On-Road, other	MOVES3 - county based
Mobile	Non-Road, TX	TexN2.2
Mobile	Non-Road, Non-TX	MOVES3
Mobile	Off-Road Shipping, tx_4km domain	2019 Automatic Identification System and vessel characteristic IHS 2020; MARINER v1
Mobile	Off-Road Shipping, us_12km domain	EPA 2016v1 Modeling Platform
Mobile	Off-Road Airports, TX nonattainment areas	Texas Transportation Institute (TTI) 2020 data

[15] https://campd.epa.gov/
[16] https://www.tceq.texas.gov/airquality/point-source-ei/psei.html
[17] https://www.epa.gov/air-emissions-modeling/2016v1-platform
[18] https://www.epa.gov/air-emissions-modeling/2017-emissions-modeling-platform
[19] https://www.boem.gov/environment/environmental-studies/ocs-emissions-inventory-2017
[20] https://www.epa.gov/moves/latest-version-motor-vehicle-emission-simulator-moves

EI Source Category	Sector/Geographic Area	Datasets/Models used for 2019 EI
Mobile	Off-Road Airports, other	EPA 2016v1 Modeling Platform
Mobile	Off-Road Locomotives, TX nonattainment areas	TTI 2019 data
Mobile	Off-Road Locomotives, other	EPA 2016v1 Modeling Platform
Area	Area, TX	2020 Air Emissions Reporting Requirements
Area	Area, Non-TX	EPA 2017 Modeling Platform
Natural	Biogenic	Biogenic Emissions Land-use Database (BELD5); BEIS v3.7[21] and Sparse Matrix Operation Kernel Emissions (SMOKE) v4.8
Natural	Fires	2019 MODIS and VIIRS; FINN v2.2
Other	International EI	2019 Community Emission Data System;[22] SMOKEv4.7_CEDS

Total anthropogenic emissions for a model episode day of June 12 in the 2019 base case and 2023 future year from within the DFW 2015 ozone NAAQS nonattainment area are listed in tons per day (tpd) in Table 3-5: *June 12 Episode Day 2019 Base Case Anthropogenic EI in the DFW 2015 Ozone NAAQS Nonattainment Area* and Table 3-6: *June 12 Episode Day 2023 Future Year Anthropogenic EI in the DFW 2015 Ozone NAAQS Nonattainment Area*. The June 12 sample episode day was chosen since it had high monitored ozone concentrations in the nonattainment area.

Mobile sources contributed the greatest amount of nitrogen oxides (NO_x) emissions and carbon monoxide (CO) emissions in the area. Area sources contributed the greatest amount of volatile organic compound (VOC) emissions. While certain sectors increase in emissions between the 2019 base case and the 2023 future case, there is an overall decrease in NO_x, VOC, and CO emissions.

Table 3-5: June 12 Episode Day 2019 Base Case Anthropogenic EI in the DFW 2015 Ozone NAAQS Nonattainment Area

Source Category	NO_x (tpd)	VOC (tpd)	CO (tpd)
On-Road	100.80	48.22	929.79
Non-Road	38.15	40.73	823.59
Off-Road - Airports	17.12	4.30	42.94
Off-Road - Locomotives	10.50	0.49	2.60
Area Sources	32.93	247.47	53.69
Oil and Gas - Drilling	0.20	0.01	0.01
Oil and Gas - Production	10.39	50.33	7.66
Point - Cement Kilns	9.78	1.25	16.02
Point - EGU	6.17	0.20	3.69

[21] https://drive.google.com/drive/folders/1v3i0iH3lqW36oyN9aytfkczkX5hl-zF0
[22] https://data.pnnl.gov/group/nodes/project/13463

Source Category	NO_x (tpd)	VOC (tpd)	CO (tpd)
Point - Non-EGU	15.00	25.48	19.68
Nine-County Total	**241.04**	**418.48**	**1,899.67**

Table 3-6: June 12 Episode Day 2023 Future Year Anthropogenic EI in the DFW 2015 Ozone NAAQS Nonattainment Area

Source Category	NO_x (tpd)	VOC (tpd)	CO (tpd)
On-Road	71.34	38.21	799.93
Non-Road	33.83	41.98	885.61
Off-Road - Airports	15.69	4.23	42.38
Off-Road - Locomotives	7.87	0.35	2.35
Area Sources	34.18	260.32	56.36
Oil and Gas - Drilling	0.19	0.01	0.01
Oil and Gas - Production	3.42	16.56	2.65
Point - Cement Kilns	15.22	1.36	17.53
Point - EGU	7.45	0.20	3.69
Point - Non-EGU	11.20	20.61	17.85
Nine-County Total	200.39	383.82	1,828.35
Difference between 2023 and 2019	**-40.65**	**-34.66**	**-71.32**

A map showing the spatial distribution changes in anthropogenic emissions of NO_x and VOC between the 2023 future case and the 2019 base case on a sample June 12 episode day is presented in Figure 3-8: *Difference in Anthropogenic NO_x between 2023 Future and 2019 Base Case on June 12 Modeled Episode Day* and Figure 3-9: *Difference in Anthropogenic VOC between 2023 Future and 2019 Base Case on June 12 Modeled Episode Day*. The decreases in NO_x emissions from on-road mobile sources are evident in the spokes that come out of the center of the nonattainment area which correspond to the roadways. Changes in anthropogenic VOC emissions have a distinct spatial disparity between the Fort-Worth area (western counties) and the Dallas area (eastern counties). The decreases in VOC are driven by the overall decrease in non-point oil and gas emissions between 2019 and 2023, whereas the increases are driven by increases from area sources.

~~Figure 3-8: Difference in Anthropogenic NO_x between 2023 Future and 2019 Base Case on June 12 Modeled Episode Day~~

Figure 3-9: Difference in Anthropogenic VOC between 2023 Future and 2019 Base Case on June 12 Modeled Episode Day

3.4.3 Initial and Boundary Condition Inputs

In addition to emissions and meteorological inputs, CAMx requires initial and boundary conditions (IC/BC). Initial conditions refer to the state of the atmosphere in the modeling domain at the start of the modeling episode. Boundary conditions refer to the state of the atmosphere at the five edges (North, South, East, West, and Top) of a domain. IC/BC were derived from the Goddard Earth Observing Station global atmospheric model with Chemistry (GEOS-Chem) model runs for 2019 and 2023. Lateral boundary conditions were developed for each grid cell along all four lateral boundaries of the outer 36 km modeling domain. Top boundary conditions were also developed to represent pollutant concentrations from atmospheric layers above the highest CAMx vertical layer.

The TCEQ contracted with the University of Houston to complete the GEOS-Chem model runs necessary for IC/BC development. The GEOS-Chem model simulations incorporated an eight-month period from March through October with a two-month spin-up time (January - February). A spin-up period is the period of days that precede the actual time period of interest for modeling. The spin-up period is used to ensure that the atmospheric conditions in the model are balanced. For both modeled years (2019 and 2023), GEOS-Chem version 12.7.1 was run at $2^{\circ} \times 2.5^{\circ}$ horizontal resolution using tropospheric chemistry with simplified secondary organic aerosols (Tropchem+simpleSOA) and 2019 meteorology from the Modern-Era Retrospective analysis for Research and Applications, Version 2 (MERRA-2). The 2023 future anthropogenic emissions were interpolated according to a moderate emission scenario from Representative Concentration Pathways (RCP4.5), with regional scaling factors for the United States, Canada, Mexico, and Asia. The 2023 and 2025 EIs from the EPA 2016v1 modeling platform were used to develop scaling factors at the county level for the United States and Mexico, and the provincial-level for Canada. For Asia, grided scaling factors were generated based on the latest available version (v6b) of the Evaluating the Climate and Air Quality Impact of Short-Lived Pollutants (ECLIPSE) inventory (Stohl et. al, 2015) from the International Institute for Applied Systems Analysis. Additional details of IC/BC development are presented in Section 4: *Initial and Boundary Conditions* of Appendix A.

3.5 PHOTOCHEMICAL MODELING PERFORMANCE EVALUATION

Model performance evaluation of the base case modeling is necessary to demonstrate the ability of the model to replicate the formation and transport of ozone given the meteorological and emissions inputs. The model's ability to suitably replicate real-life conditions is necessary to have confidence in the model's simulation of the future case ozone and the response to various control measures. Model performance evaluation (MPE) was performed by comparing 2019 base case CAMx modeling results to measured ozone concentrations within the DFW 2015 ozone NAAQS nonattainment area. This section provides a broad overview of model performance in the DFW 2015 ozone NAAQS nonattainment area, with a more in-depth analysis available in Section 5: *Photochemical Model Performance Evaluation* of Appendix A.

For this evaluation, statistical performance measures of Normalized Mean Bias (NMB) and the Normalized Mean Error (NME) were calculated by comparing monitored and four-cell bi-linearly interpolated modeled ozone concentrations for all episode days and monitors. These statistical parameters were compared to benchmarks set by Emery et al. (2017), which were based on a meta-analysis of the model performance statistics reported in peer-reviewed photochemical modeling studies. NMB values between ±5% are within the "goal" range for one-hour or MDA8 ozone concentrations outlined by Emery et al. (2017), indicate model performance within the range demonstrated by the top third of models runs evaluated. NMB values within ±15% are within the "criteria" range, which is comparable to the top two-thirds of model runs evaluated. For NME, the analysis from Emery et al. (2017) defined the goal range as less than 15% and the criteria range as less than 25%. Statistical metrics near the "goal" benchmarks are considered to be good performance, and statistical metrics near the "criteria" benchmark is considered acceptable performance.

As discussed in the EPA modeling guidance, operational performance evaluations should be conducted across various temporal and spatial scales. Performance evaluation metrics for MDA8 ozone concentrations across all monitors in the DFW 2015 ozone NAAQS nonattainment area for each month are presented in Table 3-7: *NMB and NME of Eight-Hour Average Ozone in the DFW 2015 Ozone NAAQS Nonattainment Area.* The values represent monthly averages from all DFW monitors shown Figure 3-3. Table 3-7 shows NMB and NME for three different subsections of the eight-hour average ozone data: all eight-hour averages when observed ozone was greater than or equal to 40 ppb, all MDA8 ozone values, and MDA8 ozone values when observed MDA8 ozone was greater than or equal to 60 ppb. Across all months and different subsections of data, NMB and NME metrics fell within the goal or criteria ranges from Emery et. al (2017). These metrics indicate that the 2019 base case CAMx modeling run had good performance relative to the performance benchmarks for photochemical models for ozone when looking broadly at the entire DFW 2015 ozone NAAQS nonattainment area for each month.

Table 3-7: NMB and NME of Eight Hour Average Ozone in the DFW 2015 Ozone NAAQS Nonattainment Area

Month	NMB All Obs. ≥ 40 ppb (%)	NME All Obs. ≥ 40 ppb (%)	NMB MDA8 Ozone (%)	NME MDA8 Ozone (%)	NMB MDA8 Ozone ≥ 60 ppb (%)	NME MDA8 Ozone ≥ 60 ppb (%)
Apr	-4.17	10.60	3.77	15.91	-6.24	9.22
May	2.17	12.24	13.08	19.26	-5.83	7.58
Jun	-4.61	16.49	4.40	17.71	-12.56	14.81
Jul	2.21	10.30	6.30	13.09	-4.15	10.45
Aug	2.54	9.76	3.86	10.85	-4.58	7.52
Sep	5.15	10.26	4.03	9.16	1.52	6.29
Oct	-3.15	8.50	2.30	10.43	-5.24	8.00
Apr through Oct	-0.24	11.32	5.43	13.81	-4.99	9.13

The NMB and NME for high-ozone days with MDA8 concentrations at or above 60 ppb for each monitor in the DFW 2015 ozone NAAQS nonattainment area for the whole modeling episode is presented in Figure 3-10: *NMB of MDA8 Ozone ≥ 60 ppb by Monitor* and Figure 3-11: *NME of MDA8 Ozone ≥ 60 ppb by Monitor*. Figure 3-10 shows that all monitors in the DFW area have NMB for this data aggregation within the criteria range, with seven monitors meeting the goal range. Most monitors had a negative bias, apart from the Fort Worth Northwest (C13) and Grapevine Fairway (C70) monitors which were slightly positively biased. All monitors in the nonattainment area had NME within the goal range for this data aggregation. By these metrics, the base case CAMx modeling has overall good to acceptable performance when replicating MDA8 ozone concentrations greater than or equal to 60 ppb in the DFW area.

Figure 3-10: NMB of MDA8 Ozone ≥ 60 ppb by Monitor

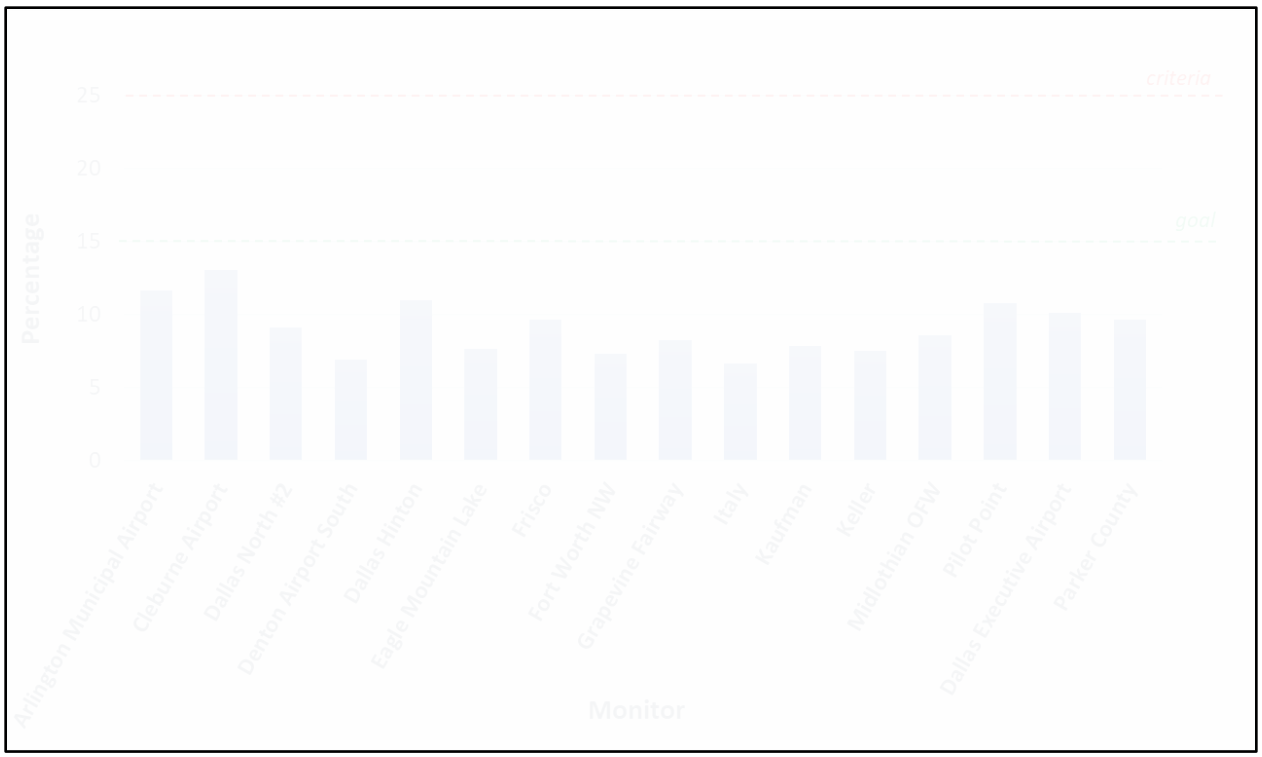

Figure 3-11: NME of MDA8 Ozone ≥ 60 ppb by Monitor

3.6 ATTAINMENT TEST

3.6.1 Future Year Design Values

In accordance with the EPA modeling guidance, the top 10 base case episode days with modeled eight-hour maximum concentrations above 60 ppb, per monitor, were used for the modeled attainment test. The relative response factor (RRF) that is used in the attainment test was calculated based on the EPA modeling guidance as follows:

- from the base case modeling, the maximum concentrations of the three-by-three grid cell array surrounding each monitor were averaged over the top-10 modeled days to produce the top-10 day average base case MDA8 values;
- from the future case modeling, the concentrations from the corresponding base case top-10 modeled days and maximum grid cells were averaged to calculate the future case top-10 day average future MDA8 values; and
- the RRF was calculated for each monitor as a ratio of the top-10 day average future case MDA8 values to the top-10 day average base case MDA8 values.

RRFs for each monitor included in the attainment test are shown in Table 3-8: *DFW Monitor-Specific Relative Response Factors for Attainment Test*. The Italy monitor was the only monitor that did not meet the criteria to be included in the RRF calculation, as it did not have at least five days with observed MDA8 ozone greater than or equal to 60 ppb in the modeling episode. All other regulatory monitors in the nonattainment area were included in the RRF calculation.

Table 3-8: DFW Monitor-Specific Relative Response Factors for Attainment Test

Monitor Name	CAMS Number	2019 Top 10-Day Modeled MDA8 Mean (ppb)	2023 Top 10-Day Modeled MDA8 Mean (ppb)	Relative Response Factor (RRF)
Arlington Municipal Airport	0061	68.22	67.54	0.990
Cleburne Airport	0077	67.47	66.46	0.985
Dallas Executive Airport	0402	67.41	67.21	0.997
Dallas Hinton	0401	72.70	71.25	0.980
Dallas North #2	0063	74.06	72.43	0.978
Denton Airport South	0056	75.43	73.02	0.968
Eagle Mountain Lake	0075	73.62	71.93	0.977
Frisco	0031	75.16	73.43	0.977
Ft. Worth Northwest	0013	72.91	71.60	0.982
Grapevine Fairway	0070	76.70	74.48	0.971
Kaufman	0071	65.87	66.20	1.005
Keller	0017	73.97	72.12	0.975
Midlothian OFW	0052	65.36	65.16	0.997
Parker County	0076	69.74	68.48	0.982
Pilot Point	1032	70.92	69.64	0.982

The RRF is then multiplied by the 2019 base case design value (DVB) to obtain the 2023 future case design value (DVF) for each ozone monitor. The 2019 DVB is calculated as the average of the 2019, 2020, and 2021 regulatory DVs, which is shown in Figure 3-12: *Example Calculation for the 2019 DVB*.

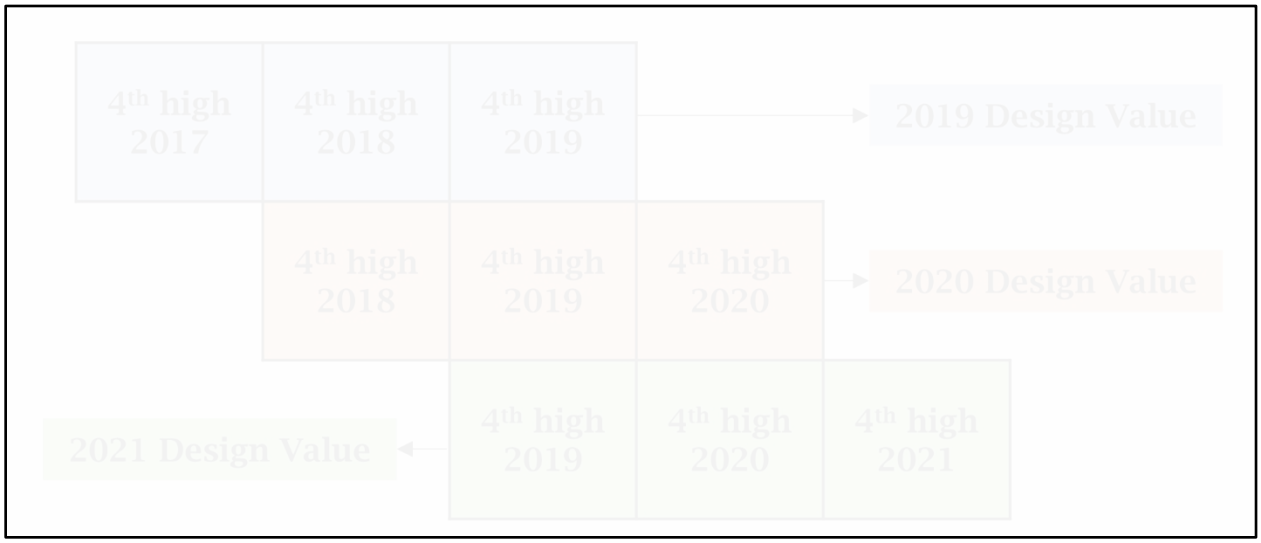

Figure 3-12: Example Calculation for the 2019 DVB

As required by the EPA modeling guidance, the final regulatory DVF is obtained by rounding to the tenths digit and truncating to zero decimal places. The DVFs for the

DFW 2015 ozone NAAQS nonattainment area are presented in Table 3-9*: Summary of the 2023 DVF for the Attainment Test*. Application of the attainment test results in seven monitors above the 2015 eight-hour ozone standard of 70 ppb in 2023: Cleburne Airport, Dallas North #2, Eagle Mountain Lake, Frisco, Grapevine Fairway, Keller, and Pilot Point. The highest DVF value is 73 ppb at the Frisco monitor. The monitors are mapped with their projected future year attainment status in Figure 3-13: *2023 DVF in the DFW 2015 Ozone NAAQS Nonattainment Area*.

Table 3-9: Summary of the 2023 DVF for the Attainment Test

Monitor Name	CAMS Number	2019 DVB (ppb)	2023 Pre-Truncated DVF (ppb)	2023 Truncated DVF (ppb)
Arlington Municipal Airport	0061	70.00	69.31	69
Cleburne Airport	0077	73.33	72.25	72
Dallas Executive Airport	0402	68.33	68.11	68
Dallas Hinton	0401	69.67	68.25	68
Dallas North #2	0063	74.00	72.34	72
Denton Airport South	0056	73.00	70.68	70
Eagle Mountain Lake	0075	74.33	72.66	72
Frisco	0031	75.33	73.60	73
Ft. Worth Northwest	0013	72.00	70.67	70
Grapevine Fairway	0070	75.00	72.84	72
Kaufman	0071	63.67	63.96	64
Keller	0017	73.00	71.17	71
Midlothian OFW	0052	64.00	63.81	63
Parker County	0076	68.67	67.46	67
Pilot Point	1032	73.00	71.69	71

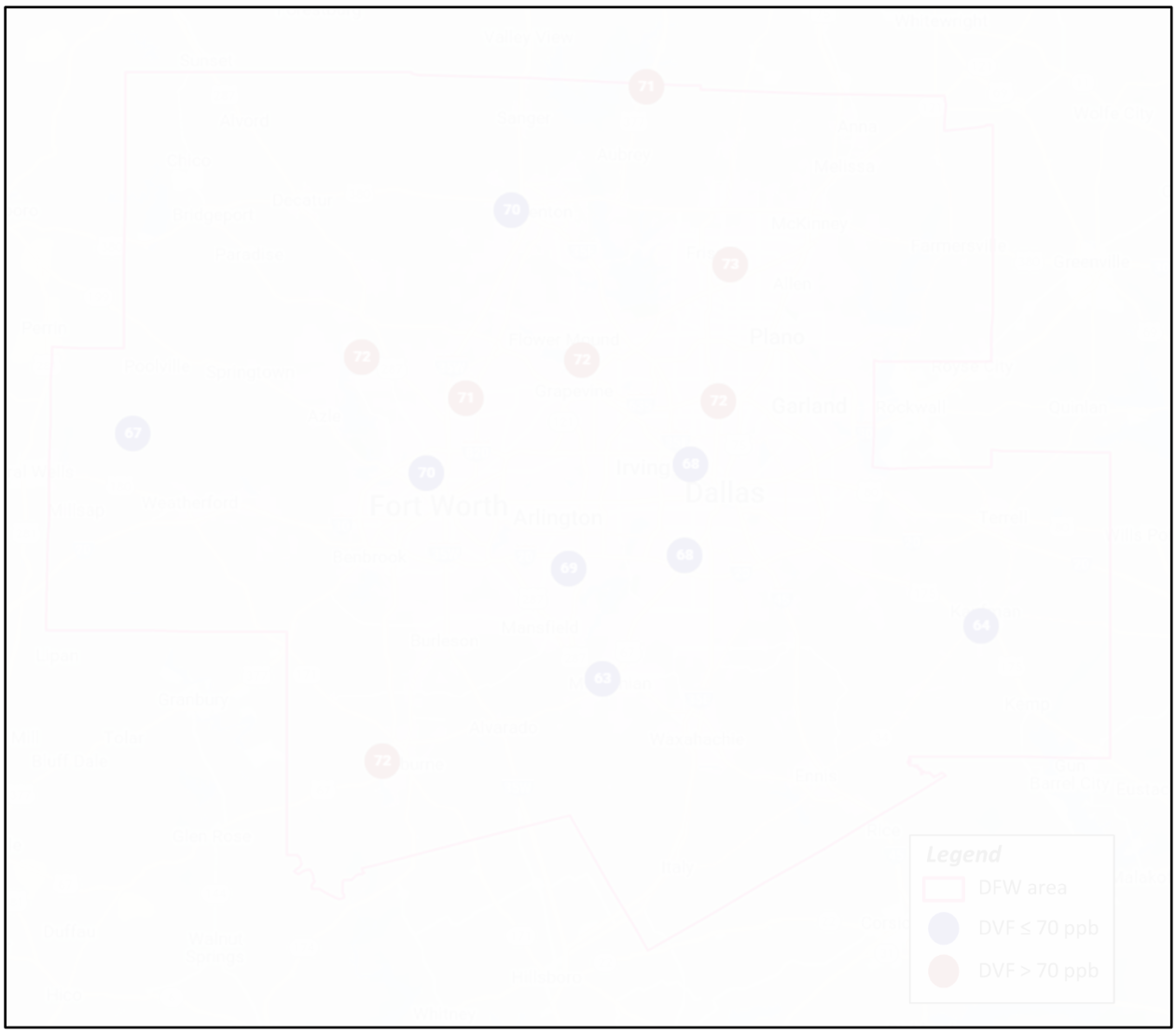

Figure 3-13: 2023 DVF in the DFW 2015 Ozone NAAQS Nonattainment Area

3.6.2 Emission Reduction Credits (ERC) Sensitivity Test Design Values

A sensitivity modeling run was performed to determine the impact of certified and potential (submitted applications that have not yet been certified) ERC on the 2023 DVF in the DFW 2015 ozone NAAQS nonattainment area. The sensitivity modeling run was performed to ensure that the emissions associated with ERCs remain surplus, as required by 30 Texas Administrative Code Chapter 101, Subchapter H, Division 1.

