TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
AGENDA ITEM REQUEST
for Proposed State Implementation Plan Revision

AGENDA REQUESTED: 05/31/2023

DATE OF REQUEST: 05/12/2023

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

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

To meet federal Clean Air Act requirements, the proposed SIP revision would include a photochemical modeling analysis, a weight of evidence analysis, a reasonably available control technology analysis, a reasonably available control measures analysis, motor vehicle emissions budgets for 2023, and a contingency plan. (Denine Calvin, 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:** May 12, 2023

Thru: Laurie Gharis, Chief Clerk
Erin E. Chancellor, Interim Executive Director

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

Docket No.: 2023-0305-SIP

Subject: Commission Approval for Proposal 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 of August 3, 2021 for areas classified as marginal, 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 United States 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 is now subject to the moderate nonattainment area requirements in FCAA, §182(b), and the Texas Commission on Environmental Quality (TCEQ) is required to submit moderate classification AD and reasonable further progress (RFP) SIP revisions to EPA. The attainment date for the moderate classification is August 3, 2024 with a 2023 attainment year (87 FR 60897).[2] 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.

Scope of the SIP revision:
As a result of reclassification, the TCEQ is required to submit to EPA an AD SIP revision consistent with FCAA requirements for areas classified as moderate nonattainment for the 2015 eight-hour ozone NAAQS.

A.) Summary of what the SIP revision would do:
This SIP revision includes a photochemical modeling analysis and a weight-of-evidence (WoE) analysis that evaluates the attainment status of the area. This proposed SIP revision also includes a reasonably available control measures (RACM) analysis, a reasonably available control technology (RACT) analysis, and a contingency plan that would provide additional emissions reductions if the area fails to attain the standard by the moderate attainment date. To ensure that federal transportation funding conforms to the SIP, this proposed DFW AD SIP revision contains nitrogen

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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.

oxides and volatile organic compounds motor vehicle emissions budgets (MVEB) for the 2023 attainment year. No control measures were identified as RACM for this SIP revision because any such measures would have had to be implemented by January 1, 2023, to be considered as even potentially advancing attainment. This proposed SIP revision also includes a RACT analysis from the 2008 Ozone NAAQS Serious AD SIP Revision for the DFW area, adopted March 4, 2020. The 2020 SIP revision for the 2008 ozone NAAQS was performed at a more stringent classification than the current proposed SIP revision. Additionally, the 2020 RACT analysis for the DFW area used a 2017 base year, which is only two years prior to the 2019 base year used for the current proposed SIP revision. Therefore, the RACT analysis performed for the 2008 Ozone NAAQS Serious AD SIP Revision is adequate for the purposes of this proposed 2015 Ozone NAAQS Moderate AD SIP Revision.

B.) Scope required by federal regulations or state statutes:
If adopted, this SIP revision would be submitted to EPA in response to the requirements 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). The FCAA-required SIP elements include analyses for RACT and RACM, MVEBs, and a contingency plan. Consistent with EPA's November 2018 modeling guidance, this proposed SIP revision includes a modeled attainment demonstration and a WoE analysis.[3] This SIP revision also includes 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.

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 under the commission's general authority under Texas Water Code, §5.102, General Powers and §5.105, General Policy. The SIP revision is also proposed under 42 United States Code, §§7420 *et seq.*, and implementing rules in 40 Code of Federal Regulations Part 51, which requires states 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.

Effect on the:

A.) Regulated community:
This SIP revision will impact the regulated community by changing the SIP emissions year for emissions banking and trading credit generation for the DFW 2015 ozone NAAQS nonattainment area to 2019. On April 9, 2021, TCEQ communicated this change to regulated entities.

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[3] EPA. *Modeling Guidance for Demonstrating Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze.* November 29, 2018. https://www3.epa.gov/ttn/scram/guidance/guide/O3-PM-RH-Modeling_Guidance-2018.pdf.