The ERC sensitivity test resulted in a 0.12 ppb increase to the maximum 2023 DVF in the DFW 2015 ozone NAAQS nonattainment area (73.59 ppb to 73.71 ppb at the Frisco monitor). The pre-truncated DVF increased across all regulatory monitors, with a maximum increase of 0.14 ppb at the Denton Airport South monitor. After rounding and truncation, the 2023 DVF for the ERC sensitivity did not change for any monitor except for the Grapevine Fairway monitor, which increased from 72 ppb to 73 ppb due to a 0.12 ppb difference. The maximum 2023 DVF in DFW remains at 73 ppb at the Frisco monitor and at the Grapevine Fairway monitor. Results from the ERC sensitivity

test are listed in Table 3-10: *DFW Future Year Design Values for ERC Sensitivity Test*. Additional details of the ERC sensitivity are provided in Section 3.3.1.3: *Sources in Non-Attainment Areas* of Appendix A.

Table 3-10: DFW Future Year Design Values for ERC Sensitivity Test

DFW Monitor	CAMS Number	ERC Sensitivity 2023 Pre-Truncated DVF (ppb)	Difference in 2023 DVF from ERC Sensitivity (ppb)	ERC Sensitivity 2023 Truncated DVF (ppb)
Arlington Municipal Airport	0061	69.44	0.13	69
Cleburne Airport	0077	72.33	0.09	72
Dallas Executive Airport	0402	68.22	0.11	68
Dallas Hinton	0401	68.37	0.12	68
Dallas North #2	0063	72.46	0.12	72
Denton Airport South	0056	70.82	0.14	70
Eagle Mountain Lake	0075	72.77	0.11	72
Frisco	0031	73.72	0.12	73
Ft. Worth Northwest	0013	70.78	0.11	70
Grapevine Fairway	0070	72.96	0.12	73
Italy	1044	63.53	0.05	63
Kaufman	0071	64.01	0.05	64
Keller	0017	71.28	0.11	71
Midlothian OFW	0052	63.85	0.04	63
Parker County	0076	67.58	0.12	67
Pilot Point	1032	71.79	0.10	71

3.7 MODELING REFERENCES

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CHAPTER 4: CONTROL STRATEGIES AND REQUIRED ELEMENTS

4.1 INTRODUCTION

The Dallas-Fort Worth (DFW) 2015 ozone National Ambient Air Quality Standard (NAAQS) nonattainment area, which consists of Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Tarrant, and Wise Counties, includes a wide variety of major and minor industrial, commercial, and institutional entities. The Texas Commission on Environmental Quality (TCEQ) has implemented regulations that address emissions of nitrogen oxides (NO_X) and volatile organic compounds (VOC) from these sources. This chapter describes existing ozone control measures for the DFW ozone nonattainment area, as well as the following moderate ozone nonattainment area state implementation plan (SIP) requirements for the 2015 eight-hour ozone NAAQS: reasonably available control technology (RACT)~~, reasonably available control measures (RACM), motor vehicle emissions budgets (MVEB), and contingency~~.

4.2 EXISTING CONTROL MEASURES

Since the early 1990s, a broad range of control measures have been implemented for each emission source category for ozone planning in the DFW ozone nonattainment area. For the 1979 one-hour ozone NAAQS, the DFW ozone nonattainment area consisted of four counties: Collin, Dallas, Denton, and Tarrant. For the 1997 eight-hour ozone NAAQS, the DFW ozone nonattainment area consisted of nine counties: Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant. Wise County was added to the nine-county nonattainment area for the 2008 eight-hour ozone NAAQS, resulting in a 10-county ozone nonattainment area. For the 2015 eight-hour ozone NAAQS, Rockwall County was not included in the nonattainment area designation, resulting in a nine-county ozone nonattainment area: Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Tarrant, and Wise counties. Table 4-1: *Existing Ozone Control and Voluntary Measures Applicable to the DFW 2015 Ozone NAAQS Nonattainment Area* lists the existing ozone control strategies that have been implemented for the one-hour and the 1997, 2008, and 2015 eight-hour ozone standards for the nine counties comprising the DFW 2015 ozone NAAQS nonattainment area. This includes NO_X and VOC rules to implement major source RACT for affected sources at a lower 25 tons per year (tpy) major source threshold for the 2008 severe ozone nonattainment classification (Rule Project Nos. 2023-116-115-AI and 2023-117-117-AI). These rules, which revised 30 Texas Administrative Code (TAC) Chapters 115 and 117, were submitted to EPA on May 7, 2024, and became effective May 16, 2024 (49 TexReg 3292). These measures have been added to Table 4-1. Implementation of major source VOC and NO_X RACT at the 25 tpy major source level includes all sites that are major at the 100 tpy moderate nonattainment classification.

Table 4-1: Existing Ozone Control and Voluntary Measures Applicable to the DFW 2015 Ozone NAAQS Nonattainment Area

Measure	Description	Start Date(s)
DFW Industrial, Commercial, and Institutional (ICI) Major Source Rule 30 Texas Administrative Code (TAC) Chapter 117, Subchapter B, Division 4	Applies to major sources (50 tons per year (tpy) of NO_x or more) with affected units in Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties NO_x emission limits for affected source categories include: boilers; process heaters; stationary gas turbines, and duct burners used in turbine exhaust ducts; lime kilns; heat treat and reheat metallurgical furnaces; stationary internal combustion engines; incinerators; glass, fiberglass, and mineral wool melting furnaces; fiberglass and mineral wool curing ovens; natural gas-fired ovens and heaters; brick and ceramic kilns; lead smelting reverberatory and blast furnaces; natural gas-fired dryers used in organic solvent, printing ink, clay, brick, ceramic tile, calcining, and vitrifying processes; and wood-fired boilers	March 1, 2009 or March 1, 2010, depending on source category January 1, 2017 for Wise County and for wood-fired boilers in all 10 counties of the DFW area
DFW ICI Minor Source Rule 30 TAC Chapter 117, Subchapter D, Division 2	Applies to all minor sources (less than 50 tpy of NO_x) with stationary internal combustion engines in Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties NO_x emission limits for stationary gas-fired, dual-fuel, and diesel-fired reciprocating internal combustion engines	March 1, 2009 for rich-burn gas-fired engines, diesel-fired engines, and dual-fuel engines March 1, 2010 for lean-burn gas-fired engines
Stationary Diesel and Dual-Fuel Engines 30 TAC Chapter 117, Subchapter B, Division 4 and Subchapter D, Division 2	Restrictions on operating stationary diesel and dual-fuel engines for testing and maintenance purposes between 6:00 a.m. and noon in Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties	March 1, 2009

Measure	Description	Start Date(s)
DFW Major Utility Electric Generation Source Rule 30 TAC Chapter 117, Subchapter C, Division 4	NO_x control requirements for major source (50 tpy of NO_x or more) utility electric generating facilities in Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties Applies to utility boilers, auxiliary steam boilers, stationary gas turbines, and duct burners used in turbine exhaust ducts used in electric power generating systems	March 1, 2009 for Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties January 1, 2017 for Wise County
Utility Electric Generation in East and Central Texas 30 TAC Chapter 117, Subchapter E, Division 1	NO_x emission limits for electric power boilers and stationary gas turbines (including duct burners used in turbine exhaust ducts) at utility electric generation sites in East and Central Texas, including Parker County	May 1, 2003 through May 1, 2005
DFW Cement Kiln Rule 30 TAC Chapter 117, Subchapter E, Division 2	NO_x emission limits for all Portland cement kilns located in Ellis County Voluntary agreed order No. 2017- 1648-SIP with TXI Operations, LP, limits #5 Kiln to 1.95 pounds of NO_x per ton of clinker	March 1, 2009 and August 8, 2018
NO_x Emission Standards for Nitric Acid Manufacturing – General 30 TAC Chapter 117, Subchapter F, Division 3	NO_x emission limits for nitric acid manufacturing facilities (state-wide rule – no nitric acid facilities in the DFW area)	November 15, 1999
East Texas Combustion Sources 30 TAC Chapter 117, Subchapter E, Division 4	NO_x emission limits for stationary rich-burn, gas-fired internal combustion engines (240 horsepower and greater) Measure implemented to reduce ozone in the DFW area although controls not applicable in the DFW area	March 1, 2010
Natural Gas-Fired Small Boilers, Process Heaters, and Water Heaters 30 TAC Chapter 117, Subchapter E, Division 3	NO_x emission limits on small-scale residential and industrial boilers, process heaters, and water heaters equal to or less than 2.0 million British thermal units per hour (state-wide rule)	July 1, 2002

Measure	Description	Start Date(s)
VOC Control Measures 30 TAC Chapter 115	VOC control measures adopted to satisfy reasonably available control technology (RACT) and other SIP planning requirements for sources including: vent gas, industrial wastewater, water separation, municipal solid waste landfills, batch processes, loading and unloading operations, VOC leak detection and repair, solvent-using processes, fugitive emission control in petroleum refining, natural gas/gasoline processing, and petrochemical processing, cutback asphalt, and pharmaceutical manufacturing facilities	December 31, 2002 and earlier for Collin, Dallas, Denton, and Tarrant Counties March 1, 2009 for Ellis, Johnson, Kaufman, Parker, and Rockwall Counties January 1, 2017 for Wise County
Degassing Operations 30 TAC, Chapter 115, Subchapter F, Division 3	VOC control requirements for degassing during, or in preparation of, cleaning any storage tanks and transport vessels in Collin, Dallas, Denton, and Tarrant Counties	May 21, 2011
Storage of VOC 30 TAC Chapter 115, Subchapter B, Division 1	Controls on fixed and floating roof tanks storing VOC liquids, including oil and condensate, based on the size of the tank and vapor pressure of the liquid being stored in Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties Audio-visual-olfactory inspections, repair requirements, and associated recordkeeping for certain fixed-roof oil and condensate tanks	January 1, 2017 and earlier

Measure	Description	Start Date(s)
Solvent-Using Processes 30 TAC Chapter 115, Subchapter E	Revised to implement RACT requirements per control technique guidelines published by the U.S. Environmental Protection Agency (EPA) Control, testing, monitoring and recordkeeping requirements for: paper, film, and foil coatings; large appliance coatings; metal furniture coatings; miscellaneous metal and plastic parts coatings; automobile and light-duty truck coating; industrial cleaning solvents; miscellaneous industrial adhesives; offset lithographic printing; and flexible package printing in Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties	March 1, 2013 for industrial cleaning solvents March 1, 2011 for major source offset lithographic printing lines March 1, 2012 for minor source offset lithographic printing lines January 1, 2017 for Wise County
Petroleum Dry Cleaning Systems 30 TAC Chapter 115, Subchapter F, Division 4	Control requirements for petroleum dry cleaning system dryers and filters at sources that use less than 2,000 gallons of petroleum solvent per year in Collin, Dallas, Denton, and Tarrant Counties	May 21, 2011
VOC RACT Rules for the Oil and Natural Gas Industry 30 TAC Chapter 115	VOC measures adopted for RACT addressing the emission source categories in the Control Techniques Guidelines for the Oil and Natural Gas Industry published by EPA on October 20, 2016	January 1, 2023
Refueling – Stage I 30 TAC, Chapter 115, Subchapter C, Division 2	Captures gasoline vapors that are released when gasoline is delivered to a storage tank Vapors returned to tank truck as storage tank is filled with fuel, rather than released into ambient air	1979 January 1, 2017 for Wise County A SIP revision related to Stage I regulations was approved by EPA, effective June 29, 2015
Texas Emissions Reduction Plan (TERP) 30 TAC Chapter 114, Subchapter K	Provides grant funds for on-road and non-road heavy-duty diesel engine replacement/retrofit.	January 2002 ~~See Section 5.3.1.4: *Texas Emissions Reduction Plan (TERP)*~~

Measure	Description	Start Date(s)
Texas Low Emission Diesel 30 TAC Chapter 114, Subchapter H, Division 2	Requires all diesel fuel for both on-road and non-road use to have a lower aromatic content and a higher cetane number	Phased in from October 31, 2005 through January 31, 2006
Vehicle Inspection/ Maintenance (I/M) 30 TAC Chapter 114, Subchapter C	Emissions tests for model year 2-24 gasoline-powered vehicles The DFW area meets the federal Clean Air Act (FCAA), §182(c)(3) requirements to implement an I/M program, and according to 40 Code of Federal Regulations (CFR) §51.350(b)(2), an I/M program is required to cover the entire urbanized area based on the 1990 census.	May 1, 2002 in Collin, Dallas, Denton, and Tarrant Counties May 1, 2003 in Ellis, Johnson, Kaufman, Parker, and Rockwall Counties
California Gasoline Engines	California standards for non-road gasoline engines 25 horsepower and larger	May 1, 2004
Transportation Control Measures	Various measures implemented under the previous one-hour and 1997 eight-hour ozone standards (see Appendix D: Reasonably Available Control Technology Analysis of the 2007 DFW 1997 Eight-Hour Ozone Attainment Demonstration SIP Revision) The North Central Texas Council of Governments (NCTCOG) has implemented all TCM commitments and provides an accounting of TCMs as part of the transportation conformity process.	Phased in through 2016
~~Voluntary Energy Efficiency/Renewable Energy (EE/RE)~~	~~See Section 5.3.1.2: *Energy Efficiency and Renewable Energy Measures*~~	~~See Section 5.3.1.2~~
Voluntary Mobile Emissions Reduction Program	Various pedestrian, bicycle, traffic, and mass transit voluntary measures committed to as part of the 2007 DFW 1997 Eight-Hour Ozone Attainment Demonstration SIP Revision and administered by NCTCOG	Phased in through 2009

Measure	Description	Start Date(s)
Federal On-Road Measures	Series of emissions limits implemented by EPA for on-road vehicles Included in measures: Tier 1, Tier 2, and Tier 3 light-duty and medium- duty passenger vehicle standards, heavy-duty vehicle standards, low sulfur diesel standards, National Low Emission Vehicle standards, and reformulated gasoline	Phase in through 2010 Tier 3 phase in from 2017 through 2025
Federal Area/Non- Road Measures	Series of emissions limits implemented by EPA for area and non-road emissions sources Examples: diesel and gasoline engine standards for locomotives and leaf-blowers	Phase in through 2018
VOC RACT for Major Sources in Wise County 30 TAC Chapter 115	Implements RACT to reflect lowering of the major source emissions threshold for source categories in Wise County due to reclassification change to serious for the 2008 eight-hour ozone NAAQS	July 20, 2021
NO_X RACT for Major Sources in Wise County 30 TAC Chapter 117	Implements RACT to reflect lowering of the major source emissions threshold for source categories in Wise County due to reclassification change to serious for the 2008 eight-hour ozone NAAQS	July 20, 2021
NO_X RACT Update for Major Sources in DFW 30 TAC Chapter 117	Reflects lowering of the major source emissions threshold for source categories in DFW due to reclassification change to severe for the 2008 NAAQS. Major source RACT was implemented at 25 tpy, which includes all sources that are major for the 2015 moderate major source level of 100 tpy.	May 16, 2024

Measure	Description	Start Date(s)
Contingency Measures and Updates to VOC RACT Rules for the Oil and Natural Gas Industry 30 TAC Chapter 115 Subchapter B, Division 7	Implement major source RACT at the lower 25 tpy major source threshold for the severe ozone nonattainment classification, which includes all sources that are major for the 2015 moderate major source level of 100 tpy, adds SIP contingency measures, and revisions to better align rules with EPA's 2016 Control Techniques Guidelines for the Oil and Natural Gas sector.	May 16, 2024

4.3 UPDATES TO EXISTING CONTROL MEASURES

4.3.1 Updates to NO_x Control Measures

Control measures addressing federal Clean Air Act (FCAA), §172 and §182 for the DFW ozone nonattainment area were last updated in a rulemaking adopted March 4, 2020 to address serious RACT requirements for the area under the 2008 ozone NAAQS. Rule Project No. 2023-117-117-AI was adopted April 24, 2024, submitted to EPA on May 7, 2024, and became effective May 16, 2024 (49 TexReg 3347). The rulemaking implemented major source RACT for affected sources at a lower 25 tpy major source threshold for the 2008 severe ozone nonattainment classification. All NO_x sources that are major at the 100 tpy moderate level were included in the RACT implementation at the 25 tpy severe level, so Rule Project No. 2023-117-117-AI also implemented NO_x RACT for major sources at the 100 tpy moderate major source level.

4.3.2 Updates to VOC Control Measures

Control measures addressing FCAA, §172 and §182 for the DFW ozone nonattainment area were last updated in a rulemaking adopted March 4, 2020 to address serious RACT requirements for the area under the 2008 ozone NAAQS and then again in a rulemaking adopted June 30, 2021 to implement the United States Environmental Protection Agency's (EPA) 2016 Control Techniques Guidelines for the Oil and Natural Gas Industry. Rule Project No. 2023-116-115-AI was adopted April 24, 2024, submitted to EPA on May 7, 2024, and became effective May 16, 2024 (49 TexReg 3292). The rulemaking implemented major source RACT for affected sources at a lower 25 tpy major source threshold for the 2008 severe ozone nonattainment classification and provided revisions to better align state rules with EPA's 2016 Control Techniques Guidelines for the Oil and Natural Gas. All VOC sources that are major at the 100 tpy moderate level were included in the RACT implementation at the 25 tpy severe level, so Rule Project No. 2023-116-115-AI also implemented VOC RACT for major sources at the 100 tpy moderate major source level.

4.3.3 Updates to Mobile Source Control Measures

On November 29, 2023, TCEQ adopted a rulemaking (Rule Project No. 2022-026-114-AI) and an associated SIP revision (2022-027-SIP-NR) to expand the state's vehicle inspection and maintenance (I/M) requirements to Bexar County. The rulemaking also removed Ellis, Johnson, Kaufman, Parker, Rockwall, and Wise Counties in the DFW area

from the list of affected counties required to comply with the state's low Reid vapor pressure (RVP) control requirements in 30 TAC Chapter 114, Subchapter H, Division 1.

On April 15, 2022, TCEQ adopted a rulemaking (Rule Project Number 2021-029-114-AI) to update I/M rules in 30 TAC Chapter 114 to be consistent with a change to the Texas Transportation Code required by Senate Bill (SB) 604, 86th Legislature, 2019 (SB 604). The updates related to allowing the display of a vehicle's registration insignia for certain commercial fleet or governmental entity vehicles on a digital license plate in lieu of attaching the registration insignia to the vehicle's windshield. The rulemaking to implement SB 604 did not include any new control measures. The administrative updates made to the I/M program as a result of the rulemaking to implement SB 604 are incorporated into the Bexar County I/M SIP revision (2022-027-SIP-NR). The Bexar County I/M SIP revision and the 30 TAC Chapter 114 rulemaking to implement I/M for Bexar County (Project No. 2022-026-114-AI), along with the previously adopted SB 604 rulemaking, were submitted to the EPA for consideration and approval on December 21, 2023.

4.4 RACT ANALYSIS

RACT regulations were adopted by the commission on April 24, 2024, as part of Rule Project No. 2023-116-115-AI and Rule Project No. 2023-117-117-AI, to implement severe RACT requirements in the DFW area under the 2008 ozone NAAQS. The RACT SIP and rule revisions were submitted to EPA on May 7, 2024. The CTG and ACT analysis in the 2008 NAAQS severe attainment demonstration, Project No. 2023-107-SIP-NR, along with the major source RACT analysis at the 25 tpy major source threshold, satisfy the requirements of a RACT analysis for a moderate classification because all major sources at 100 tpy were included in the RACT analysis at 25 tpy.

The RACT analysis submitted as part of this SIP revision is, with some clarifying amendments and updates, the RACT analysis included in the DFW Serious Classification AD SIP Revision for the 2008 Eight-Hour Ozone NAAQS (Project No. 2019-078-SIP-NR) that was adopted by the commission on March 4, 2020, and submitted to EPA on May 13, 2020. The 2020 RACT analysis is submitted as part of this SIP revision in Appendix D: *Reasonably Available Control Technology Analysis*. Two rulemakings resulted from that analysis to amend 30 TAC Chapter 117 NO_x rules and 30 TAC Chapter 115 VOC rules to implement RACT for the DFW 2008 ozone NAAQS serious nonattainment area. The TCEQ reaffirms the 2020 RACT analysis for this SIP revision for the DFW 2015 ozone NAAQS moderate nonattainment area and ~~will assess the need for any updates to existing control measures required~~ has updated control measures to satisfy RACT for the DFW 2008 ozone NAAQS severe nonattainment area in ~~a forthcoming~~ an attainment demonstration SIP revision ~~proposal~~ (Project No. 2023-107-SIP-NR) that was adopted by the commission on April 24, 2024 and submitted to EPA on May 7, 2024. Changes to Chapter 117 to implement NO_x rules for major sources at the 25 tpy major source threshold are described in Section 4.3.1, and changes to VOC rules to implement RACT at the 25 tpy major source threshold are described in Section 4.3.2.

4.5 RACM ANALYSIS

4.5.1 General Discussion

FCAA, §172(c)(1) requires states to provide for implementation of all RACM as expeditiously as practicable and to include RACM analyses in the SIP. In the general preamble for implementation of the FCAA Amendments published in the April 16, 1992 issue of the *Federal Register*, the EPA explains that it interprets FCAA, §172(c)(1) as a requirement that states incorporate into their SIP all RACM that would advance a region's attainment date; however, states are obligated to adopt only those measures that are reasonably available for implementation in light of local circumstances (57 FR 13498).

When performing RACM analyses, TCEQ uses the general criteria specified by EPA in the proposed approval of the New Jersey RACM analysis published in the January 16, 2009 issue of the *Federal Register* (74 FR 2945).

RACM is defined by EPA as any potential control measure for application to point, area, on-road, or non-road emission source categories that meets the following criteria:

- the control measure is technologically feasible;
- the control measure is economically feasible;
- the control measure does not cause "substantial widespread and long-term adverse impacts."
- the control measure is not "absurd, unenforceable, or impracticable;" and
- the control measure can advance the attainment date by at least one year.

The EPA did not provide guidance on how to interpret the criteria "advance the attainment date by at least one year." A control measure would have to be implemented by March 1, 2023, the beginning of the attainment year, to be considered as advancing attainment. Given the attainment date, advancing attainment is the only criteria of relevance for the purposes of this SIP revision.

4.5.2 Results of the RACM Analysis

The TCEQ determined that no potential control measures met the criteria to be considered RACM. Because it is not possible to implement any control measures before March 2023, no control measures can meet the criteria of advancing attainment of the NAAQS.

4.6 MOTOR VEHICLE EMISSIONS BUDGETS

An attainment-year MVEB represents the maximum allowable emissions from on-road mobile sources for an applicable criteria pollutant or precursor as defined in the SIP revision for the attainment year. Adequate or approved MVEBs must be used in transportation conformity analyses. The MVEB represents the summer weekday on-road mobile source emissions that was modeled for the AD and include all the on-road control measures reflected in Chapter 4: *Control Strategies and Required Elements* of this SIP revision. The on-road NO_x and VOC emissions inventories (EI) establishing these MVEBs were developed with version 3 of the Motor Vehicle Emission Simulator (MOVES3) model, and the resulting MVEBs are shown in Table 4-2: *2023 Attainment Demonstration MVEBs for the DFW 2015 Ozone NAAQS Nonattainment Area.*

~~**Table 4-2: 2023 Attainment Demonstration MVEBs for the DFW 2015 Ozone NAAQS Nonattainment Area (tons per day)**~~

~~Description~~	~~NO_x (tpd)~~	~~VOC (tpd)~~
~~2023 On-Road MVEBs based on MOVES3~~	~~71.34~~	~~38.21~~

~~For additional details regarding on-road mobile EI development, refer to Section 3: *Emissions Modeling* of Appendix A.~~

4.7 MONITORING NETWORK

The ambient air quality monitoring network provides data to verify the attainment status for areas under the 2015 eight-hour ozone NAAQS. TCEQ's monitoring network in the DFW area consists of 16 regulatory ambient air ozone monitors located in Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Tarrant, and Wise Counties. TCEQ and its local partners operate these ozone monitors at the following air monitoring sites:

- Arlington Municipal Airport (484393011);
- Cleburne Airport (482510003);
- Dallas Hinton (481130069);
- Dallas North number (#) 2 (481130075);
- Dallas Redbird Airport Executive (481130087);
- Denton Airport South (481210034);
- Eagle Mountain Lake (484390075);
- Fort Worth Northwest (484391002);
- Frisco (480850005);
- Grapevine Fairway (484393009);
- Italy (481391044);
- Kaufman (482570005);
- Keller (484392003);
- Midlothian OFW (481390016);
- Parker County (483670081); and
- Pilot Point (481211032).

The monitors are managed in accordance with EPA requirements prescribed by 40 CFR Part 58 to verify the area's attainment status. The TCEQ commits to maintaining an air monitoring network that meets EPA regulatory requirements in the DFW area. The TCEQ continues to work with EPA through the air monitoring network review process, as required by 40 CFR Part 58, to determine: the adequacy of the ozone monitoring network, additional monitoring needs, and recommended monitor decommissions. Details of the review of the air monitoring network can be found on TCEQ's Air Monitoring Network Plans webpage (https://www.tceq.texas.gov/airquality/monops/past_network_reviews). Air monitoring data from these monitors continue to be quality assured, reported, and certified according to 40 CFR Part 58.

~~4.8 CONTINGENCY PLAN~~

~~AD SIP revisions for nonattainment areas are required by FCAA, §172(c)(9) to provide for specific contingency measures that take effect and result in emissions reductions if an area fails to attain a NAAQS by the applicable attainment date or fails to demonstrate reasonable further progress. EPA has interpreted recent court decisions~~

to have invalidated key aspects of EPA's historical approach to implementing the contingency measure requirement. At the time this SIP revision was being developed, EPA had historically accepted the use of surplus emissions reductions from previously implemented control measures to fulfill the contingency measure requirements. However, EPA's new draft guidance on contingency measures, published in the *Federal Register* for public comment on March 23, 2023 (88 FR 17571), indicates that contingency measures must be conditional and prospective (not previously implemented) based on the recent court rulings. The draft guidance also establishes an entirely new scheme for determining the amount of emissions reductions necessary to address the contingency requirement.

Since EPA had not issued final guidance to states regarding contingency measures at the time this SIP revision was developed, this SIP revision relies on the historically approved approach of using surplus emissions reductions to fulfill the contingency measure requirements.

Under the historical approach, the General Preamble for implementation of the FCAA Amendments of 1990 published in the April 16, 1992 *Federal Register*, EPA interpreted the contingency requirement to mean additional emissions reductions that are sufficient to equal up to 3% of the emissions in the base year inventory (57 FR 13498). Similarly, EPA's 2015 eight-hour ozone standard SIP requirements rule (December 6, 2018, 83 FR 62998) states that contingency measures "should provide 1 year's worth of emissions reductions, or approximately 3 percent of the baseline emissions inventory." These emissions reductions should be realized in the year following the year in which the failure is identified.

This AD SIP revision uses the 2017 RFP base year inventory from the concurrent DFW and Houston-Galveston Brazoria (HGB) Moderate Classification RFP SIP Revision for the 2015 Eight-Hour Ozone NAAQS (Non-Rule Project Number 2022-23-SIP-NR) as the inventory from which to calculate the required 3% contingency reductions. The 3% contingency analysis for 2024 is based on a 1.5% reduction in NO_x and a 1.5% reduction in VOC, to be achieved during the one-year period from January 1, 2024 through December 31, 2024. Analyses were performed to assess emissions reductions for the 2024 contingency year from the federal emissions certification programs and for fuel control programs for both on-road and non-road vehicles.

A summary of the 2024 contingency analysis is provided in Table 4-3: *2024 DFW 2015 Ozone NAAQS Nonattainment Area Attainment Contingency Plan (tons per day).* The analysis demonstrates that the 2024 contingency reductions exceed the 3% reduction requirement; therefore, the AD contingency requirement is met based on the historical approach. Additional documentation for the attainment contingency demonstration calculations is available in the DFW-HGB 2015 Ozone NAAQS Moderate RFP SIP Revision (Project No. 2022-023-SIP-NR) for the 2015 Eight-Hour ozone NAAQS, which is scheduled to be considered for adoption concurrent with this AD SIP revision.

Table 4-3: 2024 DFW 2015 Ozone NAAQS Nonattainment Area Attainment Contingency Plan (tons per day)

Contingency Plan Description	NO_x	VOC
2017 DFW nine-county RFP base year (BY) EI	263.02	428.43
Percent for contingency calculation (total of 3%)	1.5	1.5
2023 to 2024 AD required contingency reductions (RFP BY EI x [contingency percent])	3.95	6.43
Control reductions to meet contingency requirements		
2023 to 2024 emission reductions due to post-1990 Federal Motor Vehicle Control Program, Inspection/Maintenance (I/M) Program, ultra-low sulfur diesel, on-road reformulated gasoline (RFG)[†], East Texas Regional Low RVP, 2017 Low Sulfur Gasoline Standard, and on-road Texas Low Emissions Diesel (TxLED)	26.33	15.22
2023 to 2024 emission reductions due to federal non-road mobile new vehicle certification standards, non-road RFG, and non-road TxLED	3.33	3.66
Total nine-county DFW AD contingency reductions	29.66	18.88
Contingency Excess (+) or Shortfall (-)	25.71	12.45

Note 1: The nine-county DFW area includes counties with federal RFG and counties with Texas Regional Low RVP. The four counties with federal RFG are: Collin, Dallas Denton and Tarrant. The five counties with Texas Regional Low RVP are: Ellis, Johnson, Kaufman, Parker, and Wise.

4.9 ADDITIONAL FCAA REQUIREMENTS

FCAA, §182 sets out a graduated control program for ozone nonattainment areas. According to EPA's final 2015 eight-hour ozone standard SIP requirements rule, states must submit a SIP element to meet each FCAA, §182 nonattainment area planning requirement for the 2015 eight-hour ozone NAAQS (83 FR 62998). Where an air agency determines that an existing regulation is adequate to meet the applicable nonattainment area planning requirements of FCAA, §182 for a revised ozone NAAQS, that air agency's SIP revision may provide a written statement certifying that determination in lieu of submitting new revised regulations. This section certifies that Texas meets all additional FCAA nonattainment area requirements applicable to the DFW 2015 ozone NAAQS nonattainment area for the moderate classification, including nonattainment new source review (NSR) program requirements, vehicle inspection and maintenance (I/M) program requirements, and Stage I vapor recovery requirements.

4.9.1 Nonattainment NSR Program

Ozone nonattainment area SIP revisions must include provisions to require permits for the construction and operation of new or modified major stationary sources. Major stationary sources in moderate ozone nonattainment areas are those sources emitting at least 100 tpy of a regulated pollutant. Minor stationary sources are all sources that are not major stationary sources.

An NSR permitting program for nonattainment areas is required by FCAA, §182(a)(2)(C) and further defined in 40 CFR Part 51, Subpart I (Review of New Sources and Modifications). Under these requirements, new major sources or major modifications at existing sources in an ozone nonattainment area must comply with the lowest achievable emissions rate and obtain sufficient emissions offsets.

Nonattainment NSR permits for ozone authorize construction of new major sources or major modifications of existing sources of NO_x or VOC in an area that is designated nonattainment for the ozone NAAQS. Emissions thresholds and pollutant offset requirements under the nonattainment NSR program are based on the nonattainment area's classification. The NSR offset ratio for moderate ozone nonattainment areas is 1.15:1.

EPA initially approved Texas' nonattainment NSR regulation for ozone on November 27, 1995 (60 FR 49781). TCEQ has determined that because the Texas SIP already includes 30 TAC §116.12 (Nonattainment and Prevention of Significant Deterioration Review Definitions) and 30 TAC §116.150 (New Major Source or Major Modification in Ozone Nonattainment Area), the nonattainment NSR SIP requirements are met for Texas for the DFW 2015 ozone NAAQS nonattainment area under the moderate classification.

Further, TCEQ already certified that Texas has EPA-approved rules that cover nonattainment NSR requirements for the DFW 2015 ozone NAAQS nonattainment area in the 2015 Eight-Hour Ozone NAAQS EI SIP Revision for the Houston-Galveston-Brazoria, Dallas-Fort Worth, and Bexar County Nonattainment Areas. On September 9, 2021, EPA published final approval of the emissions statement and nonattainment NSR certification statement portions of the EI SIP Revision (86 FR 50456).

4.9.2 I/M Program

Texas established a vehicle emissions testing program on January 1, 1995, meeting EPA's requirements for I/M programs. Enhanced vehicle emissions inspections have been implemented in eight of the nine counties in the DFW 2015 ozone NAAQS nonattainment area (Collin, Dallas, Denton, and Tarrant Counties on May 1, 2002, and in Ellis, Johnson, Kaufman, and Parker Counties on May 1, 2003). I/M program requirements are codified in 30 TAC Chapter 114, Subchapter C.

The DFW area meets the FCAA, §182(b)(4) requirements to implement an I/M program, and according to 40 CFR §51.350(b)(2), an I/M program is required to cover the entire urbanized area based on the 1990 census. As previously certified in the 2016 DFW 2008 Eight-Hour Ozone Standard Attainment Demonstration (AD) SIP Revision, the current I/M program in the DFW ozone nonattainment area sufficiently covers a population equal to the DFW urbanized area, thus expansion of the I/M program to include Wise County is not required. On June 14, 2017, EPA approved the portions of the 2016 DFW 2008 Eight-Hour Ozone Standard AD SIP Revision that describe how FCAA requirements for I/M are met in the DFW area for the 2008 eight-hour ozone NAAQS (82 FR 27122). The TCEQ has determined that the I/M program SIP requirements are met for Texas for the DFW 2015 ozone NAAQS nonattainment area.

A demonstration addressing EPA's requirement for I/M performance standard modeling for existing I/M programs is provided in Section 4.11: *I/M Program Performance Standard Modeling (PSM)*.

4.9.3 Stage I Vapor Recovery

Stage I vapor recovery is a control strategy to capture gasoline vapors that are released when gasoline is delivered to a storage tank. The vapors are returned to the tank truck

as the storage tank is being filled with fuel, rather than released to the ambient air. The EPA took a direct final action on April 30, 2015 (80 FR 24213) to approve revisions to the Texas SIP related to Stage I regulations. The TCEQ has determined that the Stage I vapor recovery SIP requirements are met for Texas for the DFW 2015 ozone NAAQS nonattainment area.

4.10 EMISSION CREDIT GENERATION

Because TCEQ is not submitting a photochemical modeling demonstration and related emissions inventory (EI) with this SIP revision, 2019 will remain the SIP emissions year. The 2019 SIP emissions year used for DFW emission credit generation was set by the 2024 DFW 2008 Eight-Hour Ozone Severe Classification AD SIP Revision (Non-Rule Project No. 2023-107-SIP-NR) that the commission adopted on April 24, 2024.

~~The Emissions Banking and Trading rules in 30 TAC Chapter 101, Subchapter H, Divisions 1 and 4 require sources in nonattainment areas to have SIP emissions to be eligible to generate emission credits. SIP emissions are the actual emissions from a facility or mobile source during the SIP emissions year, not to exceed any applicable local, state, or federal requirement. For point sources, the SIP emissions cannot exceed the amount reported to the state's EI; if no emissions were reported for a point source facility in the SIP emissions year, then the facility is not eligible for credits.~~

~~This SIP revision revises the SIP emissions year used for emission credit generation. If adopted and submitted to EPA, the new SIP emissions year will be 2019 for point source electric generating units with emissions recorded in EPA's Air Markets Program Database, 2019 for all other point sources with emissions recorded in TCEQ's STARS emissions database, 2019 for oil and gas area sources, 2020 for all other area sources, and 2019 for all mobile sources.~~

~~On April 9, 2021, TCEQ sent notice to point sources through agency email system and posted notice on TCEQ's website that 2019 point source emissions revisions for the STARS database must be provided by July 9, 2021 to be included in this SIP revision; as discussed in Chapter 2: *Anthropogenic Emissions Inventory Description*, those revisions were incorporated into this SIP revision.~~

4.11 I/M PROGRAM PERFORMANCE STANDARD MODELING (PSM)

On October 7, 2022, EPA published the final *Determinations of Attainment by the Attainment Date, Extensions of the Attainment Date, and Reclassification of Areas Classified as Marginal for the 2015 Ozone National Ambient Air Quality Standards* (87 FR 60897). This rule requires states to provide a demonstration that the existing or proposed I/M program for a newly designated or reclassified ozone nonattainment area meets the emissions reduction benchmarks specified for the area's ozone NAAQS classification level. The EPA interprets the I/M performance requirement to mean upon designation or reclassification that a proposed or existing I/M program must meet the I/M performance benchmark. These I/M emissions reductions should be realized in the attainment year or program implementation year.

Texas established a vehicle emissions testing program on January 1, 1995, meeting EPA's requirements for I/M programs. Enhanced vehicle emissions inspections have been implemented in eight of the nine counties in the DFW 2015 ozone NAAQS

nonattainment area (Collin, Dallas, Denton, and Tarrant Counties on May 1, 2002, and in Ellis, Johnson, Kaufman, and Parker Counties on May 1, 2003). I/M program requirements are codified in 30 TAC Chapter 114, Subchapter C.

TCEQ performed the required performance standard modeling analysis of the DFW 2015 ozone NAAQS nonattainment area using the requirements in the EPA guidance document, *Performance Standard Modeling for New and Existing Vehicle Inspection and Maintenance (I/M) Programs Using the MOVES Mobile Source Emissions Model* (EPA-420-B-22-034, October 2022). TCEQ specifically used the Enhanced Performance Standard that reflects the I/M program design elements as specified in 40 CFR §51.351(i) that are implemented in the DFW area. The assessment uses a 2023 analysis year, the attainment year under the 2015 ozone NAAQS for moderate nonattainment areas. The PSM analysis was performed for each of the eight counties within the DFW 2015 ozone NAAQS nonattainment area in which the DFW I/M program is required to operate. Wise County does not have an I/M program. Rockwall County is not included in this assessment because it is not located in the DFW 2015 ozone NAAQS nonattainment area. Summaries of the 2023 I/M PSM analysis are provided in:

- Table 4-4: *Summary of NO_X Performance Standard Evaluation for DFW 2015 Ozone NAAQS Nonattainment Area Existing I/M Program*; and
- Table 4-5: *Summary of VOC Performance Standard Evaluation for DFW 2015 Ozone NAAQS Nonattainment Area Existing I/M Program*.

Evaluating whether an existing I/M program meets the enhanced performance standard requires demonstrating that the existing program emission rates for NO_X and VOC do not exceed the benchmark program's emission rates. The benchmark program's emission rates include a 0.02 gram per mile buffer for each pollutant, as noted in Tables 4-4 and 4-5. The analysis demonstrates that the existing DFW area I/M program emissions rates do not exceed the performance standard benchmark emission rates for all eight counties required to operate an I/M program within the DFW 2015 ozone NAAQS nonattainment area. Therefore, the DFW area I/M program performance requirement is met.

All required documentation for the I/M program performance standard benchmark assessment is available in Appendix C: *Inspection and Maintenance (I/M) Program Performance Standard Modeling (PSM) for the Existing I/M Program in the DFW 2015 Ozone National Ambient Air Quality Standards Nonattainment Area*.

Table 4-4: Summary of NO_X Performance Standard Evaluation for DFW 2015 Ozone NAAQS Nonattainment Area Existing I/M Program

County	I/M Program NO_X Emission Rate	I/M NO_X Performance Standard Benchmark	I/M NO_X Performance Standard Benchmark Plus Buffer	Does Existing Program Meet I/M Performance Standard?
Collin	0.25	0.25	0.27	Yes
Dallas	0.26	0.26	0.28	Yes
Denton	0.30	0.29	0.31	Yes
Ellis	0.40	0.40	0.42	Yes
Johnson	0.47	0.47	0.49	Yes

County	I/M Program NO_x Emission Rate	I/M NO_x Performance Standard Benchmark	I/M NO_x Performance Standard Benchmark Plus Buffer	Does Existing Program Meet I/M Performance Standard?
Kaufman	0.46	0.46	0.48	Yes
Parker	0.54	0.54	0.56	Yes
Tarrant	0.26	0.26	0.28	Yes

Table 4-5: Summary of VOC Performance Standard Evaluation for DFW 2015 Ozone NAAQS Nonattainment Area Existing I/M Program

County	I/M Program VOC Emission Rate	I/M VOC Performance Standard Benchmark	I/M VOC Performance Standard Benchmark Plus Buffer	Does Existing Program Meet I/M Performance Standard?
Collin	0.17	0.17	0.19	Yes
Dallas	0.14	0.14	0.16	Yes
Denton	0.18	0.18	0.20	Yes
Ellis	0.14	0.14	0.16	Yes
Johnson	0.19	0.20	0.22	Yes
Kaufman	0.14	0.14	0.16	Yes
Parker	0.17	0.17	0.19	Yes
Tarrant	0.16	0.17	0.19	Yes

CHAPTER 5: WEIGHT OF EVIDENCE (NO CHANGE)

5.1 INTRODUCTION

The corroborative analyses presented in this chapter demonstrate the progress that the Dallas-Fort Worth (DFW) 2015 ozone National Ambient Air Quality Standard (NAAQS) nonattainment area is making towards attainment of the 70 parts per billion (ppb) standard. This corroborative information supplements photochemical modeling analyses presented in Chapter 3: *Photochemical Modeling*. The United States Environmental Protection Agency's (EPA) *Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze* (EPA 2018; hereafter referred to as modeling guidance) states that all modeled attainment demonstrations (AD) should include supplemental evidence that conclusions derived from basic attainment modeling are supported by other independent sources of information. This chapter details this supplemental evidence, i.e., the corroborative analyses, for this DFW AD State Implementation Plan (SIP) revision.

This chapter describes analyses that corroborate the conclusions of Chapter 3. Topics covered include ambient and emissions trends, background ozone trends, ozone chemistry, and meteorological influences on ozone. Analyses of ambient measurements corroborate modeling analyses and independently support the AD. More detail on ozone and emissions in the DFW area is provided in Appendix B: *Conceptual Model for the Dallas-Fort Worth Nonattainment Area for the 2015 Eight-Hour Ozone National Ambient Air Quality Standards*. This chapter also discusses results of additional air quality studies and their relevance to the DFW AD SIP. Finally, this chapter describes air quality control measures that are not quantified but are nonetheless expected to yield tangible air quality benefits, even though they were not included in the AD SIP modeling discussed in Chapter 3.

5.2 ANALYSIS OF AMBIENT TRENDS AND EMISSIONS TRENDS

The EPA's modeling guidance states that examining recently observed air quality and emissions trends is an acceptable method to qualitatively assess progress toward attainment. Declining trends in observed concentrations of ozone, its precursors and in emissions, past and projected, are consistent with progress toward attainment. The strength of evidence produced by emissions and air quality trends is increased if an extensive monitoring network exists.

The nine-county DFW 2015 ozone NAAQS nonattainment area has an extensive continuous air monitoring station (CAMS) network and as of 2022 has 16 regulatory ozone monitors, 15 nitrogen oxides (NO_x) monitors, and 15 automated gas chromatographs (auto-GC) for volatile organic compounds (VOC). An additional four regulatory ozone monitors are included in many of the following analyses but are outside the nine-county nonattainment area (Corsicana Airport, Granbury, Greenville, and Rockwall Heath). All ozone monitors in the DFW nine-county area report to EPA. Details for these monitors are listed in Table 5-1: *Monitor Information for the DFW Area*. More detail on nonregulatory monitors, monitor locations, and other parameters measured per monitor can be found on the Texas Commission on Environmental Quality (TCEQ) Air Monitoring Sites webpage (https://www.tceq.texas.gov/air quality/monops/sites/air-mon-sites). Ozone data used in this Chapter are from EPA's

Air Quality System (AQS). All other pollutant data is from Texas Air Monitoring Information System (TAMIS) unless otherwise noted.