B.) Public:
The general public in the DFW ozone nonattainment area may benefit from the DFW area ultimately meeting the ozone NAAQS and the area being redesignated as attainment for the 2015 eight-hour ozone NAAQS.

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

Stakeholder meetings:
The 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. Attendees included representatives from industry, county and city government, environmental groups, and the public.

If this proposed SIP revision is approved by the commission for public comment and public hearing, then a formal public comment period will be opened, and a public hearing will be offered.

Public Involvement Plan
Yes.

Alternative Language Requirements
Yes. Spanish.

Potential controversial concerns and legislative interest:
The current project timeline allows for submission to EPA by the end of 2023, after EPA's January 1, 2023 SIP submittal deadline. Missing the submittal deadline could lead to EPA issuing a finding of failure to submit prior to TCEQ's planned submittal, which would start sanctions and federal implementation plan (FIP) clocks. EPA would be required to promulgate a FIP anytime within two years after finding TCEQ failed to make the required submission unless the TCEQ submits, and EPA approves, a plan revision correcting the deficiency prior to promulgating the FIP. Sanctions could include transportation funding restrictions, grant withholdings, and 2-to-1 emissions offset requirements for new construction and major modifications of stationary sources in the DFW 2015 ozone NAAQS nonattainment area. Based on the 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.

A 2021 court ruling on the 2015 eight-hour ozone standard SIP requirements rule vacated provisions in the rule allowing for the use of previously implemented measures as contingency measures (*Sierra Club v. EPA*, 21 F.4th 815, D.C. Cir. 2021). EPA published draft guidance on contingency measures in the *Federal Register* for public comment on March 23, 2023. Since EPA had not issued guidance to states regarding contingency measures at the time it was developed, this SIP revision relies on the historically approved approach of using surplus mobile source emissions reductions to fulfill the contingency measure requirements.

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

What are the consequences if this SIP revision does not go forward? Are there alternatives to revision?
The commission could choose to not comply with requirements to develop and submit an AD SIP revision to EPA. However, if the SIP revision is not submitted to EPA, EPA could issue a finding of failure to submit, requiring that TCEQ submit the required SIP revision within a specified time

period, and impose sanctions on the state. The EPA would be required to promulgate a FIP anytime within two years after finding TCEQ failed to make the required submission. 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 could impose such sanctions and implement a FIP until the state submitted, and EPA approved, an AD SIP revision for the area.

Key points in the proposal SIP revision schedule:

Anticipated proposal date: May 31, 2023
Anticipated public hearing date: July 6, 2023
Anticipated public comment period: June 2, 2023 through July 17, 2023
Anticipated adoption date: November 8, 2023

Agency contacts:

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Terry Salem, Staff Attorney, Environment Law Division, (512) 239-0469
Jamie Zech, Agenda Coordinator, Air Quality Division (512) 239-3935

cc: Chief Clerk, 2 copies
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Krista Kyle
Office of General Counsel
Denine Calvin
Terry Salem
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

Proposal
May 31, 2023

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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 United States 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 is now subject to the requirements in FCAA, §182(b) for moderate nonattainment areas. The Texas Commission on Environmental Quality (TCEQ) is required to submit moderate ozone classification attainment demonstration (AD) and reasonable further progress (RFP) state implementation plan (SIP) revisions to the 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.

This proposed 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 is scheduled to be proposed in conjunction with the DFW and Houston-Galveston-Brazoria (HGB) 2015 Eight-Hour Ozone Moderate Classification RFP SIP Revision (Project Number 2022-023-SIP-NR).

This proposed 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*

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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.

Evidence supplement the photochemical modeling analysis presented in Chapter 3: *Photochemical Modeling* to characterize 2023 future ozone conditions.

For the photochemical modeling analysis, this proposed 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 proposed 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 the 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 the EPA's 2018 *Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze*, the 2023 DVFs presented have been rounded to one decimal place and then truncated.[3] Based on the 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 St.	0401	69.67	0.980	68
Dallas North No.2	0063	74.00	0.978	72
Denton Airport North	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 proposed 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 the 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 the 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.