Table 5-1: Monitor Information for the DFW Area

Monitor Name	Abbreviation	AQS No.[1]	CAMS No.[2]	Compounds or Parameters Measured
Frisco	FRI	480850005	0031, 0680	Ozone, meteorology
Dallas Hinton	HIN	481130069	0060, 0161, 0401, 3002	Ozone, meteorology, VOC, $PM_{2.5}$[3], NO_2
Dallas North #2	NO2	481130075	0063, 0679	Ozone, meteorology, NO_x
Dallas Redbird Airport Executive	RED	481130087	0402	Ozone, NO_x, meteorology
Dallas LBJ Freeway	LBJ	481131067	1067	NO_x, meteorology
Dallas Elm Fork	ELM	481131505	1505	VOC, meteorology
Denton Airport South	DEN	481210034	0056, 0157, 0163	Ozone, NO_x, $PM_{2.5}$, meteorology
Flower Mound Shiloh	FLO	481211007	1007	VOC, meteorology
DISH Airfield	DIS	481211013	1013	VOC, meteorology
Pilot Point	PIL	481211032	1032	Ozone, meteorology
Midlothian OFW	MID	481390016	0052, 0137	Ozone, NO_x, $PM_{2.5}$, meteorology
Italy	ITA	481391044	1044	Ozone, NO_x, meteorology
Granbury	GRB	482210001	0073, 0681	Ozone, meteorology
Greenville	GRE	482311006	0198, 1006	Ozone, NO_x, meteorology
Cleburne Airport	CLE	482510003	0077, 0682	Ozone, meteorology
Mansfield Flying L Lane	MAN	482511063	1063	VOC, meteorology
Godley FM2331	GOD	482511501	1501	VOC, meteorology
Kaufman	KAU	482570005	0071	Ozone, NO_x, $PM_{2.5}$, meteorology
Corsicana Airport	COR	483491051	1051	Ozone, NO_x, $PM_{2.5}$, meteorology
Parker County	PAR	483670081	0076	Ozone, meteorology
Rockwall Heath	ROC	483970001	0069	Ozone, meteorology
Eagle Mountain Lake	EAG	484390075	0075	Ozone, NO_x, VOC, meteorology
Fort Worth Northwest	FNW	484391002	0013	Ozone, NO_x, VOC, $PM_{2.5}$, meteorology
Everman Johnson Park	EVE	484391009	1009	VOC, meteorology
Arlington UT Campus	ARU	484391018	1018	VOC, meteorology
Fort Worth California Parkway North	CAL	484391053	1053	$PM_{2.5}$, NO_x, meteorology
Kennedale Treepoint Drive	KEN	484391062	1062	VOC, meteorology

Monitor Name	Abbreviation	AQS No.[1]	CAMS No.[2]	Compounds or Parameters Measured
Fort Worth Joe B. Rushing Road	RUS	484391065	1065	VOC, meteorology
Fort Worth Benbrook Lake	BEN	484391503	1503	VOC, meteorology
Keller	KEL	484392003	0017	Ozone, NO_x, meteorology
Grapevine Fairway	GRA	484393009	0070, 0182	Ozone, NO_x, meteorology
Arlington Municipal Airport	ARL	484393011	0061	Ozone, NO_x, meteorology
Decatur Thompson	DEC	484970088	0088	VOC, meteorology
Rhome Seven Hills Road	RHO	484971064	1064	VOC, meteorology

1 AQS: EPA's Air Quality System.
2 CAMS: Continuous Air Monitoring System.
3 Particulate matter equal to or less than 2.5 microns (micrometers) in width.

This section examines emissions and ambient concentration trends from the extensive ozone and ozone precursor monitoring network in the DFW area. Appendix B provides additional details on ozone formation in the region. Overall, observed ozone levels have declined since 2012 despite increases in the population of the DFW 2015 ozone NAAQS nonattainment area, a strong economic development pattern, and growth in vehicle miles traveled (VMT).

5.2.1 Ozone Trends

Because ozone varies both temporally and spatially, there are several ways that trends in ozone concentrations are analyzed. This section will discuss ozone design value trends, trends in the fourth-highest eight-hour ozone concentrations, trends in ozone exceedance days, and background ozone trends.

5.2.1.1 Ozone Design Value Trends

A design value is the statistic used to determine compliance with the NAAQS. For the 2015 eight-hour ozone NAAQS, design values are calculated by averaging the fourth-highest daily maximum eight-hour averaged (MDA8) ozone values at each regulatory monitor over three years. The eight-hour ozone design value for a metropolitan area is the maximum design value from all the area's regulatory monitors' individual design values. Design values of 71 ppb and greater exceed the 2015 eight-hour ozone NAAQS of 70 ppb.

Figure 5-1: *Eight-Hour Ozone Design Values in the DFW Area* shows that ozone design values have decreased in the DFW 2015 ozone NAAQS nonattainment area. The 2022 eight-hour ozone design value is 77 ppb, a slight increase from the 2021 value of 76 ppb, the lowest ever recorded in DFW. This 2022 value is an 11% decrease from the 2012 design value of 87 ppb. Ozone decreases may be due to changes in meteorology, background ozone, and/or emissions.

Figure 5-1: Eight-Hour Ozone Design Values in the DFW Area

Because ozone levels vary spatially, it is also prudent to investigate trends at all monitors in an area. Figure 5-2: *Eight-Hour Ozone Design Values by Monitor in the DFW Area* displays eight-hour design values from 2012 through 2022 at each monitor in the DFW area. Individual monitor trends are less important for assessing progress towards compliance with federal ozone standards than the overall range in design values across the area. The figure demonstrates that design values have been decreasing across the DFW area, not only at the monitor with the highest design value. In 2012, only two monitors in the DFW area measured below the 2015 ozone NAAQS. In 2022, three-quarters of DFW monitors recorded design values below the NAAQS.

Figure 5-2 also shows how the monitor with the highest eight-hour ozone design value in the DFW area changed over time. In 2012, Keller recorded the highest design value in the DFW area. For the next five years, Denton Airport South recorded the highest design values. The highest design value monitor was Grapevine Fairway in 2018, then Dallas North #2 in 2019, then Grapevine Fairway again in 2020. Finally, in 2021 and 2022, Pilot Point recorded the highest design values.

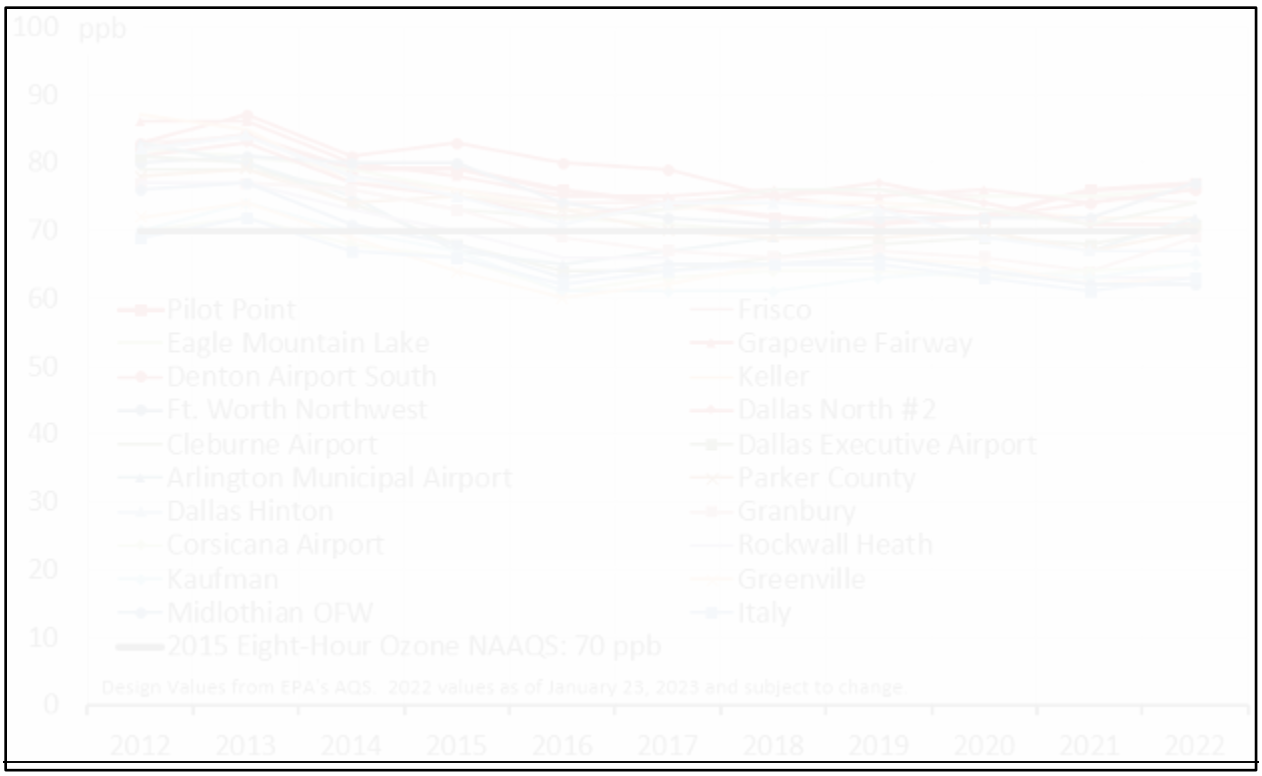


Figure 5-2: Eight-Hour Ozone Design Values by Monitor in the DFW Area

Displaying monitor level eight-hour ozone design values on a map can provide better insight into ozone formation patterns within the DFW area. Figure 5-3: *Map of 2022 Design Values at DFW Area Monitors* shows that nine of 16 ozone monitors in the DFW area attained the 2015 ozone NAAQS in 2022, while six attained the 2008 ozone NAAQS, and five failed to attain either.

Figure 5-3: Map of 2022 Design Values at DFW Area Monitors

Eight-hour ozone design values in the DFW area from 2012, 2016, and 2021 were also interpolated spatially using the kriging method.[23] Figure 5-4: *Map of Eight-Hour Ozone Design Values for the DFW Area* shows how much eight-hour ozone design values have decreased across the DFW area. As eight-hour ozone design values have decreased across the area, the highest design values continue to occur to the north and northwest of the DFW area, while the lowest design values continue to be observed to the east and southeast. This supports the findings of prior DFW ozone formation investigations that showed the prevailing winds from the east or southeast carry ozone and precursors across the most urbanized portions of Dallas and Fort Worth to the north and northwest of the metro area.

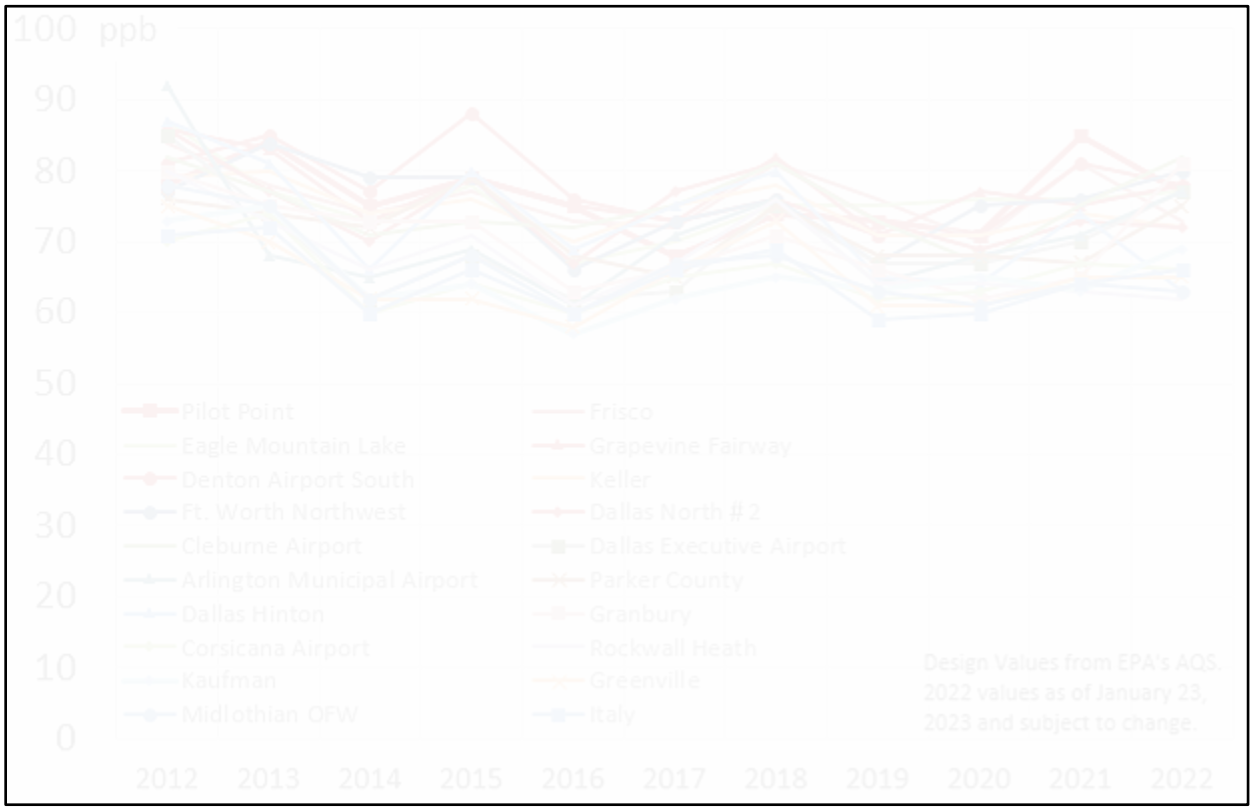
[23] Kriging interpolation is a method that uses a limited set of sampled points to estimate the value of a variable over a continuous spatial field.

Figure 5-4: Map of Eight-Hour Ozone Design Values for the DFW Area

5.2.1.2 Fourth-Highest Eight-Hour Ozone Trends

Because eight-hour ozone design values are three-year averages, trends tend to be smooth, making year-to-year variations in ozone concentrations due to factors such as meteorology less apparent. Investigating trends in annual fourth-highest MDA8 ozone concentrations can provide more insight into each individual year. Annual fourth-highest MDA8 ozone trends can also help determine what levels of ozone are required for the area to monitor attainment. Area-wide annual fourth-highest MDA8 ozone trends are not very instructive because design values are calculated on a per monitor basis. Instead, fourth-highest MDA8 ozone trends are investigated at each monitor. Figure 5-5: *Fourth-Highest MDA8 Ozone Concentration by Monitor in the DFW Area* shows data from 2010 though 2022 to examine all years used in 2012 through 2022 design value computations.

These trends show there is greater variability in fourth-highest MDA8 ozone values compared to design values and a single adverse year can disrupt years of progress. Ozone concentrations are subject to substantial variability from various factors interacting with ozone conducive meteorology, which are discussed later in this chapter. For example, the 2020 annual fourth-highest reading at Pilot Point was 70 ppb. This is compelling evidence that monitors that record the highest fourth-highest ozone concentrations can record much lower values, but for meteorological variability or other factors beyond the control of state and local authorities. Even though some DFW monitors occasionally record annual fourth-highest values in the upper 70s and 80s, they frequently record values much lower, often in attainment.



~~Figure 5-5: Fourth-Highest MDA8 Ozone Concentration by Monitor in the DFW Area~~

~~5.2.1.3 Background Ozone Trends~~

~~Regional background ozone, which will be referred to as background ozone for the remainder of this section, reflects the ozone produced from all sources outside the nine-county DFW 2015 ozone NAAQS nonattainment area. Examination of background ozone trends provides insight into whether observed ozone changes are from locally produced ozone or from transported ozone. The technique for estimating background ozone concentrations, which uses the lowest MDA8 ozone value from selected sites to determine background ozone concentrations, is detailed in Appendix B.~~

~~Locally produced ozone (within the DFW area) was calculated by subtracting the estimated background ozone concentration from the highest MDA8 ozone value for the area. Results were then separated into low ozone days and high ozone days to investigate if high ozone is due to changes in background ozone or changes in local ozone. For this analysis, high ozone days includes all days with an MDA8 ozone value greater than 70 ppb. Low ozone days includes all days with an MDA8 ozone value less than or equal to 70 ppb.~~

~~To focus on months that observe the highest eight-hour ozone concentrations, this analysis used ozone data from only the months of March through October. These months will be referred to as the ozone season for the remainder of this chapter.~~

~~Figure 5-6: *Ozone Season Trends in MDA8 Ozone, Background Ozone, and Locally Produced Ozone for High versus Low Ozone Days in the DFW Area* shows that the 2022~~

area-wide median background ozone was 38 ppb on low ozone days and 47 ppb on high ozone days. Although background ozone is higher on high ozone days, local ozone production is also higher on these days. For both high and low ozone days, background ozone accounts for approximately two-thirds of the MDA8 ozone and locally produced ozone accounts for approximately one-third of the MDA8 ozone. Background ozone, MDA8 ozone, and locally produced ozone are stable on low ozone days. On high ozone days, background ozone concentrations are slightly lower over the 10-year period and locally produced ozone concentrations are slightly higher, resulting in a flat MDA8 ozone trend.

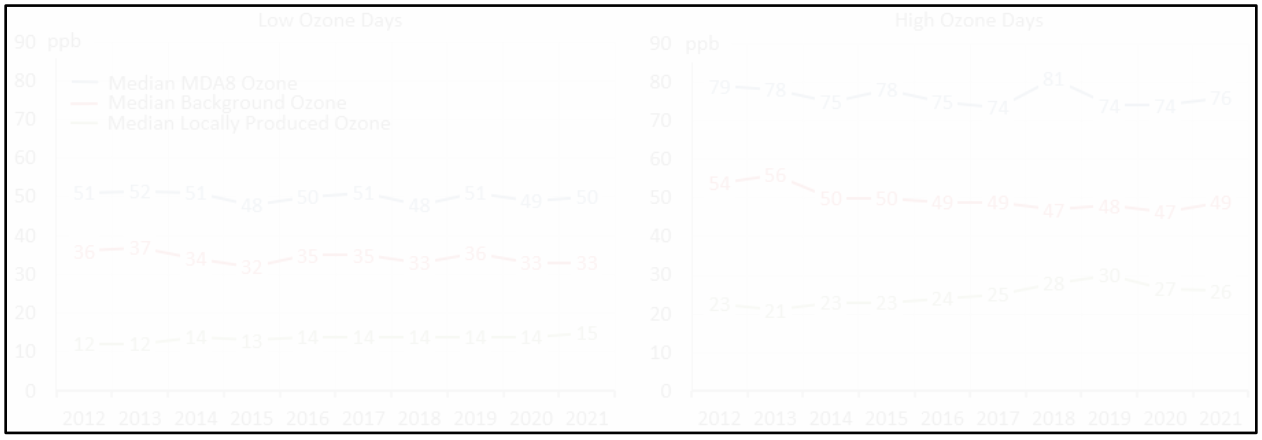


Figure 5-6: Ozone Season Trends in MDA8 Ozone, Background Ozone, and Locally Produced Ozone for High versus Low Ozone Days in the DFW Area

5.2.2 NO_x Trends

NO_x, a precursor to ozone formation, is a mixture of nitrogen oxide (NO) and nitrogen dioxide (NO_2). NO_x is primarily emitted by fossil fuel combustion, lightning, biomass burning, and soil. Examples of common NO_x emission sources in urban areas are automobiles, diesel engines, other small engines, residential water heaters, industrial heaters, flares, and industrial and commercial boilers. Mobile, residential, and commercial NO_x sources are usually numerous smaller sources distributed over a large geographic area, while industrial sources are usually large point sources, or numerous small sources, clustered in a small geographic area. Because of the large number of NO_x sources, elevated ambient NO_x concentrations can occur throughout the DFW area.

Because NO_x reacts in the presence of sunlight, NO_x concentrations tend to be lower in the summer and higher in the winter. To focus on NO_x values that lead to ozone formation, this analysis uses only NO_x concentrations that occur during the ozone season, from March through October.

Since 2012, there have been at least 15 NO_x monitors operating in the DFW area, all of which report data to EPA. Two monitors are near highly trafficked roadways: Dallas LBJ Freeway (Interstate 635, began operation April 1, 2014) and Fort Worth California Parkway North (Interstate 20, began March 12, 2015). These near-road monitors provide valuable information about on-road mobile sources, but because of their proximity to sources, they tend to record high NO_x concentrations, which must be considered in comparisons across time periods.

All valid hours and years of ozone season NO_x concentrations were used to calculate median and 95th percentile NO_x trends. The 95th percentile represents NO_x values at the upper end of the distribution, which are most influential on ozone formation, while the median represents a typical NO_x concentration. Figure 5-7: *Ozone Season NO_x Trends in the DFW Area* shows the 95th percentile of the NO_x distribution increased 20% from 2012 through 2021. The median ozone season NO_x concentration was steady over this period. Excluding near-road monitors, 95th percentile and median NO_x concentrations fell 13.0% and 10.4%, respectively. More detailed analysis of NO_x trends, including monitor level trends, is available in Appendix B.

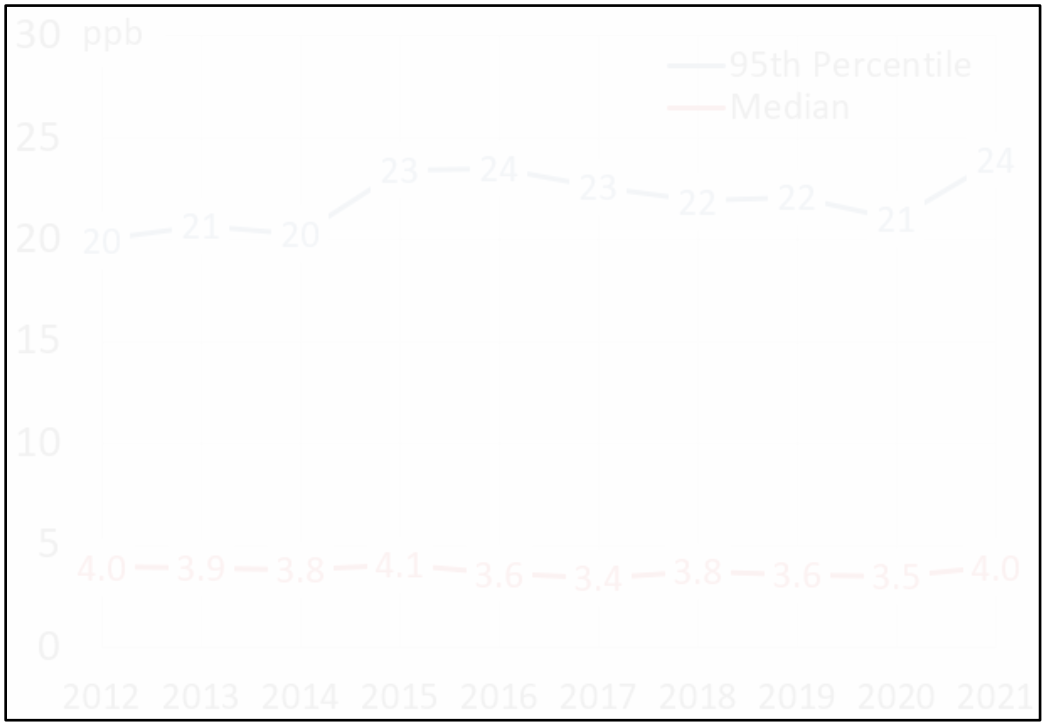


Figure 5-7: Ozone Season NO_x Trends in the DFW Area

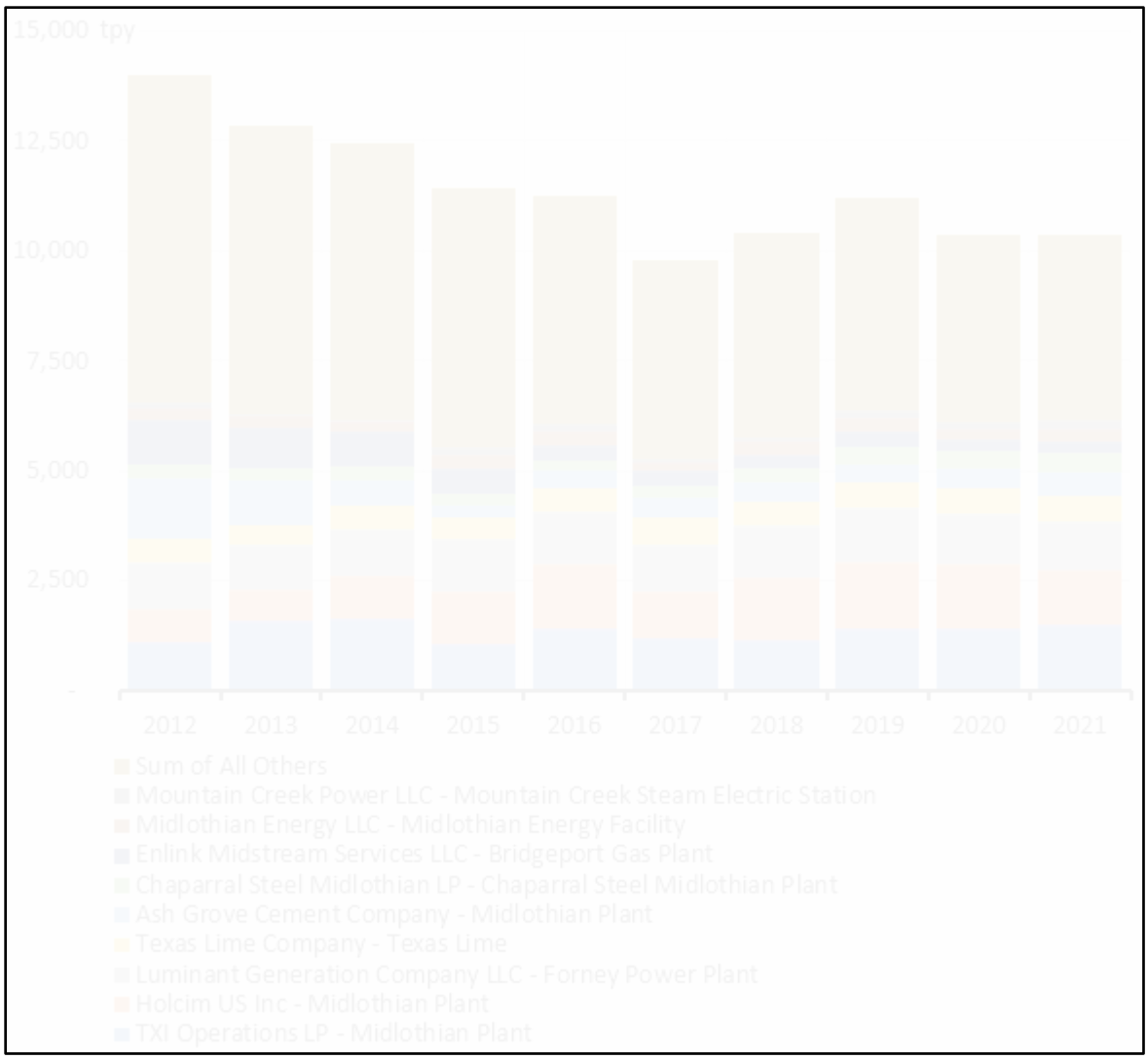
Like ozone, NO_x concentrations can vary based on location. NO_x values tend to be higher at monitors located in urban areas or near large NO_x sources. Due to these variations, ozone season NO_x trends were examined at the 15 NO_x monitors used to determine area-wide trends. In addition, NO_x concentrations were checked for completeness because incomplete data may show inaccurate trends. Only days and years with at least 75% complete data were used in this analysis.

From the late 1990s to the present, federal, state, and local measures have resulted in significant NO_x reductions from on-road and non-road mobile sources within the DFW area. The TCEQ funded a study by the Texas Transportation Institute (TTI) to estimate on-road mobile emissions trends throughout Texas from 1999 through 2050 using the 2014a version of the Motor Vehicle Emission Simulator (MOVES2014a) model (TTI 2015). On-road emissions in the DFW area are estimated to have large decreases from 1999 through 2021 and beyond, even as daily VMT is estimated to increase. This reduction in on-road NO_x is projected to continue as older, higher-emitting vehicles are removed from the fleet and are replaced with newer, lower-emitting ones.

A similar pattern is reflected in a TCEQ non-road emissions trends analysis using the Texas NONROAD (TexN) model. Non-road emissions are estimated to decrease from 1999 through 2021 and beyond even as the number of non-road engines, based on equipment population, has increased. As with the on-road fleet turnover effect, reductions in non-road NO_x emissions are projected to continue as older, higher-emitting equipment is removed from the fleet and replaced with newer, lower-emitting equipment.

Point source NO_x emission trends from the State of Texas Air Reporting System (STARS) were also investigated. These emissions are from sources that meet the reporting requirements under the TCEQ emissions inventory rule (30 Texas Administrative Code (TAC) §101.10). Emissions from 2021 were not available in time to be included in this analysis. The emissions trends analysis uses 10 years of data from 2011 through 2020.

Emissions trends by site are displayed in Figure 5-8: *DFW Area Point Source NO_x Emissions by Site*. Because the DFW area has so many point sources, only the top emitters are displayed. All other point source emissions in the DFW area were added together and displayed as the Sum of All Others. Point source NO_x emission trends show that the top nine reporting sites accounted for 60% of the total point source NO_x emissions in the DFW area in 2021. Each of these sites report total NO_x emissions exceeding 200 tons in 2021.The overall trend in NO_x emissions is a decline of 26% since 2012.



~~Figure 5-8: DFW Area Point Source NO_x Emissions by Site~~

~~Figure 5-9: *Map of Stationary NO_x Emissions Sources in the DFW Area* shows that NO_x emissions sources are scattered throughout the metropolitan area, with the largest NO_x emitters located south and southeast. As shown in Appendix B, on high ozone days, typically winds travel from the southeast, where the largest NO_x sources are located, and carry these emissions over the city centers where they mix with other urban emissions and form ozone. Over the course of the morning and early afternoon, this ozone is then conveyed to the north and northwest, where it is measured by surface monitors in mid-afternoon. NO_x emissions are reported here in units of tons per year (tpy).~~

Figure 5-9: Map of Stationary NO_x Emissions Sources in the DFW Area

5.2.3 VOC Trends

Total non-methane organic compounds (TNMOC), which is used to represent total VOC concentrations, can enhance ozone production in combination with NO_x and sunlight. VOC is emitted from numerous sources including large industrial process, automobiles, solvents, paints, dry cleaning, fuels, and even natural sources such as trees.

Two types of instruments record VOC data in the DFW area: auto-GCs, which record hourly measurements; and canisters, which record 24-hour totals. Due to the reactive nature of VOCs, hourly auto-GC measurements are preferred when assessing trends. The DFW area currently has 15 auto-GC monitors. To focus on VOC concentrations that affect ozone formation, this analysis uses only ozone season data from March through October. To remove effects of incomplete data on VOC trends, data was first checked for validity. Fourteen of fifteen monitors had nine or more valid years of data for ozone seasons from 2012 through 2021 and were used in this analysis. A year was considered valid if there were at least 75% valid days of data during ozone season and a day was considered valid if there were at least 75% valid hours recorded for that day.

All valid hours and years were used to calculate ozone season median and 95th percentile ambient TNMOC trends. The 95th percentile shows trends at the highest levels while the median shows the central tendency. Figure 5-10*: Ozone Season Median and 95th Percentile TNMOC Trends in the DFW Area* shows both ozone season median and 95th percentile TNMOC concentrations have declined over the period, with the median declining 17%, and the 95th percentile declining 27%. The declines occurred before 2017, with no trend in the median since 2017 and a slight increase in the 95th percentile.

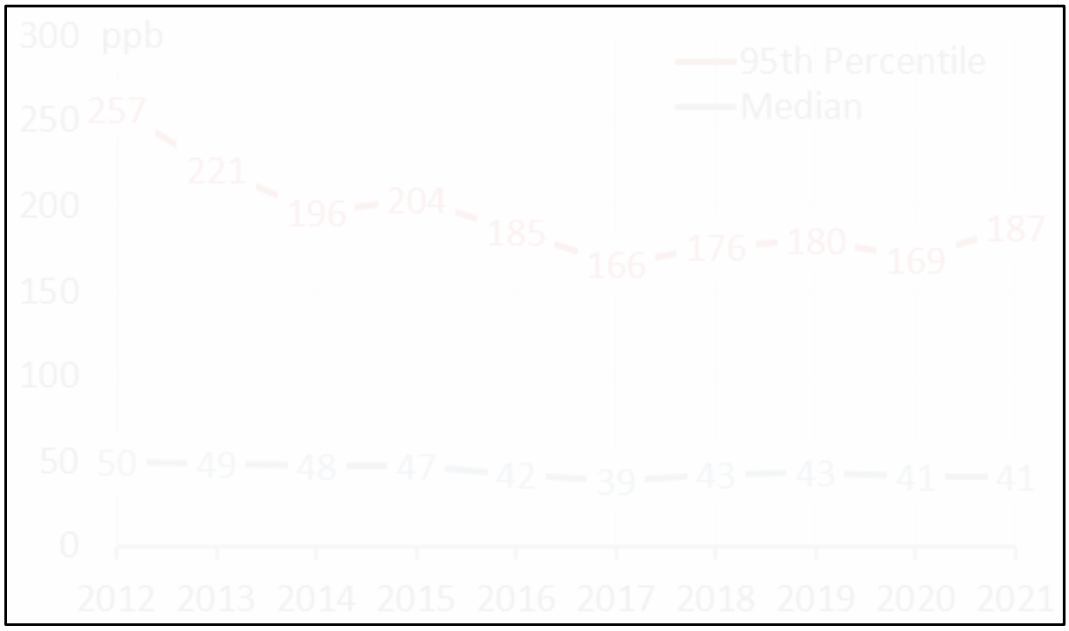


Figure 5-10: Ozone Season Median and 95th Percentile TNMOC Trends in the DFW Area

From the late 1990s to the present, federal, state, and local measures have resulted in VOC reductions from on-road and non-road emissions sources within the DFW area. The TCEQ studies mentioned in Section 5.2.2 showed decreases in on-road and non-road VOC from 1999 through the present. These reductions are projected to continue as older, higher-emitting vehicles and equipment are removed from the fleet and replaced with newer, lower-emitting ones.

Point source VOC emission trends from STARS were also investigated. Figure 5-11: *DFW Area Point Source VOC Emissions by Site* shows that the top six reporting sites accounted for 27% of the total DFW area point source VOC emissions in 2021. Each of these sites reported total VOC emissions exceeding 250 tons in 2021, with the three largest emitters reporting 20% of the total. Overall, VOC emissions are decreasing, with an 32% decrease from 2012 through 2021, though the rate of decline slowed after 2016. This correlates with ambient VOC trends for the DFW area. For more information, see Appendix B.

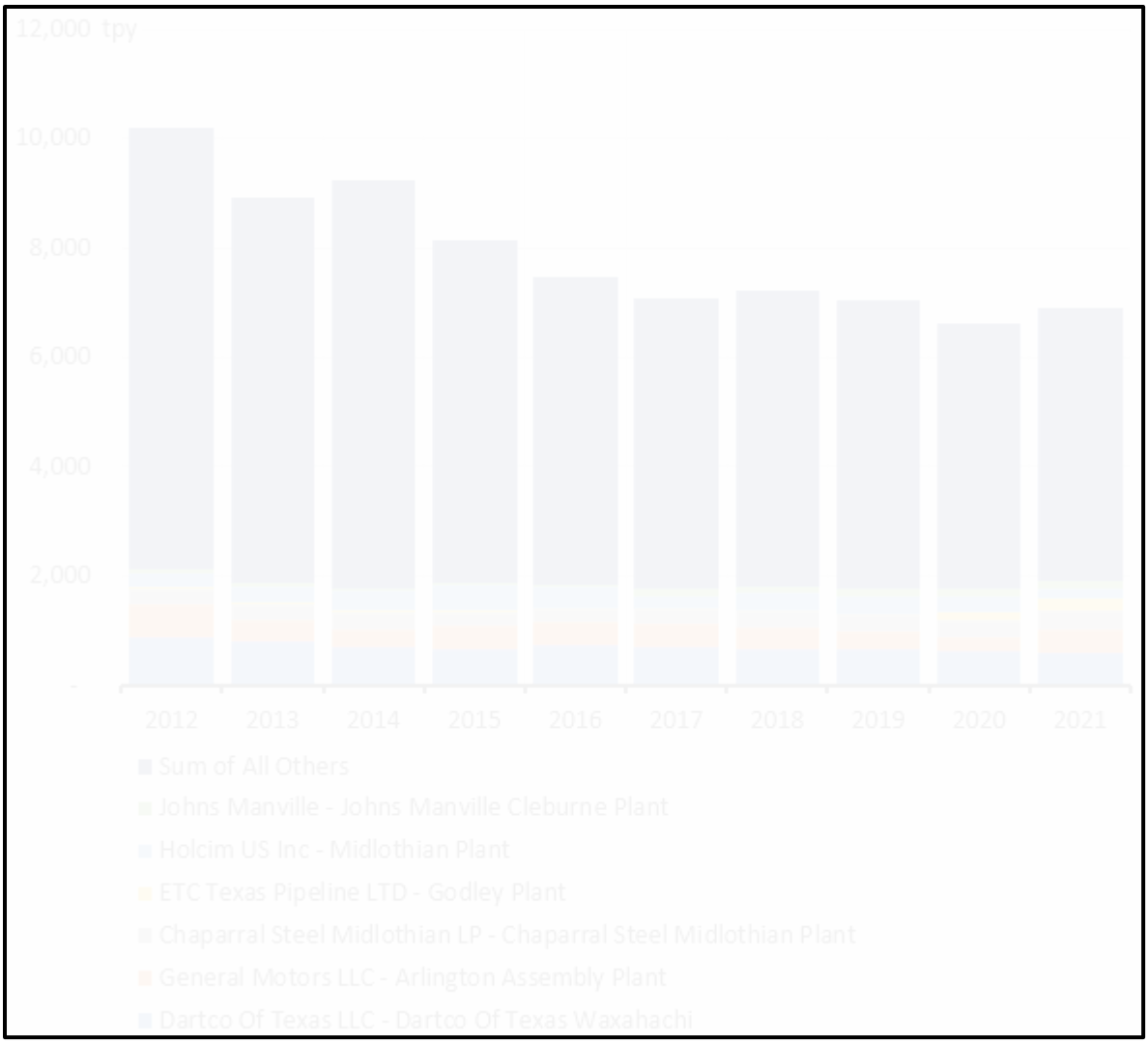


Figure 5-11: DFW Area Point Source VOC Emissions by Site

5.2.4 VOC and NO_x Limitation

Ozone is formed from the interaction of precursors (NO_x and VOC) in proportions determined by their molecular properties, therefore, unless precursors are present in these exact proportions in an airshed, ozone formation will be governed by whichever precursor is scarcer or limited. If one precursor is present in excess in the atmosphere, that excess will be unused in chemical reactions that form ozone; and ozone formation will be more dependent on the presence of the other precursor.

Because the formation of ozone is due to the interaction of these precursors, the relative proportion of VOC and NO_x in an airshed, the VOC-to-NO_x ratio, is an important indicator of the likely efficacy of different emission control strategies. The VOC or NO_x limitation of an air shed suggests how immediate reductions in VOC and NO_x concentrations might affect the duration and magnitude of ozone formation. A NO_x limited regime occurs when radicals from VOC oxidation are abundant, and ozone formation is more sensitive to the amount of NO_x in the atmosphere. In these NO_x limited regimes, controlling NO_x would be more effective in reducing ozone

concentrations. In VOC limited regimes, NO_x is abundant, and ozone formation is more sensitive to the number of radicals from VOC oxidation in the atmosphere. In VOC-limited regimes, controlling VOC emissions would be more effective in reducing ozone concentrations. Areas where ozone formation is not strongly limited by either VOC or NO_x are considered transitional and controlling either VOC or NO_x emissions might reduce ozone concentrations.

VOC-to-NO_x ratios are calculated by dividing hourly total non-methane hydrocarbon concentrations in parts per billion by carbon (ppbC) by hourly NO_x concentrations in parts per billion volume (ppbV). Ratios less than 5 ppbC/ppbV are considered VOC-limited, ratios above 15 ppbC/ppbV are considered NO_x-limited, and ratios between 5 ppbC/ppbV and 15 ppbC/ppbV are considered transitional. The understanding of VOC-to-NO_x ratios in an airshed is limited by the number of collocated VOC and NO_x monitors available in the area. In addition, VOC monitors are often source oriented, and therefore they primarily provide information on the air mass located near the source and may not be generally reflective of the wider area.

The DFW area has fifteen auto-GC instruments, three of which are collocated with NO_x monitors: Dallas Hinton, Eagle Mountain Lake, and Fort Worth Northwest. Ozone season measurements from March through October, 2012 through 2021, were used to assess VOC-to-NO_x ratios in DFW.

Figure 5-12: *Median VOC-to-NO_x Ratios During the Ozone Season in the DFW Area* shows the evolving nature of the relationship between these two ozone precursors over the decade. At Dallas Hinton, the ratio began near the VOC sensitive regime and rose to be clearly transitional. Eagle Mountain Lake began as NO_x sensitive, then became transitional. Fort Worth Northwest had annual fluctuations but was consistently transitional. There is also an evolution from more VOC limited to more NO_x limited as a site is more westerly and northerly in the DFW area, which has important implications for ozone formation. Sites in the DFW area with the highest measured ozone concentrations, that determine the regulatory design value for the area, such as Pilot Point, Frisco, and Grapevine Fairway, tend to be to the north and west. Overall, it is likely that controlling NO_x would be more effective at influencing the DFW area design value than controlling VOC, although ozone formation may respond to VOC reductions in some parts of the metro area and at certain times of day.

Figure 5-12: Median VOC-to-NO_x Ratios During the Ozone Season in the DFW Area

5.2.4.1 Modeling Sensitivity Analysis

Photochemical modeling of the 2019 base case was performed with reduced anthropogenic VOC and NO_x emissions in and around the DFW area and the impact of these reduced emission on the 2019 ozone Base Case Design Value (DVB) was obtained. The DVB calculation and its use in an attainment test is described in Chapter 3: *Photochemical Modeling*. Figure 5-13: *Modeling Domain and Monitors for DFW VOC and NO_x Sensitivity Analysis* shows a map with a blue outline surrounding the DFW area and parts of adjacent counties that comprise the modeling domain and the various monitors used for this analysis represented as circles within the modeling domain. Anthropogenic emissions within this modeling domain were reduced by 20% relative to emissions in each grid for the sensitivity analysis.

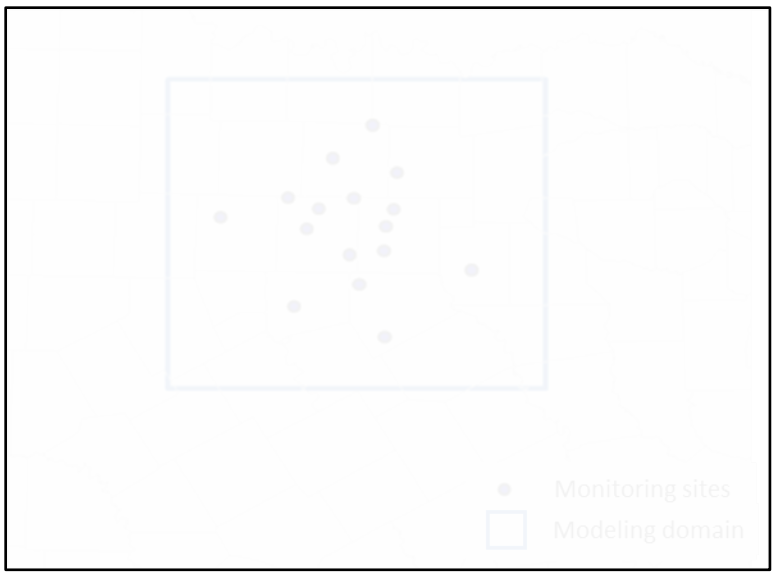


Figure 5-13: Modeling Domain and Monitors for DFW VOC and NO_x Sensitivity Analysis

The impact on the 2019 ozone DVB was estimated for the top modeled 10 days within the months of April through October by completing three model runs – 2019 base case scenario, a 20% anthropogenic NO_x emissions reduction scenario, and a 20% anthropogenic VOC emissions reduction scenario. The impact was estimated by calculating a ratio of the average MDA8 ozone from the top 10 days from the 20% anthropogenic emissions reduction emission scenario to the average MDA8 ozone from the top 10 days from the base case scenario for each monitor and adjusting the 2019 DVB with the ratio. Results show that although ozone decreased when VOC or NO_x was decreased, reductions in NO_x were more impactful. Figure 5-14: *Modeled Impact of VOC and NO_x Reductions on 2019 Ozone DVB* shows the estimated change in the 2019 ozone DVB at each monitor due to a 20% reduction in anthropogenic NO_x and VOC emissions in and around the DFW area. The maximum estimated decrease in ozone base case design value from a 20% NO_x reduction is 2.4 ppb, which is much greater than the maximum estimated decrease in ozone base case design value from a 20% VOC reduction is 0.6 ppb.

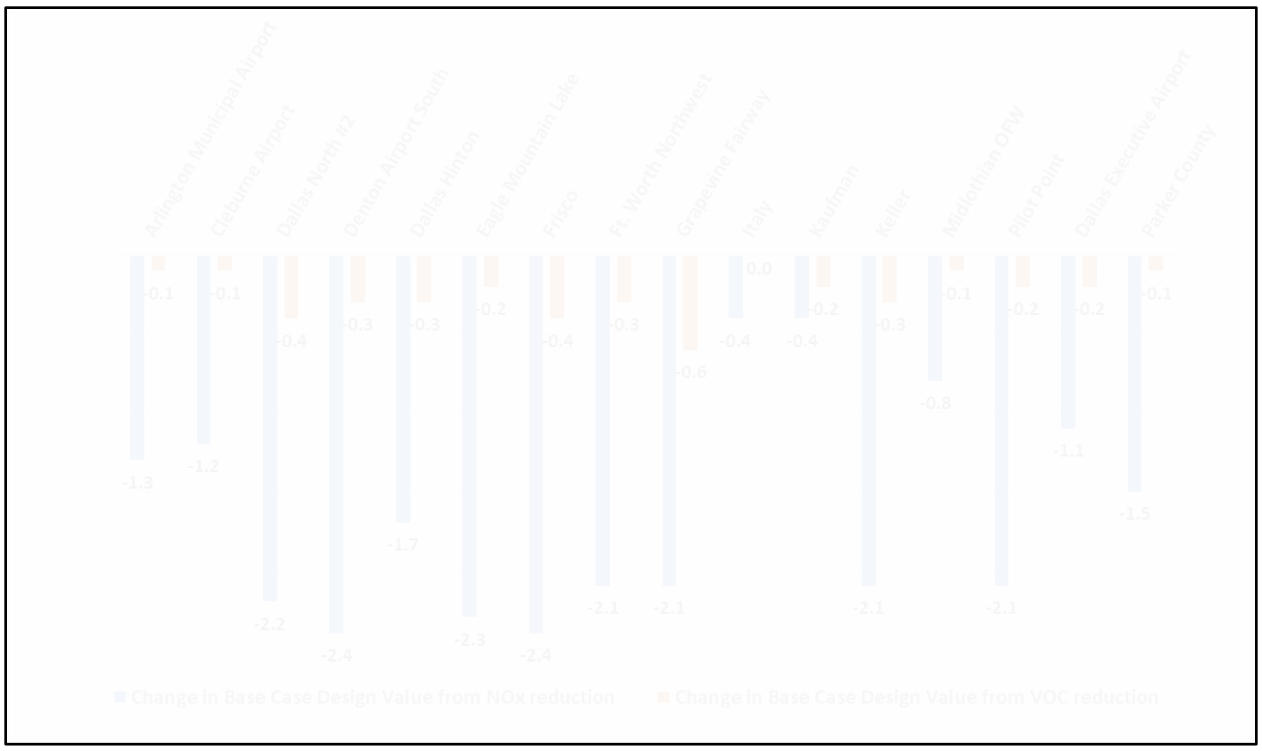


Figure 5-14: Modeled Impact of VOC and NO_x Reductions on 2019 Ozone DVB

Modeling results show that the impact of NO_x reductions on 2019 ozone base case design values is higher than the impact from VOC reductions. The impact from NO_x reductions is higher at monitors located on the west side of the DFW area compared to monitors on the east side.

5.2.5 Meteorological Influences on Ozone

Meteorological conditions play an important role in ozone formation. Year-to-year variability in meteorological conditions in turn contributes to variability in ozone concentrations. Although design values account for some of this variability by averaging fourth highest MDA8 ozone over three-years, this is often not enough to account for years with extreme meteorological conditions such as low wind speeds, drought, or extremely high temperatures. Investigating meteorological influences on ozone allows analysis of how ozone concentrations respond to changes in emissions rather than changes in meteorology.

Meteorologically adjusted MDA8 ozone values represent what ozone would have been if effects of anomalous meteorology on ozone formation are removed. Without the influence of unusual meteorology, changes observed in ozone concentrations are more likely due to emission changes than extreme meteorological events. The EPA developed a statistical model that uses local weather data to adjust ozone trends according to meteorology for that year (Wells et al. 2021). These trends compare average, 90th percentile, and 98th percentile MDA8 ozone from May through September to the meteorologically adjusted average, 90th percentile, and 98th percentile MDA8 ozone from May through September. The EPA calculated these trends for each ozone monitor in the DFW area from 2012 through 2021 (EPA 2022). Although results for all statistics

were examined, only 98th percentile trends are shown since it is the metric most closely related to the formula used in design value calculations.