With the creation of the TNRCC (and its successor the TCEQ), authority over air quality is found in both the Texas Water Code (TWC) and the TCAA. The general authority of the 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 the TCEQ, and the responsibilities and authority of the executive director. TWC, Chapter 5 also authorizes the TCEQ to implement action when emergency conditions arise and to conduct hearings. The TCAA specifically authorizes the 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 the 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 the TCEQ to enter property and make inspections. They also may make recommendations to the commission concerning any action of the TCEQ that affects their territorial jurisdiction, may bring enforcement actions, and may execute cooperative agreements with the 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 the 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.

<u>Applicable Law</u>
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.

<u>Statutes</u>
All sections of each subchapter are included, with the most recent effective date, unless otherwise noted.

TEXAS HEALTH & SAFETY CODE, Chapter 382	September 1, 2021
TEXAS WATER CODE	September 1, 2021

Chapter 5: Texas Natural Resource Conservation Commission
- Subchapter A: General Provisions
- Subchapter B: Organization of the Texas Natural Resource Conservation Commission
- Subchapter C: Texas Natural Resource Conservation Commission
- Subchapter D: General Powers and Duties of the Commission
- Subchapter E: Administrative Provisions for Commission
- Subchapter F: Executive Director (except §§5.225, 5.226, 5.227, 5.231, 5.232, and 5.236)
- Subchapter H: Delegation of Hearings
- Subchapter I: Judicial Review
- Subchapter J: Consolidated Permit Processing
- Subchapter L: Emergency and Temporary Orders (§§5.514, 5.5145, and 5.515 only)
- Subchapter M: Environmental Permitting Procedures (§5.558 only)

Chapter 7: Enforcement
- Subchapter A: General Provisions (§§7.001, 7.002, 7.0025, 7.004, and 7.005 only)
- Subchapter B: Corrective Action and Injunctive Relief (§7.032 only)
- Subchapter C: Administrative Penalties
- Subchapter D: Civil Penalties (except §7.109)
- 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, 2022, 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

Chapter 106: Permits by Rule, Subchapter A April 17, 2014

Chapter 111: Control of Air Pollution from Visible Emissions and Particulate Matter November 12, 2020

Chapter 112: Control of Air Pollution from Sulfur Compounds October 27, 2022

Chapter 114: Control of Air Pollution from Motor Vehicles April 21, 2022

Chapter 115: Control of Air Pollution from Volatile Organic Compounds July 22, 2021

Chapter 116: Control of Air Pollution by Permits for New Construction or Modification July 1, 2021

Chapter 117: Control of Air Pollution from Nitrogen Compounds March 26, 2020

Chapter 118: Control of Air Pollution Episodes March 5, 2000

SECTION VI: CONTROL STRATEGY

A. Introduction (No change)

B. Ozone (Revised)

1. Dallas-Fort Worth (Revised)
2. Houston-Galveston-Brazoria (No change)
3. Beaumont-Port Arthur (No change)
4. El Paso (No change)
5. Regional Strategies (No change)
6. Northeast Texas (No change)
7. Austin Area (No change)
8. San Antonio Area (No change)
9. Victoria Area (No change)

C. Particulate Matter (No change)

D. Carbon Monoxide (No change)

E. Lead (No change)

F. Oxides of Nitrogen (No change)

G. Sulfur Dioxide (No change)

H. Conformity with the National Ambient Air Quality Standards (No change)

I. Site Specific (No change)

J. Mobile Sources Strategies (No change)

K. Clean Air Interstate Rule (No change)

L. Transport (No change)

M. Regional Haze (No change)

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LIST OF ACRONYMS

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	United States Environmental Protection Agency
ERC	Emission Reduction Credit
ERG	Eastern Research Group

ESL	Energy Systems Laboratory
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 United States 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 the 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