Figure 5-15: *Meteorologically Adjusted Ozone Trends for May Through September in the DFW Area* shows the entire range of 98th percentile ozone concentrations at the 20 DFW area ozone monitors. The effect of meteorology appears to vary from year to year. Correcting for meteorology yields a more robust trend with less year-to-year variability, as higher ozone concentrations measured in 2015 and 2018 are adjusted lower when meteorology is removed, while lower ozone in 2014, 2017, and 2019 are adjusted higher when meteorology is removed.

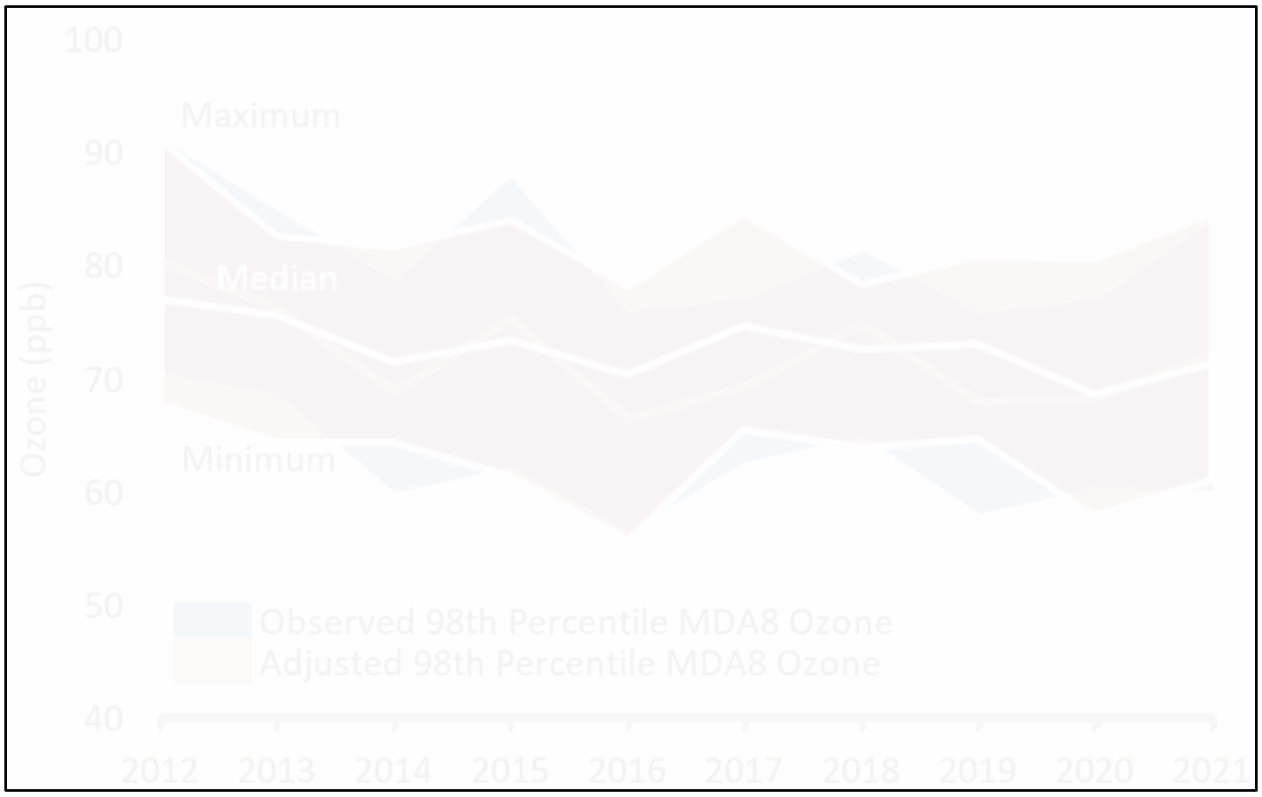


Figure 5-15: Meteorologically Adjusted Ozone Trends for May through September in the DFW Area

5.3 QUALITATIVE CORROBORATIVE ANALYSIS

This section outlines additional measures, not included in the photochemical modeling, that are expected to further reduce ozone levels in the DFW ozone nonattainment area. Various federal, state, and local control measures exist that are anticipated to provide real emissions reductions; however, these measures are not included in the photochemical model because they may not meet all the EPA's standard tests of SIP creditability (permanent, enforceable, surplus, and quantifiable) but are crucial to the success of the air quality plan in the DFW area.

5.3.1 Additional Measures

5.3.1.1 SmartWay Transport Partnership and the Blue Skyway Collaborative

Among its various efforts to improve air quality in Texas, TCEQ continues to promote two voluntary programs in cooperation with EPA: SmartWay Transport Partnership and Blue Skyways Collaborative.

The SmartWay Transport Partnership is a market-driven partnership aimed at helping businesses move goods in the cleanest, most efficient way possible. This is a voluntary EPA program primarily for the freight transport industry that promotes strategies and technologies to help improve fleet efficiency while also reducing air emissions.

There are nearly 4,000 SmartWay partners in the U.S., including most of the nation's largest truck carriers, all the Class 1 rail companies, and many of the top Fortune 500 companies. Since its founding, SmartWay has reduced oil consumption by 336 million barrels.[24] Since 2004, SmartWay partners have prevented the release of 2,700,000 tons of NO_x and 112,000 tons of particulate matter into the atmosphere.[25] Approximately 247 Texas companies are SmartWay partners, 74 of which are in the DFW area.[26] The SmartWay Transport Partnership will continue to benefit the DFW area by reducing emissions as more companies and affiliates join and additional idle reduction, trailer aerodynamic kits, low-rolling resistance tire, and retrofit technologies are incorporated into SmartWay-verified technologies.

The Blue Skyways Collaborative was created to encourage voluntary air emission reductions by planning or implementing projects that use innovations in diesel engines, alternative fuels, and renewable energy technologies applicable to on-road and non-road emissions sources.[27] The Blue Skyways Collaborative partnerships include international, federal, state, and local governments, non-profit organizations, environmental groups, and private industries.

5.3.1.2 Energy Efficiency and Renewable Energy (EE/RE) Measures

Energy efficiency (EE) measures are typically programs that reduce the amount of electricity and natural gas consumed by residential, commercial, industrial, and municipal energy consumers. Examples of EE measures include increasing insulation in homes; installing light-emitting diode or compact fluorescent light bulbs; and replacing motors and pumps with high efficiency units. Renewable energy (RE) measures include programs that generate energy from resources that are replenished or are otherwise not consumed as with traditional fuel-based energy production. Examples of renewable energy include wind energy and solar energy projects.

Texas leads the nation in RE generation from wind. As of 2021, Texas has 34,370 megawatts (MW) of installed wind generation capacity, 25.9% of the 132,753[28] MW installed wind capacity in the U.S. Texas' total net electrical generation from renewable wind generators in 2021 was 99.47 million megawatt-hours (MWh), approximately

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[24] https://www.epa.gov/smartway/smartway-program-successes
[25] *Id*
[26] https://www.epa.gov/smartway/smartway-partner-list
[27] https://blueskyways.org/
[28] https://www.eia.gov/electricity/annual/html/epa_04_07_b.html

26.3% of the 378.2 million MWh total wind net electrical generation for the U.S.[29] In 2021, total net electrical generation from renewable wind generators in Texas was 11.9% more than in 2020.[30]

Texas non-residential solar electricity generation in 2021 totaled 17.2 million MWh, a 69.5% increase from 2020.[31] The 2021 total installed solar electricity generation capacity in Texas was 10,374 MW, a 73% increase from 2020.[32]

While EE/RE measures are beneficial and do result in lower overall emissions from fossil fuel-fired power plants in Texas, emission reductions resulting from these programs are not explicitly included in photochemical modeling for SIP purposes because local efficiency or renewable energy efforts may not result in local emissions reductions or may be offset by increased demand in electricity. The complex nature of the electrical grid makes accurately quantifying emission reductions from EE/RE measures difficult.

While specific emission reductions from EE/RE measures are not provided in the SIP, persons interested in estimates of energy savings and emission reductions from EE/RE measures can access additional information and reports from the Texas A&M Engineering Experiment Station's Energy Systems Laboratory (ESL) website (http://esl.tamu.edu/). The Texas Emissions Reduction Plan (TERP) reports submitted to TCEQ regarding EE/RE measures are available on the ESL website on the TERP Reports webpage (http://esl.tamu.edu/terp/documents/terp-reports/).

5.3.1.3 Cross-State Air Pollution Rule (CSAPR)

The EPA originally finalized CSAPR to help eastern states meet FCAA interstate transport obligations for the 1997 eight-hour ozone, 1997 fine particulate matter ($PM_{2.5}$), and 2006 $PM_{2.5}$ NAAQS by requiring reductions in electric generating unit (EGU) emissions that cross state lines. The rule required reductions in ozone season NO_x emissions for states under the ozone requirements and in annual sulfur dioxide (SO_2) and NO_2 for states under $PM_{2.5}$ requirements. Texas was included in the original CSAPR program for the 1997 eight-hour ozone and 1997 $PM_{2.5}$ standards. As of 2016, Texas is no longer subject to the original CSAPR trading programs for the 1997 eight-hour ozone and PM2.5 standards but became subject to EPA's CSAPR Update Rule to address transport obligations under the 2008 eight-hour ozone standard and EPA's transport FIP for the 2015 eight-hour ozone standard.

On September 7, 2016, EPA signed the final CSAPR Update Rule for the 2008 eight-hour ozone standard. The EPA's modeling showed that emissions from within Texas no longer significantly contribute to downwind nonattainment or interference with maintenance for the 1997 eight-hour ozone NAAQS even without implementation of the original CSAPR ozone season NO_x emissions budget. Accordingly, sources in Texas are no longer subject to the emissions budget calculated to address the 1997 eight-hour ozone NAAQS. However, this rule finalized a new ozone season NO_x emissions

[29] https://www.eia.gov/electricity/annual/xls/epa_03_01_b.xlsx
[30] *Id*
[31] https://www.eia.gov/electricity/annual/xls/epa_03_21.xlsx
[32] https://www.eia.gov/electricity/annual/html/epa_04_07_b.html

budget for Texas, effective for the 2017 ozone season, to address interstate transport with respect to the 2008 eight-hour ozone NAAQS. On July 10, 2018, EPA published a proposed close-out of CSAPR, proposing to determine that the CSAPR Update Rule fully addresses interstate pollution transport obligations for the 2008 eight-hour ozone NAAQS in 20 covered states, including Texas. The EPA's modeling analysis projects that by 2023 there will be no remaining nonattainment or maintenance areas for the 2008 eight-hour ozone NAAQS in the CSAPR Update region and therefore EPA would have no obligation to establish additional control requirements for sources in these states. As a result, these states would not need to submit SIP revisions establishing additional control requirements beyond the CSAPR Update. The final rule was published on December 21, 2018 with an effective date of February 19, 2019 (83 FR 65878). On September 13, 2019, the D.C. Circuit Court remanded the CSAPR Update back to EPA after finding that the rule is inconsistent with the FCAA and allows upwind states to continue their significant contributions to downwind air quality problems beyond the attainment dates for those downwind areas. On October 1, 2019, the D.C. Circuit Court vacated the CSAPR close-out rule.

On April 30, 2021, EPA published the final Revised CSAPR Update for the 2008 ozone NAAQS, effective June 29, 2021 (86 FR 23054). For nine out of the 21 states, including Texas, for which the CSAPR Update was previously found to be only a partial remedy, projected 2021 emissions do not significantly contribute to nonattainment or maintenance problems for the 2008 ozone NAAQS in downwind states. Therefore, no further emission reductions beyond those under the CSAPR Update are required for Texas to address interstate air pollution under the 2008 ozone NAAQS.

On August 8, 2018, the commission adopted the 2015 Ozone NAAQS Transport SIP Revision (Non-Rule Project No. 2017-039-SIP-NR) which included a modeling analysis demonstrating that Texas does not contribute to nonattainment or interfere with maintenance of the 2015 ozone NAAQS in any other state. On March 30, 2021, EPA published final disapproval of the portion of the 2015 Ozone NAAQS Transport SIP Revision relating to visibility transport with a determination that visibility transport requirements for the 2015 ozone NAAQS are met through Federal Implementation Plans (FIP) in place for the Texas Regional Haze program, and no further federal action is required (86 FR 16531). On February 22, 2022, EPA proposed disapproval of the remaining portions of the 2015 Ozone NAAQS Transport SIP Revision (87 FR 9798), which the EPA finalized on February 13, 2023 (88 FR 9336).

The EPA signed a final FIP on March 15, 2023 to address obligations for 23 states, including Texas, to eliminate significant contribution to nonattainment, or interference with maintenance, of the 2015 ozone NAAQS in other states. As part of the final FIP to address interstate transport obligations for the 2015 ozone NAAQS, EPA is including 22 states, including Texas, in a revised and strengthened CSAPR NO_x Ozone Season Group 3 Trading Program for EGUs beginning in the 2023 ozone season. The EPA is also establishing emissions limitations beginning in 2026 for non-EGU sources located within 20 states, including Texas. The control measures for the identified EGU and non-EGU sources apply to both existing units and any new, modified, or reconstructed units meeting the final rule's applicability criteria.

5.3.1.4 Texas Emissions Reduction Plan (TERP)

The TERP program was created in 2001 by the 77th Texas Legislature to provide grants to offset the incremental costs associated with reducing NO_x emissions from high-emitting heavy-duty internal combustion engines on heavy-duty vehicles, non-road equipment, marine vessels, locomotives, and some stationary equipment.

The primary emissions reduction incentives are awarded under the Diesel Emissions Reduction Incentive (DERI) program. DERI incentives are awarded to projects to replace, repower, or retrofit eligible vehicles and equipment to achieve NO_x emission reductions in Texas ozone nonattainment areas and other counties identified as affected counties under the TERP program where ground-level ozone is a concern.

From 2001 through August 2022, $1,192,434,745 in DERI grants were awarded for projects projected to help reduce an estimated 189,151 tons of NO_x in the period over which emissions reductions are reported for each project under the program. This includes $406,794,350 going to activities in the DFW area, with an estimated 67,093 tons of NO_x reduced in the DFW area in the period over which emissions reductions are reported for each project under the program.

Three other incentive programs under the TERP program will result in the reduction in NO_x emissions in the DFW area.

The Drayage Truck Incentive Program was established in 2013 to provide grants for the replacement of drayage trucks operating in and from seaports and rail yards located in nonattainment areas. In 2017, the name of this program was changed to the Seaport and Rail Yard Areas Emissions Reduction Program (SPRY), and replacement and repower of cargo handling equipment was added to the eligible project list. Through August 2022, the program awarded $28,702,701, with an estimated 1,303 tons of NO_x reduced in the period over which emissions reductions are reported for each project under the program. In the DFW area $1,527,349 was awarded to projects with an estimated 68 tons of NO_x reduced in the period over which emissions reductions are reported for each project under the program.

The Texas Clean Fleet Program (TCFP) was established in 2009 to provide grants for the replacement of light-duty and heavy-duty diesel vehicles with vehicles powered by alternative fuels, including: natural gas, liquefied petroleum gas, hydrogen, methanol (85% by volume), or electricity. This program is for larger fleets; therefore, applicants must commit to replacing at least 10 eligible diesel-powered vehicles with qualifying alternative fuel or hybrid vehicles. From 2009 through August 2022, $69,363,635 in TCFP grants were awarded for projects to help reduce an estimated 261 tons of NO_x in the period over which emissions reductions are reported for each project under the program. In the DFW area, $17,835,047 in TCFP grants were awarded with an estimated 261 tons of NO_x reduced in the period over which emissions reductions are reported for each project under the program.

The Texas Natural Gas Vehicle Grant Program (TNGVGP) was established in 2011 to provide grants for the replacement of medium-duty and heavy-duty diesel vehicles with vehicles powered by natural gas. This program may include grants for individual vehicles or multiple vehicles. From 2011 through August 2022, $54,012,006 in TNGVGP grants were awarded for projects to help reduce an estimated 1,668 tons of

NO_x in the period over which emissions reductions are reported for each project under the program. In the DFW area, $17,263,847 in TNGVGP grants were awarded to projects with an estimated 565 tons of NO_x reduced in the period over which emissions reductions are reported for each project under the program.

Through FY 2017, both the TCFP and TNGVGP required that the majority of the grant-funded vehicle's operation occur in the Texas nonattainment areas, other counties designated as affected counties under the TERP, and the counties in and between the triangular area between Houston, San Antonio, and Dallas-Fort Worth. Legislative changes in 2017 expanded the eligible areas into a new Clean Transportation Zone, to include the counties in and between an area bounded by Dallas-Fort Worth, Houston, Corpus Christi, Laredo, and San Antonio.

5.3.1.5 Clean School Bus Program

House Bill (HB) 3469, 79th Texas Legislature, 2005, Regular Session, established the Clean School Bus Program, which provides monetary incentives for school districts in the state for reducing emissions of diesel exhaust from school buses through retrofit of older school buses with diesel oxidation catalysts, diesel particulate filters, and closed crankcase filters. As a result of legislative changes in 2017, this program also includes replacement of older school buses with newer, lower-emitting models. Through August 2022, TCEQ's Clean School Bus Program has awarded $53,053,626 in grants for over 7,860 retrofit and replacement activities across the state. This amount includes $4,694,101 in federal funds. Of the total amount, $8,355,410 was used for 890 school bus retrofit and replacement activities in the DFW area, resulting in a projected 31 tons of NO_x reduced in the period over which emissions reductions are reported for each project under the program.

5.3.1.6 87th Texas Legislature

A summary of the bills passed during the 87th Texas Legislature, 2021, Regular and Special Sessions, that have the potential to impact the DFW area are discussed in this section. For legislative updates regarding EE/RE measures and programs, see Section 5.3.1.2: Energy Efficiency and Renewable Energy Measures.

HB 4472, Relating to the TERP

HB 4472 directed TCEQ to remit not less than 35% of TERP Trust Fund to the Texas Department of Transportation for congestion mitigation and air quality improvement projects in nonattainment areas and affected counties. The Texas Department of Transportation (TxDOT) is required to report to TCEQ by October 1 of each year a description, estimated emission reductions, and costs of the related projects. TxDOT could fund additional projects to reduce emissions within Texas nonattainment areas.

HB 4772 set 55% as the minimum amount of time a marine vessel or engine must operate in the Texas intercoastal waters adjacent to a nonattainment area or affected county to be eligible for a TERP DERI grant. This may increase the number of eligible marine vessels or engines that could be replaced or retrofitted with cleaner engines, thus reducing NO_x emissions along the Texas coast.

HB 4772 added New Technology Implementation Grant (NTIG) projects that reduce flaring emissions and other site emissions to the list of projects that TCEQ must give

preference to when awarding grants. The requirement that flaring and other oil and gas site emissions reduction projects capture waste heat to generate electricity solely for on-site service was removed under the NTIG program. These changes may yield more grant awards to reduce flaring and other emissions under the NTIG program.

5.3.1.7 Local Initiatives

The North Central Texas Council of Governments submitted an assortment of locally implemented strategies in the DFW ozone nonattainment area including projects, programs, partnerships, and policies. These programs are expected to be implemented in the DFW 2015 ozone NAAQS nonattainment area by 2023. Due to the continued progress of these measures, additional air quality benefits will be gained that will further reduce precursors to ground-level ozone formation. A summary of each strategy is included in Appendix E: *Local Initiatives Submitted by the North Central Texas Council of Governments.*

5.4 CONCLUSIONS

TCEQ has used several sophisticated technical tools to evaluate the past and present causes of high ozone in the DFW 2015 ozone NAAQS nonattainment area to predict the area's future air quality, as discussed in this chapter. Historical trends in ozone and ozone precursor concentrations and their causes have been investigated extensively. The following conclusions can be reached from these evaluations.

The eight-hour ozone design values decreased from 2012 through 2022. The preliminary 2022 eight-hour design value for the DFW area is 77 ppb, an 11% decrease from the 2012 design value of 87 ppb. The largest design value decreases occurred prior to 2014. After 2017, ozone declines in the DFW area stagnated.

This trend of recent slight decreases is seen not only in ozone design values, but also in the fourth-highest eight-hour ozone values and background ozone. In general, background ozone accounts for approximately two-thirds of ozone in the DFW area and locally produced ozone accounts for approximately one-third of ozone in the area.

Ambient concentrations of ozone precursors, point source emissions of ozone precursors, and meteorologically adjusted ozone appear to be trending down from 2012 through 2021. With precursor emissions and ambient concentrations also trending down, it appears that most of the recent changes observed in ozone concentrations are due to meteorology.

Trends in VOC-to-NO_x ratios show that, although all three monitors measure in the transitional regime at some point over the 10-year period studied, one site to the northwest, Eagle Mountain Lake, has become NO_x- limited. While controls on either NO_x or VOC emissions may be effective in reducing ozone in the DFW area, controls on either VOC or NO_x may not result in equal reductions in ozone, as one species may reduce ozone at greater rates than the other. Modeling shows that, although some monitors observe a benefit from VOC reductions, ozone decreases in larger amounts with the NO_x reductions, especially in the areas with higher ozone readings.

This DFW AD SIP revision documents a fully evaluated photochemical modeling analysis and a thorough weight-of-evidence assessment. Based on TCEQ's modeling

and available data, the DFW area is not expected to attain the 2015 ozone NAAQS by the August 3, 2024 attainment date.

5.5 REFERENCES

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CHAPTER 6: ONGOING AND FUTURE INITIATIVES (NO CHANGE)

6.1 INTRODUCTION

The Texas Commission on Environmental Quality (TCEQ) is committed to maintaining healthy air quality in the Dallas-Fort Worth (DFW) area and continues to work toward this goal. Texas continues to invest resources in air quality scientific research for better understanding of atmospheric chemical processes and the advancement of pollution control technology, refining quantification of emissions, and improving the science for ozone modeling and state implementation plan (SIP) analysis. Additionally, TCEQ is working with the U.S. Environmental Protection Agency (EPA), local area leaders, and the scientific community to evaluate new measures for addressing ozone precursors. This chapter describes ongoing technical work that will be beneficial for identifying effective and efficient approaches for improving air quality and management in Texas and the DFW ozone nonattainment area.

6.2 ONGOING WORK

6.2.1 Other Emissions Inventory Improvement Projects

TCEQ emissions inventory (EI) reflects years of emissions data improvement, including extensive point and area source inventory reconciliation with ambient emissions monitoring data. Reports detailing recent TCEQ EI improvement projects can be found at TCEQ's Air Quality Research and Contract Projects webpage (https://www.tceq.texas.gov/airquality/airmod/project/pj.html).

6.2.2 Air Quality Research Program

6.2.2.1 TCEQ Applied Research Programs

TCEQ sponsors applied research projects to support the SIP and other agency requirements. Previous project goals have included improving the understanding of ozone and particulate matter formation, developing advanced modeling techniques, enhancing emission estimates, and air quality monitoring during special studies. Final project reports can be found at TCEQ's Air Quality Research and Contract Projects webpage (https://www.tceq.texas.gov/airquality/airmod/project/).

6.2.2.2 Black and Brown Carbon ($(BC)^2$) Monitoring

The $(BC)^2$ monitoring network was created to identify the influence of wildfires and dust events on urban air quality in Texas. The network started in 2019 as a pilot study in El Paso, sampling aerosol properties as indicators of biomass burning and dust impacts. The network expanded in 2020, adding three sites in the Houston area. After continued measurements in 2021 and 2022, the network is being enhanced with two sites in the DFW area. The $(BC)^2$ network has identified periods when biomass burning events are most likely in eastern Texas, while improving the long-term understanding of dust effects in El Paso. The $(BC)^2$ data contributes to analyses studying the relationship between biomass burning and exceptional ozone and particulate matter air quality events.

6.2.2.3 Texas Air Quality Research Program (AQRP)

The goals of the AQRP are:

- to support scientific research related to Texas air quality, in the areas of emissions inventory development, atmospheric chemistry, meteorology, and air quality modeling; and
- to integrate AQRP research with the work of other organizations and to communicate the results of AQRP research to air quality decision-makers and stakeholders.

The AQRP is supporting seven projects during the 2022-2023 biennium. Four projects that could have findings relevant to the DFW area are listed below.

Statewide projects:

- Evaluating the Ability of Statistical and Photochemical Models to Capture the Impacts of Biomass Burning Smoke on Urban Air Quality in Texas (project number 22-003);
- Hydrogen Cyanide for Improved Identification of Fire Plumes in the (BC)^{2} Network (project number 22-006); and
- Refining Ammonia Emissions Using Inverse Modeling and Satellite Observations Over Texas and the Gulf of Mexico and Investigating Its Effect On Fine Particulate Matter (project number 22-019).

Dallas-area project:

- Dallas Field Study; Ozone Precursors, Local Sources and Remote Transport Including Biomass Burning (project number 22-010).

The AQRP program began in 2010 and has supported research in Houston, Dallas, San Antonio, and El Paso. Details about the AQRP and past research can be found at the University of Texas at Austin's AQRP webpage (https://aqrp.ceer.utexas.edu).

6.2.3 Wildfire and Smoke Impact

TCEQ is reviewing ambient air monitoring data from monitors in the DFW area. TCEQ will be flagging the relevant data in the Air Quality System if it is found to be of regulatory significance as being influenced by emissions from wildfires and further investigating the circumstances that affected the development of these ozone episodes.

Appendices Available Upon Request

Rachel Melton
rachel.melton@tceq.texas.gov
512.239.1512

RESPONSE TO COMMENTS RECEIVED CONCERNING THE DALLAS-FORT WORTH (DFW) MODERATE CLASSIFICATION ATTAINMENT DEMONSTRATION (AD) STATE IMPLEMENTATION PLAN (SIP) REVISION FOR THE 2015 EIGHT-HOUR OZONE NATIONAL AMBIENT AIR QUALITY STANDARDS (NAAQS)

The Texas Commission on Environmental Quality (commission or TCEQ) offered a public hearing in Arlington on July 6, 2023, at 7:00 p.m. No attendees registered to provide comment; therefore, the hearing was not opened. During the comment period, which closed on July 17, 2023, the commission received comments from the North Central Texas Council of Governments (NCTCOG), the Sierra Club, the United States Environmental Protection Agency (EPA) and 43 individuals.

In this response to comments, unless otherwise specified, the commission uses "DFW area" to refer to the 2015 eight-hour ozone nonattainment area, consisting of Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Tarrant, and Wise Counties. With the final reclassification of the DFW area to serious nonattainment for the 2015 ozone NAAQS, a demonstration of attainment, an emissions inventory, reasonably available control measures (RACM), and contingency measures for failure to attain are no longer required. These elements may be referenced and summarized in comments received but are no longer included in this SIP revision and are not being submitted to EPA.

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GENERAL COMMENTS

NCTCOG commended TCEQ for quickly developing this SIP revision for the 2023 attainment year in spite of limited resources. NCTCOG stated they concur with the on-road mobile source nitrogen oxides (NO_x) and volatile organic compounds (VOC) emissions and the resulting 2023 NO_x and VOC motor vehicle emission budgets. NCTCOG also stated that they appreciate the opportunity to include their locally implemented emissions reduction strategies as Appendix E *Local Initiatives Submitted by the North Central Texas Council of Governments* and looks forward to continued collaboration between agencies.

The commission appreciates NCTCOG's support. However, with the final reclassification of the DFW area to serious nonattainment for the 2015 ozone NAAQS, Appendix E is not being adopted and submitted to EPA as part of this SIP revision.

No changes were made in response to these comments.

NCTCOG requested TCEQ organize more engagement and information meetings, outside SIP proposal timelines, for the DFW region to allow for notice of the technical evolution of the modeling platform providing details on base case, emissions summaries, etc., such that results are not a surprise to those outside of TCEQ. NCTCOG also recommended a regional discussion on control strategies and air quality programs based on EPA disapproving existing contingency measures. Sierra Club and NCTCOG commented that TCEQ should perform scenario-based sensitivity runs. NCTCOG further commented that the results from those sensitivity runs should be presented at technical information meetings.

The commission acknowledges NCTCOG's suggestions on how SIP planning and development should be conducted. Comments concerning future SIP planning and development are outside the scope of this attainment demonstration SIP revision. However, for this SIP revision, TCEQ conducted timely technical meetings in 2021 and 2022 to present details of the 2019 modeling platform at key developmental stages. Information on these meetings is outlined in Section 1.4 *Stakeholder Participation and Public Meetings* of this SIP revision. Details on the episode selection, emissions inventory data set and models used for input development, and preliminary future year design value (DVF) were presented at the meetings. Following the meetings, detailed emissions summaries were provided to stakeholders upon request. In addition to the technical information meetings, TCEQ also released preliminary modeling files to the public and requested feedback. The meteorological input files were made available publicly on June 7, 2021, and photochemical modeling files on December 29, 2021. TCEQ did not receive any feedback or comments on the preliminary modeling files.

No changes were made in response to these comments.

NCTCOG stated they will be hosting sessions with local governments and the public to solicit ideas for emission reductions. They have offered to share any relevant information gleaned. NCTCOG also proposed the reinstatement of a North Texas Clean Air Steering Committee and stated that they are willing to facilitate.

The commission values all public engagement and appreciates the collaborative relationship with NCTCOG to achieve emission reductions and attain the ozone NAAQS.

EPA suggested TCEQ consider a voluntary reclassification to serious nonattainment to maximize time for assessing, adopting, and implementing emission reduction measures.

The commission acknowledges the federal Clean Air Act (FCAA) provides for voluntary reclassification. On October 12, 2023, Texas Governor Greg Abbott signed and submitted a letter to EPA to voluntarily reclassify the Bexar County, DFW, and Houston-Galveston-Brazoria (HGB) 2015 ozone NAAQS moderate nonattainment areas to serious. EPA's proposal to reclassify these areas to serious in accordance with Governor Abbott's letter was published on January 26, 2024 (89 FR 5145). On June 20, 2024, EPA published the final reclassification of the 2015 eight-hour ozone NAAQS nonattainment areas to serious effective July 22, 2024 (89 FR 51829).

As a result of the voluntary reclassification of the 2015 eight-hour ozone NAAQS nonattainment areas to serious, effective July 22, 2024, EPA determined that the prior moderate classification attainment demonstration is no longer required and has been removed from the SIP revision with strikethrough formatting.

Sierra Club commented that TCEQ has failed to perform its duty to protect the public from the effects of ozone pollution for more than 45 years. Sierra Club further stated that DFW area has consistently failed to attain any currently effective federal NAAQS for ozone pollution. Sierra Club also noted that the area has a history of far exceeding ozone levels that current scientific research deems necessary to protect human health, especially for sensitive populations. Sierra Club and 43 individuals also urged TCEQ to implement the most stringent plan possible to get DFW into attainment. Sierra Club and one individual commented that the air pollution is getting progressively worse, and actions need to be taken to prevent negative impacts.

Attainment of the ozone NAAQS is an ongoing challenge, particularly as EPA continues to revise the NAAQS to be more stringent. As shown in Figure 1-1: *Ozone Design Values and Population in the Dallas-Fort Worth Area* of this DFW AD SIP revision, both one-hour and eight-hour design values have decreased over the past 31 years. The 2022 one-hour ozone design value of 101 parts per billion (ppb) represents a decrease of 28%, nearly one-third the 1991 one-hour design value of 140 ppb. The 2022 eight-hour ozone design value of 77 ppb represents a 27% decrease from the 1991 eight-hour ozone design value of 105 ppb. The DFW area has attained the 1979 one-hour ozone NAAQS of 0.12 ppm since 2006 and was determined by EPA to be in attainment in 2020 (85 FR 19096). Further, in 2014, the DFW area attained the 1997 eight-hour ozone NAAQS of 0.08 ppm as well. These decreases in design values occurred despite a 90% increase in area population from 1991 through 2021. The air quality in the DFW area has improved dramatically as a result of state, local, and federal air pollution control measures, such as federal emissions standards for mobile source engines and TCEQ Chapter 117 rules pertaining to control nitrogen oxides emissions.[1] The commission remains committed to working with area stakeholders and local government to attain the 2015 eight-hour ozone standard as expeditiously as practicable in accordance with EPA rules and guidance under the FCAA. As discussed elsewhere in this response to comments document and in the revised SIP, the DFW nonattainment area was reclassified to serious, which will require additional planning obligations for the DFW nonattainment area.

No changes were made in response to these comments.

Sierra Club and one individual stated that TCEQ has a responsibility to work with citizens and other government entities to save the wilderness, waterways, and environment from senseless destruction in the name of ignorance and greed. Sierra Club and another individual commented that it is also the responsibility of elected legislators to make responsible decisions that will have a positive impact on the DFW community.

[1] https://www.tceq.texas.gov/airquality/airsuccess/airsuccessmetro

The commission takes its commitment to protect the environment and public health seriously. The air quality in the DFW area has improved dramatically as a result of state, local, and federal air pollution control measures, as discussed elsewhere in this response to comments. The commission remains committed to working with area stakeholders and local governments to meet FCAA requirements as expeditiously as practicable.

Comments regarding the responsibilities of elected legislators are outside the scope of this attainment demonstration SIP revision.

No changes were made in response to these comments.

Sierra Club and 43 individuals asked the commission to enforce the strictest plan to ensure that the City of Houston returns to an attainment status and greatly reduces its ozone pollution.

This comment refers to the City of Houston which is part of the HGB nonattainment area and is outside the scope of this DFW SIP revision.

Sierra Club and 43 individuals expressed concerns regarding TCEQ's vehicle emissions inspection and maintenance (I/M) program and recent reports of testing fraud in the program resulting in cars renewing registration without passing the required emissions test. They also expressed concern that the reports indicated the state's computer system was not programmed to catch and immediately stop fake inspections. The same commenters expressed concern that such oversights have a detrimental impact on air quality.

The Texas Department of Public Safety (DPS) is responsible for the enforcement of the I/M program, and TCEQ's role is to support DPS in its administration and enforcement of the program. TCEQ routinely audits the program's effectiveness, including providing data to DPS to assist in its efforts to identify or confirm fraud. Additionally, TCEQ and DPS are working together to evaluate legal, technical, and procedural considerations with stopping potential fraud. TCEQ also conducts the federally required biennial I/M program evaluation to assess the overall effectiveness of the Texas I/M program. This study has repeatedly concluded that the Texas I/M program is effective and in compliance with EPA's program requirements.

No changes were made in response to this comment.

Sierra Club and an individual commented that the use of coal as fuel is outdated and should be eliminated and added that it would be better to use natural gas as it is much cleaner. Sierra Club and another individual commented that TCEQ should do anything that it can to stop the burning of fossil fuels. Sierra Club and another individual commented that gas wells are a big contributor to ground level ozone and time is of the essence to address global warming.

TCEQ supports efforts to improve energy efficiency and clean energy production but does not have authority to eliminate the use of coal as fuel, nor does it have the authority to specify use of a particular fuel. Comments regarding efforts to address global warming are outside the scope of this SIP revision.

No changes were made in response to these comments.

EPA requested TCEQ carefully review applicable authorities for opportunities to incorporate environmental justice (EJ) considerations and ensure they have been adequately and appropriately incorporated in this State Implementation Plan (SIP), as well as incorporating EJ considerations in developing contingency measures. In addition, EPA suggested that TCEQ consider the number of pollution sources, major and minor, in a geographic area as part of evaluating community risk during SIP development.

Sierra Club stated coal-fired electricity generating units (EGU's) have led to high ozone levels in EJ communities. Further, Sierra Club stated that communities of color and economically marginalized communities carry a disproportionate burden of ozone exposure.

EPA encouraged TCEQ to use both EJScreen and specific area information in developing its SIP to consider potential issues related to civil rights of the communities potentially impacted. EPA commented that using EJScreen would indicate (1) whether a SIP revision has the potential to contribute to significant public health or environmental impacts, (2) whether the community may be particularly vulnerable to impacts from the SIP revision, and (3) whether the community is already disproportionately impacted by public health and/or environmental burdens on the basis of demographic factors. Sierra Club stated that ozone exposure does not affect all Texans equally and noted that EPA's EJScreen tool shows areas of concern, pointing out specific index values for Dallas and Fort Worth.

As a result of the voluntary reclassification of the 2015 eight-hour ozone NAAQS nonattainment areas to serious, effective July 22, 2024, (89 FR 51829) EPA determined that certain elements associated with the prior moderate classification and attainment date are no longer required. Those elements have been removed from the SIP revision with strikethrough formatting.

The SIP is not the appropriate mechanism to address EJ issues. No federal or state statute, regulation, or guidance provides a process for evaluating or considering the socioeconomic or racial status of communities within an ozone nonattainment area. In a recent proposed approval of a TCEQ submittal for El Paso County, which did not include an EJ evaluation, EPA stated that the FCAA "and applicable implementing regulations neither prohibit nor require such an evaluation" (March 7, 2023, 88 FR 14103). Further, TCEQ's jurisdiction is limited by statute; for example, it may not consider location, land use, or zoning when permitting facilities. TCEQ continues to be committed to protecting Texas' environment and the health of its citizens regardless of location.

While EPA may encourage states to utilize EJScreen in SIP actions, it is not necessary, because the NAAQS are protective of all populations. If the NAAQS are not sufficient to protect public health, it is incumbent upon EPA to revise the NAAQS.

This SIP revision was developed in compliance with the policies and guidance delineated in TCEQ's Language Access Plan (LAP) and TCEQ's Public Participation

Plan (PPP).[2,3] The LAP helps ensure individuals with limited English proficiency may meaningfully access TCEQ programs, activities, and services in a timely and effective manner; and the PPP identifies the methods by which TCEQ interacts with the public, provides guidance and best practices for ensuring meaningful public participation in TCEQ activities, and highlights opportunities for enhancing public involvement in TCEQ activities and programs.

In accordance with the PPP, EJScreen was used to conduct a preliminary analysis of the population in the DFW nonattainment area, which was then used to plan public engagement efforts for this SIP revision. Specifically, TCEQ translated the Plain Language Summaries, GovDelivery notices, Public Hearing notices, and SIP Hot Topics notices into Spanish for all projects. Newspaper publications were also in Spanish. Additionally, two Spanish interpreters were available at all hearings, and the notices included a statement that Spanish interpretation would be available at each hearing.

Specific health-related concerns are further addressed elsewhere in this response to comments.

No changes were made in response to these comments.

Sierra Club expressed concern that the Air Quality System (AQS) network monitors were not well located to record the impacts of coal fired electric generating units (EGU) in environmental justice communities in nonattainment areas.

Federal network design criteria, those used to determine the number and placement of monitors reporting to the AQS, require agencies to site monitors in populated areas that represent regional air quality where people live, work, and play, and are not generally sited to assess impacts from specific industrial sources. TCEQ is federally required to operate a minimum of three ozone monitors in the Dallas-Fort Worth-Arlington metropolitan statistical area (MSA), based on the most recent population estimates and the three-year ozone design value. Texas exceeds these requirements with 18 ozone monitors in the MSA, 16 of which are located in the DFW area and include communities located near heavily industrialized areas. TCEQ currently meets federal requirements to ensure that the network provides the information necessary to properly monitor and regulate all communities within Texas. Details regarding the annual review of the air monitoring network are located on TCEQ's Air Monitoring Network Plans webpage (https://www.tceq.texas.gov/airquality/monops/past_network_reviews).

No changes were made in response to this comment.

NCTCOG expressed disappointment that TCEQ does not do more to support or request receipt of legislative appropriations for air quality emission reductions. These funds include approximately $176 million that still exists in Clean Air Account 151 from the now defunct Local Initiatives Project and Low-Income Vehicle Repair, Retrofit, and Accelerated Vehicle Retirement Program (LIRAP), which stated could be used to fund local emissions enforcement task forces to combat fraudulent vehicle emission

[2] https://www.tceq.texas.gov/downloads/agency/decisions/participation/language-access-plan-gi-608.pdf
[3] https://www.tceq.texas.gov/downloads/agency/decisions/participation/public-participation-plan-gi-607.pdf

inspections, reduce high emitting vehicles on the road, and other transportation initiatives. NCTCOG also stated that the Texas Emissions Reduction Plan (TERP) has over $2 billion in dedicated revenue in Fund 5071, which NCTCOG posited could realize a potential reduction of around 45 tons per day of NO_x and approximately 1.5 ppb of ozone is possible in the DFW area.

Regarding the appropriation of LIRAP funds, TCEQ remains neutral on appropriation requests to the legislature, as agencies are prohibited from any activities that could be considered as lobbying. Outside entities make requests to the legislature regarding appropriations for air quality initiatives.

The commission appreciates NCTCOG's interest in funding for TERP. Fund 5071 is a General Revenue Dedicated account that was established in 2001 by Senate Bill 5, 77th Texas Legislature, and comprises revenue received from the TERP fees (Texas Health and Safety Code, §386.250). Until September 1, 2021, the Texas Legislature appropriated a portion of the revenue remitted to fund 5071 for TCEQ to administer TERP programs. In 2019, House Bill (HB) 3745, 87th Texas Legislature, established the TERP Trust as a fund outside of the state treasury that would receive all new revenue from the TERP fees beginning September 1, 2021. HB 3745 directed TCEQ to utilize TERP Trust revenue for the TERP programs, in lieu of legislative appropriation from fund 5071. The TERP Trust increased the funding available for TERP programs in the 2022-2023 state fiscal biennium. TERP funding is and has been available in the DFW area.

No changes were made in response to this comment.

Sierra Club commented that TCEQ should consider urban planning in its proposal to meet emission limits. They stated that increasing greenspaces and walkable areas could lead to health benefits, energy savings, benefits for overburdened communities, and air quality improvement.

Emission reduction benefits from regional planning efforts are not regulated by TCEQ, and are not quantified for this SIP revision. Contact NCTCOG for further information regarding programs implemented by NCTCOG.

No changes were made in response to this comment.

In comments from Sierra Club that included comments from the organization and several individual members, Sierra Club and one individual commented that the DFW area air quality affects her grandchildren in Houston.

This comment is outside the scope of this SIP revision.

Sierra Club noted that Texas has a clear and persistent problem with high levels of ozone. In support of this statement, Sierra Club referenced multiple figures showing the number of exceedance days in the DFW area in recent years, with data excerpted from the proposed SIP revision, illustrating continued high eight-hour daily ozone values through 2022 and multiple exceedance days; illustrating that the DFW area is far from meeting the ozone NAAQS.

An exceedance day is any day when any surface monitor in an area records a daily-maximum eight-hour average ozone concentration that exceeds the level of the NAAQS, in this case 70 ppb. The number of these days each year varies considerably. For example, for the years shown in the cited figure (2015 through 2022), the number of exceedance days per year varies from a low of 18 to a high of 47. It is unlikely that anthropogenic emissions varied sufficiently from year to year to cause this variability, suggesting that other factors, such as meteorology, are involved in whether a particular year has many or few exceedance days. Due to this variability, compliance with the eight-hour ozone NAAQS is determined by a design value, which averages three years of data, rather than the number of exceedance days. Hence, this DFW AD SIP revision provided details of design values as a metric for evaluating the attainment status of the area in the attainment year not exceedance days.

No changes were made in response to this comment.

EMISSIONS INVENTORY

EPA requested clarification on whether its updated February 2023 guidance for cetane improvement projects was considered for this DFW AD SIP revision.

With the final reclassification of DFW area to serious nonattainment for the 2015 ozone NAAQS, demonstration of attainment is no longer required. Therefore, assessment and quantification of emissions reductions from cetane improvement projects (i.e., the Texas Low Emissions Diesel program) is no longer required and is not being adopted and submitted to EPA as part of this SIP revision.

No changes were made in response to this comment.

HEALTH EFFECTS AND ENVIRONMENTAL IMPACTS

Sierra Club and 43 individuals, in its form letter, highlighted that the 2022 "State of the Air" report by the American Lung Association ranked Dallas as the 16th most ozone-polluted city in the nation, which is worse than in 2021, when Dallas was the 17th most ozone-polluted city in the nation. Sierra Club stated that these emissions can cause premature death and other serious health effects such as asthma attacks, cardiovascular damage, and developmental and reproductive harm.[4] Sierra Club also referenced an analysis by researchers at New York University and the American Thoracic Society that showed that elevated ozone levels in the Dallas-Fort Worth-Arlington area caused about 128 premature deaths, every year.[5]

Sierra Club in its separate comment letter stated that exposure to ozone has adverse effects on human health such as chronic respiratory, cardiovascular, reproductive, and central nervous system effects, as well as mortality. Sierra Club also stated that ozone exposure can contribute to new asthma onset, exacerbate asthma conditions, and cause respiratory symptoms such as coughing, wheezing, and shortness of breath. Sierra Club further stated that EPA's policy assessment for the 2015 ozone NAAQS

[4] https://www.lung.org/media/press-releases/sota-dallas-fy22
[5] https://healthoftheair.org/rankings

showed that there is an association between ozone exposure and increased asthma attacks, emergency room visits, hospitalization, and medication use for asthma.

Sierra Club and two individuals expressed concern regarding air quality in the DFW area and the impact on childhood and adult asthma. In comments from Sierra Club that included comments from the organization and several individual members, Sierra Club and another individual noted sinus issues as well as headaches during warm months and emphasized the importance of a healthy environment. The importance of clean air on citizens' health, especially children's health, was also emphasized by Sierra Club and two more individuals. Sierra Club and another individual noted that ozone pollution causes many debilitating health issues. Sierra Club and one individual highlighted the impact of air quality on human health, especially asthmatic children, it was requested that coal plants in the area be required to clean up their pollution using available technologies. Sierra Club and another individual advocated that actions be taken to prevent the negative impacts of air pollution on human health.

The ozone NAAQS has been determined by EPA as requisite to protect public health, including sensitive members of the population such as children, the elderly, and those with pre-existing conditions, such as asthma. EPA considered these health impacts when setting the 2015 eight-hour ozone NAAQS. The 2023 Draft EPA Policy Assessment for Ozone concluded that the 2015 ozone NAAQS of 70 ppb provides the requisite protection of public health, including an adequate margin of safety and thus should be retained, without revision.[6]

Many different health effects have been investigated after ozone exposure. However, because data from minimal or inconsistent studies do not provide the weight of evidence necessary to demonstrate that a pollutant exposure causes a health outcome, only those health outcomes with consistent, robust data are determined to be causally associated with exposure to ozone in EPA's science assessments. Those that do not have robust datasets in the 2019 Ozone Integrated Science Assessment include: mortality, cancer, reproductive, cardiovascular, and central nervous system impacts.[7]

The trend in asthma prevalence and the lack of a definitive link between ambient ozone concentrations and asthma rates is consistent on the national scale. Large, multi-city studies, which have included Dallas, have not indicated a correlation between ambient concentrations of ozone and increased incidence of asthma symptoms.[8,9] **Another study has shown that the most important factors affecting**

[6] Environmental Protection Agency (EPA). 2023. Policy Assessment for the Reconsideration of the Ozone National Ambient Air Quality Standards External Review Draft Version 2. https://www.epa.gov/system/files/documents/2023-03/O3_Recon_v2_Draft_PA_Mar1-2023_ERDcmp_0.pdf. (Accessed August 11, 2023).
[7] EPA. Integrated Science Assessment (ISA) for Ozone and Related Photochemical Oxidants (Final Report, Apr 2020). https://ordspub.epa.gov/ords/eims/eimscomm.getfile?p_download_id=540022. (Accessed August 11, 2023).
[8] O'Connor GT, Neas L, Vaughn B, Kattan M, Mitchell H, Crain EF. et al. 2008. Acute respiratory health effects of air pollution on children with asthma in US inner cities. J Allergy Clin Immunol. 121(5):1133-1139.
[9] Schildcrout JS, Sheppard L, Lumley T, Slaughter JC, Koenig JQ, and Shapiro GG. 2006. Ambient air pollution and asthma exacerbations in children: An eight-city analysis. American Journal of Epidemiology, 164:505-517.

asthma incidence are ethnicity and poverty.[10] Finally, EPA's analysis completed as part of the 2015 ozone NAAQS does not anticipate a statistically significant reduction in asthma exacerbations as a result of a lower standard.[11] Therefore, because asthma rates have remained steady while ambient levels of both ozone and ozone precursors have periods of steady decrease, and asthma rates can be higher in areas with lower ozone, it does not appear that ambient ozone concentrations are a significant contributing factor to asthma rates.