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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](http://www.tceq.texas.gov/airquality/sip) webpage (http://www.tceq.texas.gov/airquality/sip) on the [Texas Commission on Environmental Quality's](http://www.tceq.texas.gov/) (TCEQ) website (http://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 12, 2008, the EPA lowered the primary and secondary eight-hour ozone NAAQS to 0.075 ppm (73 FR 16436). On May 21, 2012, the 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 March 6, 2015, the EPA published the implementation rule for the 2008 eight-hour ozone standard, which set the attainment date for the DFW moderate ozone nonattainment area as December 31, 2018 (80 FR 12264). On December 23, 2014, the D.C. Circuit Court ruled on a lawsuit filed by the Natural Resources Defense Council, which resulted in vacatur of the EPA's December 31 attainment date for the 2008 eight-hour ozone NAAQS. As part of the EPA's final 2008 eight-hour ozone standard SIP requirements rule, published in the *Federal Register* on March 6, 2015, the 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 the 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 WoE analysis to demonstrate attainment by December 31, 2018;
- two rulemakings for RACT requirements for all CTG and all non-CTG major source emission source categories of VOC and NO_X;
- a contingency plan; and
- a commitment to develop a new SIP revision to include an AD, RACM analysis, and MVEBs 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, the EPA published approval of VOC RACT (82 FR 60546), and on October 23, 2017, the 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, the 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 FCAA, §181(a)(5).[5] On August 23, 2019, the 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 the EPA's 2008 eight-hour ozone standard SIP requirements

[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 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.

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 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 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, the 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. States must submit AD and RFP SIP revisions to the EPA by May 7, 2024, 18 months from the effective date of the reclassification, 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, the 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, the 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

[6] *Id*

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, the EPA published final approval of the EI for the DFW 2015 ozone nonattainment area (86 FR 34139). On September 9, 2021, the 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, the 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.

1.2.5 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.

[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.

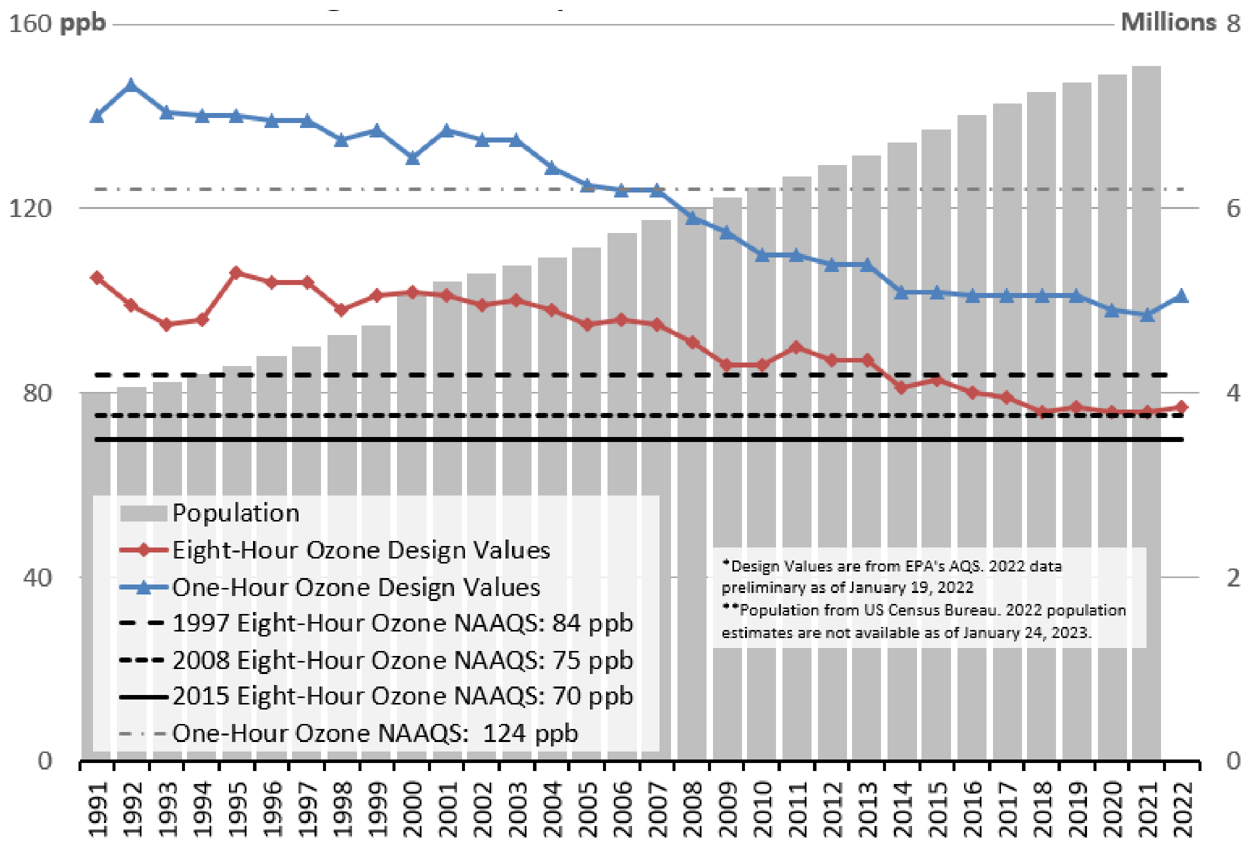

Figure 1-1: Ozone Design Values and Population in the DFW Area

1.3 HEALTH EFFECTS

In 2015, the EPA revised the primary eight-hour ozone NAAQS to 0.070 ppm (70 ppb). To support the 2015 eight-hour primary ozone standard, the 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 a virtual TIM on August 24, 2022. This TIM included presentations on ozone planning, ozone design values, modeling platform updates, airport emissions inventory development, and an update from the 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 Virtual Outreach 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.

1.5 PUBLIC HEARING AND COMMENT INFORMATION

The commission will offer a public hearing for this proposed SIP revision at the following time and location:

Table 1-1: Public Hearing Information

City	Date	Time	Location
Arlington	July 6, 2023	7:00 pm	101 W. Abrams St Arlington, TX 76010

The public comment period will open on June 2, 2023 and close on July 17, 2023. Written comments will be accepted via mail, fax, or through the TCEQ Public Comment system (https://tceq.commentinput.com/). File size restrictions may apply to comments being submitted via the TCEQ Public Comment system. All comments should reference the "DFW 2015 Ozone NAAQS Moderate AD SIP Revision" and should reference Project Number 2022-021-SIP-NR. Comments submitted via hard copy may be mailed to Denine Calvin, MC 206, State Implementation Plan Team, Air Quality Division, Texas Commission on Environmental Quality, P.O. Box 13087, Austin, Texas 78711-3087 or faxed to (512) 239-4808. Comments submitted electronically must be submitted through the TCEQ Public Comment system. File size restrictions may apply to comments being submitted via the TCEQ Public Comment system. Comments must be received by 11:59 CDT on July 17, 2023.

An electronic version of the DFW 2015 Ozone NAAQS Moderate AD SIP Revision and appendices can be found at the TCEQ's DFW: Latest Ozone Planning Activities webpage (https://www.tceq.texas.gov/airquality/sip/dfw/dfw-latest-ozone). An electronic version of the public hearing notice will be available on the Texas SIP Revisions webpage (https://www.tceq.texas.gov/airquality/sip/sipplans.html).