Although the causes of asthma are not fully understood, there are many factors that influence the development and exacerbation of asthma. According to the World Health Organization, one of the strongest risk factors for developing asthma is genetic predisposition. In addition, indoor allergens (dust mites, pet dander, and presence of pests such as rodents or cockroaches) together with outdoor allergens (pollen and mold), tobacco smoke, or other triggers such as cold air, extreme emotions (anger or fear), and physical exercise can all provoke symptoms in those with asthma. Some scientists have also suggested that changes in exposure to microorganisms or the rise in sedentary lifestyle (affecting lung health) and obesity, which results in inflammation, may contribute.

TCEQ does not support the assertion that ambient concentrations of ozone are causing death because the scientific data do not support it. Clinical studies on hundreds of human subjects have shown only a range of mild, reversible respiratory effects in people who were exposed to between 60 ppb and 120 ppb ozone (representative of ambient concentrations) for up to eight hours while exercising vigorously[12,13]. Ethical standards preclude scientists from giving human subjects potentially lethal doses of chemicals, and none of the human subjects in these studies died as a result of their exposure to ozone. Basic toxicological principles indicate that concentrations of ozone (or any other chemical) that only cause a mild, reversible effect cannot also increase the incidence of all causes of death, even in a very sensitive individual. The dose of ozone that is lethal to experimental animals is orders of magnitude higher than ambient levels of ozone[14] and the National Institute for Occupational Safety and Health (NIOSH) Immediately Dangerous to Life or Health value for ozone is 5,000 ppb.[15] Therefore, the available information does not support assertions that there is a mechanism for ambient ozone to contribute to mortality. Accordingly, EPA's 2019 Policy Assessment[16]

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[10] Keet CA, McCormack MC , Pollack CE , Peng RD , McGowan E , Matsui EC .2015. Neighborhood poverty, urban residence, race/ethnicity, and asthma: Rethinking the inner-city asthma epidemic. J Allergy Clin Immunol.135(3):655-62.

[11] Table 6-20, EPA. 2015. The National Ambient Air Quality Standards. Overview of EPA's updates to the air quality standards for ground-level ozone. https://www.epa.gov/sites/default/files/2015-10/documents/overview_of_2015_rule.pdf.

[12] Adams, WC. 2006. "Comparison of chamber 6.6-h exposures to 0.04-0.08 ppm ozone via square-wave and triangular profiles on pulmonary responses." *Inhal Toxicol* 18(2):127-136.

[13] Schelegle, ES; Morales, CA; Walby, WF; Marion, S; Allen, RP. 2009. "6.6-Hour inhalation of ozone concentrations from 60 to 87 parts per billion in healthy humans." *Am J Respir Crit Care Med* 180(3):265-272.

[14] Stokinger, HE. 1957. Evaluation of the hazards of ozone and oxides of nitrogen. *Arch Ind Health* 15:181-190.

[15] NIOSH Pocket Guide to Chemical Hazards (NPG). 2005. Pub No. 2005-149. September http://www.cdc.gov/niosh/npg/ (Accessed August 11, 2023).

[16] EPA. 2020. Policy Assessment for the Review of the O3 NAAQS. https://www.epa.gov/sites/default/files/2020-05/documents/o3-final_pa-05-29-20compressed.pdf (Accessed August 11, 2023).

downgraded the relationship between short-term exposure to ozone and mortality from a likely causal relationship to suggestive of a causal relationship.

TCEQ agrees that breathing ground-level ozone at higher than typical ambient concentrations for hours while vigorously exercising may cause acute respiratory problems like cough and respiratory irritation and may aggravate the symptoms of asthma. Clinical studies in humans exposed to ozone verify this result and indicate that health effects can generally resolve quickly once an individual is no longer exposed to high ozone levels. TCEQ uses this information to discuss and encourage meaningful regulatory policy and remains committed to ensuring the air is safe to breathe in all areas of Texas. TCEQ takes the health and concerns of Texans seriously and remains committed to working with area stakeholders to attain the 2015 eight-hour ozone standard as expeditiously as practicable and in accordance with EPA rules and guidance under the FCAA.

No changes were made in response to these comments.

Sierra Club commented that the adverse health impacts of ozone exposure do not affect all Texans equally. They commented that EPA's EJScreen tool shows that populations in Texas nonattainment areas have high environmental justice index values for ozone considering both exposure to pollution and socioeconomic indicators. Sierra Club stated that asthma affects Black communities at disproportionate rates in Texas, measured by emergency department visit, hospitalization, and death rates. Sierra Club also stated that reducing ozone pollution and NO_X emissions is essential to reduce the unequal public health harms unjustly borne by low-income populations and people of color in Texas.

The commission takes its commitment to protect the environment and public health of all Texans very seriously. The ozone NAAQS has been determined by EPA as requisite to protect public health, including sensitive members of the population such as children, the elderly, and those with pre-existing conditions, such as asthma. TCEQ is aware that black children in Texas have higher asthma prevalence compared to other racial and ethnic groups and are more likely to visit the emergency department or be admitted to the hospital due to asthma.[17] The causes of asthma are very complex and not fully understood. There are many factors that have been linked to an increasing risk of developing asthma, and it is often difficult to find a single, direct cause.[18] According to the World Health Organization, asthma is more likely if other family members also have asthma and in people who have other allergic conditions. Asthma is associated with urbanization and is increased in people who have early life events (such as prematurity and low birth weight), and environmental allergens, irritants, and obesity are also thought to increase the risk of asthma. Some scientists have also suggested that changes in exposure to microorganisms or the rise in sedentary lifestyle (affecting lung health) may also contribute.

No changes were made in response to these comments.

[17] Strategic Control for Asthma Control in Texas, 2021-2024. https://www.dshs.texas.gov/sites/default/files/asthma/Documents/Asthma-Control-Strategic-Plan-2021-2024.pdf.
[18] World Health Organization. Asthma. https://www.who.int/news-room/fact-sheets/detail/asthma

Sierra Club and one individual commented regarding the "cancer alley" of Orange, Texas with many chemical plants, refineries, and diesel spread on water to kill mosquitoes.

This comment is outside the scope of this SIP revision.

TECHNICAL ANALYSIS

Sierra Club cited a comment from EPA on TCEQ's proposed attainment demonstration SIP revision for the DFW 2008 ozone NAAQS moderate nonattainment area concerning a suggestion to reevaluate the potential benefits to the DFW area of NO_X reductions associated with EGUs just east and south of the DFW ozone nonattainment area. Sierra Club commented that TCEQ has not responded to EPA's suggestion.

The commission's response to EPA's comment on the proposed moderate attainment demonstration is included in both DFW Moderate Classification AD SIP Revisions for the 2008 Eight-Hour ozone NAAQS.[19,20]

No changes were made in response to these comments.

NCTCOG and Sierra Club commented that there are significant differences between TCEQ forecasted ozone and values measured at several monitors in the DFW nonattainment area and that the monitored values are higher than predicted. NCTCOG further requested peer review assessment of every component used in photochemical modeling to determine why there are differences between modeled and observed values and expressed concern that differences between modeled and observed values will continue for the 2026 analysis year without resolution.

With the final reclassification of DFW to serious nonattainment for the 2015 ozone NAAQS, the moderate classification attainment demonstration photochemical modeling analysis is no longer required and is not being adopted and submitted to EPA as part of this SIP revision.

No changes were made in response to these comments.

NCTCOG acknowledged that TCEQ model performance is within EPA's modeling guidance and showed a 15% normalized mean bias for all but one monitor. However, NCTCOG also commented that desirable modeled results were not achieved with this model performance, noting that the results contain a systematic under-prediction, and recommended that TCEQ establish Texas or region-specific model evaluation criteria to be used instead of national guidelines.

With the final reclassification of DFW to serious nonattainment for the 2015 ozone NAAQS, the moderate classification attainment demonstration photochemical modeling analysis is no longer required and is not being adopted and submitted to EPA as part of this SIP revision.

[19] https://wayback.archive-it.org/414/20210529162645/https:/www.tceq.texas.gov/assets/public/implementation/air/sip/dfw/dfw_ad_sip_2015/AD/Adoption/DFWAD_13015SIP_ado_all.pdf.
[20] https://wayback.archive-it.org/414/20210529044726/https:/www.tceq.texas.gov/assets/public/implementation/air/sip/dfw/dfw_ad_sip_2016/DFWAD_15014SIP_ado.pdf.

No changes were made in response to these comments.

NCTCOG encouraged TCEQ to investigate anthropogenic emission sources (since local contribution is low) and work with EPA to update parameters governing ozone transport and implement rules outside the regional airshed to prevent the DFW area from being required to make emissions reductions to address emissions the DFW area does not produce.

Investigations into emissions sources and transport influences on ozone are on-going at TCEQ and throughout the air quality research community. Transport is known to be a large, regular contributor to not only the DFW airshed but also other airsheds in Texas (e.g., Bexar County, El Paso County, Houston-Galveston-Brazoria). Background ozone generally accounts for approximately two-thirds to three-quarters of the total ozone concentration. Locally attributable ozone generally accounts for the remaining one-quarter to one-third of ozone concentrations, regardless of whether high ozone values are observed on a given day. Although they vary from year-to-year, the estimates of local ozone production in the DFW area have not changed substantially from 2012 through 2022. TCEQ continues to investigate to further understand the culpability for air quality impacts among identified sources within and outside the airshed.

No changes were made in response to this comment.

CONTROL STRATEGIES

Sierra Club recommended TCEQ apply reasonably available control technology (RACT) regulations to sources outside nonattainment areas since it has the authority.

TCEQ had very recently conducted and submitted in 2020 a full RACT analysis for the DFW area at a more stringent serious classification for the 2008 ozone NAAQS, and TCEQ reasonably concluded that this recent RACT analysis for the DFW area was sufficient for the purposes of a moderate classification RACT analysis for the 2015 ozone NAAQS. Based on this RACT analysis, TCEQ determined no new controls were needed to meet attainment for the 2015 ozone NAAQS.

No changes were made in response to this comment.

Sierra Club commented that TCEQ's definition of reasonably available control measures (RACM) as "only measures that could be fully implemented by the attainment deadline" is based on a flawed assumption that DFW will attain by the 2023 attainment year.

With the final reclassification of DFW to serious nonattainment for the 2015 ozone NAAQS, the moderate classification RACM analysis is no longer required and is not being adopted and submitted to EPA as part of this SIP revision. No changes were made in response to this comment.

EPA disagreed with the use of the already implemented measures to satisfy the contingency measure requirements and cited a recent court decision (*Sierra Club, et al. v. EPA*, 985 F.3d 1055 (D.C. Cir. 2021) that invalidated the use of already implemented

control measures and required prospective measures (i.e., undertaken in the future) to meet the federal Clean Air Act (CAA) contingency measure statutory requirements.

With the final reclassification of the DFW area to serious nonattainment for the 2015 ozone NAAQS, contingency measures for failure to attain are no longer required and are not being adopted and submitted to EPA as part of this SIP revision.

No changes were made in response to this comment.

EPA recommended that TCEQ evaluate potentially under-reported VOC in the DFW 2015 eight-hour ozone nonattainment area. EPA noted that oil and gas equipment in the Barnett Shale may be a potential source of under-reported VOC emissions, from flaring and fugitive emissions. EPA suggested mobile monitoring studies, remote sensing or other studies be conducted if underreporting persists, as underreporting can result in an inaccurate assessment of the area's NO_x or VOC-limited sensitivity, producing inaccurate modeling results.

With the final reclassification of the DFW area to serious for the 2015 ozone NAAQS, assessment and quantification of oil and gas emissions is no longer required and is not being adopted and submitted to EPA as part of this SIP revision.

No changes were made in response to this comment.

EPA commented that TCEQ's RACT analysis is based on EPAs *Control Techniques Guidelines* (CTG) and *Alternative Control Techniques* (ACT) guidelines only. Sierra Club also commented that the RACT analysis for the DFW area relies on previous RACT analysis that relied strictly on decades old CTG and ACT guidance documents published by EPA and that it was arbitrary and capricious to rely on the old analysis. EPA cited its implementation rules for the 2008 and 2015 ozone NAAQS as stating that states should refer to existing CTGs and ACTs, recent technical information, and information received in the public comment period to meet RACT requirements. EPA commented that states should document that they examined current and relevant information and should discuss if and how such information affected the determination for all types of RACT: CTG RACT, Major Source VOC RACT, and Major Source NO_x RACT.

The implementation rule for the 2015 ozone NAAQS in 40 Code of Federal Regulations, Part 51, Subpart CC, §51.1312 does not require states to perform exhaustive research of recent technical information when evaluating RACT, as claimed by EPA Region 6. § 51.1312(a) requires state to "submit a SIP revision that meets the VOC and NO_x RACT requirements in CAA sections 182(b)(2) and 182(f)." The remainder of §51.1312 only speaks to deadlines for RACT SIP submittal and RACT implementation and the determination of major stationary sources for RACT. The language referenced by EPA Region 6 is from the preamble of the implementation rule of the 2015 ozone NAAQS and, as such, is only guidance. Additionally, the guidance provided with the 2015 ozone NAAQS implementation rule was actually referenced as prior guidance from the preamble of the 2008 ozone NAAQS implementation rule. However, EPA Region 6 omits other guidance from the same preamble of the 2008 ozone NAAQS implementation rule that is specifically relevant to TCEQ RACT analysis in this case, as follows:

The EPA is finalizing the approach allowing in some cases for states to conclude that sources already addressed by RACT determinations for the 1-hour and/or 1997 ozone NAAQS do not need to implement additional controls to meet the 2008 ozone NAAQS RACT requirement. We believe that, in some cases, a new RACT determination under the 2008 standard would result in the same or similar control technology as the initial RACT determination under the 1-hour or 1997 standard because the fundamental control techniques, as described in the CTGs and ACTs, are still applicable. In cases where controls were applied due to the 1-hour or 1997 NAAQS ozone RACT requirement, we expect that any incremental emissions reductions from application of a second round of RACT controls may be small and, therefore, the cost for advancing that small additional increment of reduction may not be reasonable (80 FR 12279).

Nothing in the 2015 ozone NAAQS implementation rule preamble or rule negates this prior guidance that states might determine that sources addressed by prior RACT determinations do not need to implement additional controls. Furthermore, EPA did not provide any specific guidance by which states must make such determinations. Given the unreasonable January 1, 2023, submittal deadline established by EPA and that TCEQ had very recently conducted and submitted in 2020 a full RACT analysis for the DFW area at a more stringent serious classification for the 2008 ozone NAAQS, TCEQ reasonably concluded that this recent RACT analysis for the DFW area was sufficient for the purposes of a moderate classification RACT analysis for the 2015 ozone NAAQS. Furthermore, updates to existing control measures required to satisfy RACT for the DFW 2008 ozone NAAQS severe nonattainment area were adopted by the commission on April 24, 2024.

Additionally, especially given the short time that Texas was given to perform a RACT analysis prior to proposal of this 2015 ozone NAAQS moderate classification attainment demonstration SIP revision, EPA's expectation that Texas perform a complete reevaluation of all RACT, including presumptive RACT established by all prior EPA CTG RACT guidance, every time the state performs a RACT SIP analysis is an unreasonable and unrealistic expectation and is not supported by EPA's own prior guidance.

No changes were made in response to this comment.

Sierra Club commented that each of the three nonattainment areas for the 2015 NAAQS—DFW, HGB, and Bexar County—have failed to reach attainment by the previously assigned August 3, 2021 attainment deadline while current monitoring data indicates that none of these nonattainment areas is likely to reach attainment by the August 3, 2024 deadline. Sierra Club further commented that the proposed attainment demonstration SIP revision for the 2015 NAAQS in the DFW nonattainment area fails to provide RACT updates needed to achieve attainment as expeditiously as practicable. Sierra Club commented that RACT must be implemented at cement kilns in the DFW area and all major sources within the state that affect air quality in nonattainment areas, in particular, oil and gas sources. Sierra Club commented that TCEQ has previously implemented VOC and NO_x controls outside the DFW area to assist ozone attainment and could therefore do so again as RACT.

Regarding oil and gas sources, TCEQ has already addressed RACT for oil and gas sources by applying EPA's 2016 CTG for the Oil and Natural Gas Industry in the DFW 2015 ozone NAAQS nonattainment area in a SIP revision submitted to EPA on July 20, 2021. EPA approved this RACT determination on August 15, 2023 (88 FR 55379). The cement kilns in the DFW area are subject to the requirements of 30 TAC Chapter 117, Subchapter E, Division 2, and in 2009, the EPA approved these rules as meeting the FCAA RACT requirements for these sources (74 FR 1927, January 14, 2009). Again in 2017, the EPA approved the 30 TAC Chapter 117 rules as meeting FCAA RACT for the same cement kilns, except for the TXI Operations, LP (TXI) cement kiln, which received conditional approval (82 FR 44320, September 22, 2017). To address the EPA's conditional approval of the NO_x RACT analysis in the DFW 2008 Eight-Hour Ozone NAAQS AD SIP revision (Project No. 2013-015- SIP-NR), the TCEQ entered into an Agreed Order with TXI to include the 1.95 lb NO_x/ton of clinker permit limit as a federally enforceable addition to the Texas SIP. The EPA approved this limit as RACT on February 22, 2019 (84 FR 5601).

The FCAA and EPA guidance require RACT evaluations for nonattainment areas but not for attainment or unclassifiable areas. TCEQ has chosen to follow these federal mandates and not conduct RACT evaluations for attainment areas.

Regarding RACT requirements for the DFW area, applicable updates to existing control measures required to satisfy RACT for the DFW 2008 ozone NAAQS severe nonattainment area were adopted by the commission on April 24, 2024, and submitted to EPA on May 7, 2024. The RACT analysis for the 2015 NAAQS moderate nonattainment area comprises the same analysis of CTG and ACT documents and a major source RACT determination at the lower 25 ton per year major source threshold as what was completed for the DFW 2008 ozone NAAQS severe RACT analysis; therefore, the DFW 2008 ozone NAAQS severe RACT analysis is sufficient to cover the requirements for the DFW 2015 ozone NAAQS moderate nonattainment area.

No changes were made in response to this comment.

Sierra Club commented that TCEQ must revisit the availability of RACT for the oil and gas industry. Sierra Club specifically recommended that TCEQ strengthen the 30 TAC Chapter 115, Subchapter B, Division 7 rules by lowering the applicability threshold for leak detection and repair (LDAR) requirements and eliminating provisions allowing well operators to reduce the frequency of LDAR inspections when the percentage of leaking components at the well site is less than two percent.

TCEQ conducted a RACT analysis for the oil and natural gas industry in the DFW area in accordance with EPA's 2016 CTG guidance, which TCEQ has historically assumed to define presumptive RACT. This analysis and TCEQ's RACT determinations were submitted as a SIP revision to EPA on July 20, 2021. EPA's reclassification schedule did not allow time to complete updated DFW area RACT evaluations and incorporate them into the DFW 2015 ozone NAAQS attainment demonstration before the SIP proposal date; however, future SIP and rule proposals may be presented to the commission to address technical corrections to its oil and natural gas industry RACT regulations as well as RACT for the DFW ozone NAAQS nonattainment area.

No changes were made in response to this comment.

Sierra Club commented that TCEQ's analysis of the DFW nonattainment area for the 2015 Ozone NAAQS indicates that the area will not reach attainment by the deadline and that TCEQ must require RACM at all major sources within Texas that have an impact on the nonattainment area and that would allow the area to reach attainment as expeditiously as practical or will advance the attainment date.

With the reclassification of the DFW area to serious for the 2015 ozone NAAQS, the moderate classification RACM analysis is no longer required and is not being adopted and submitted to EPA as part of this SIP revision.

No changes were made in response to this comment.

Sierra Club commented that EPA has based its Good Neighbor Plan on emissions from coal-fired and natural gas-fired EGUs over 100 megawatts commensurate with newly-installed selective catalytic reduction (SCR) systems operating at 0.05 pound (lb) NO_X/million British thermal units (MMBtu) and optimized existing SCR systems operating at 0.08 lb/MMBtu. Sierra Club considered these levels as implementation of SCR technology to its fullest potential and asked TCEQ to set RACT or RACM for fossil-fired EGUs throughout Texas at these levels. Sierra Club argued that TCEQ must set RACT at a level at least as stringent as the Good Neighbor Plan. Alternatively, Sierra Club also commented that Georgia and other states have required RACM EGU NO_X reductions based on SCR operation. Sierra Club further commented that the implementation rate of SCR at coal-fired EGUs in Texas lags significantly behind the national average. Sierra Club claimed that coal-fired EGUs were responsible for 55,349 tons of NO_X in Texas during 2021 and that only 35% of the coal-fired EGU capacity in Texas has implemented SCR technology while the national average for SCR implementation at coal-fired EGUs is 62%.

Sierra Club also commented on one source, W.A. Parish, which has SCR technology installed but does not run the control technology at full capacity. Sierra Club provided supporting information citing four determinations EPA has made regarding SCR installation at coal-fired EGUs: First, EPA has acknowledged that states allowing some power plants to operate without SCR incentivizes stakeholders to produce higher emissions in order to lower operating costs. Second, Sierra Club claimed that EPA has found that economic feasibility of a particular technology is determined by the incidence of that technology at other sources more than by a particular source's ability to afford the technology. Third, most coal-fired EGUs across the nation have SCR technology implemented. Finally, Sierra Club estimated the cost per ton of NO_X reductions through SCR installation to be $11,000. Sierra Club further commented that Texas coal-fired EGUs could install and implement SCR technology in 11 to 36 months, which would allow enough installation time to meet the RACT implementation deadline for severe areas under the 2008 ozone NAAQS, November 7, 2025.

TCEQ concurs with Sierra Club's finding that no coal-fired EGUs exist in the DFW 2015 ozone NAAQS nonattainment area. Because RACT only applies within the nonattainment area, TCEQ has set no RACT levels for coal-fired boilers in the DFW area. With the final reclassification of the DFW area to serious nonattainment for the 2015 ozone NAAQS, the moderate classification RACM analysis is no longer required and is not being adopted and submitted to EPA as part of this SIP revision.

No changes were made in response to this comment.

Sierra Club and 43 individuals commented that coal-fired EGUs, including Martin Lake and Limestone and other emission sources, contribute to ozone nonattainment in the DFW area and urged TCEQ to require these EGUs and other entities to use already-available control technology to reduce ozone pollution. Sierra Club cited its recent February 2023 report, *Out of Control*, which addresses health effects resulting from sulfur dioxide and particulate matter emissions from coal-fired power plants. Sierra Club and one individual commented that technologies exist to help clean the air, requesting that pollution belching coal plants clean up their pollution. Sierra Club and another individual requested that TCEQ implement the capture and pollutant minimization technologies available to keep DFW and surrounding areas clean.

To the extent that the comments address NO_x emissions from sources within the DFW area, the commission notes that EPA's reclassification schedule did not allow time to complete updated RACT evaluations and incorporate them into the DFW 2015 ozone NAAQS attainment demonstration before the SIP proposal date. Applicable updates to existing controls to satisfy RACT for the DFW 2008 ozone NAAQS severe nonattainment area were adopted by the commission on April 24, 2024, and submitted to EPA on May 7, 2024.

To the extent that the comments address NO_x emissions from the Martin Lake, Limestone, other coal-fired power plants, and other emission sources which are outside the DFW area, the commission notes that no potential control measures met the criteria to be considered RACM on coal-fired boilers and other emission sources outside the DFW area. Because it is not possible to implement any control measures before the March 1 start of the 2023 DFW area ozone season, no control measures can meet the RACM criteria of advancing attainment of the NAAQS.

With the final reclassification of the DFW area to serious nonattainment for the 2015 ozone NAAQS, the moderate classification RACM analysis is no longer required and is not being adopted and submitted to EPA as part of this SIP revision.

Comments regarding sulfur dioxide and particulate matter emissions are outside the scope of this SIP Revision.

No changes were made in response to this comment.