1.6 SOCIAL AND ECONOMIC CONSIDERATIONS

No new control strategies have been incorporated into this proposed 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

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, the 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 the 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 proposed AD SIP revision, the 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, the TCEQ requested regulated entities submit any revisions to the 2019 point source EI by July 9, 2021. The point source emissions in this proposed 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 the TCEQ 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

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[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 the 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 proposed 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 the 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] 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

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[9] https://www.tceq.texas.gov/downloads/air-quality/research/reports/emissions-inventory/58221 11300fy2021-20210423-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 proposed SIP revision includes preliminary on-road EIs developed using MOVES3. Updated on-road EIs and emissions factors were developed using the 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

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[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

miles traveled for each vehicle 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 the TCEQ's Air Quality Research and Contract Projects webpage (https://www.tceq.texas.gov/airquality/airmod/project/pj.html).

CHAPTER 3: PHOTOCHEMICAL MODELING

3.1 INTRODUCTION

This chapter describes attainment demonstration (AD) modeling conducted in support of this proposed 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, PM2.5, 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 the 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.

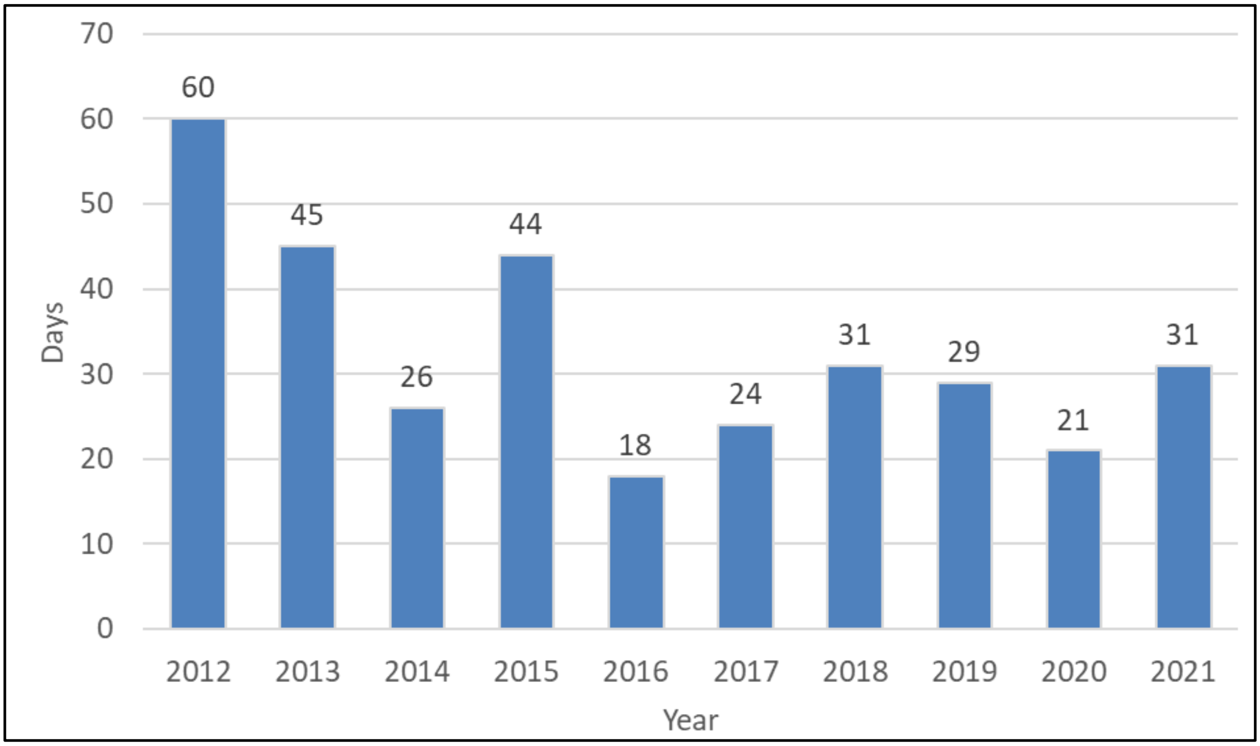

Figure 3-1: Exceedance Days in the DFW 2015 Ozone NAAQS Nonattainment Area by Year from 2012 through 2021

In selecting a modeling episode, the 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.

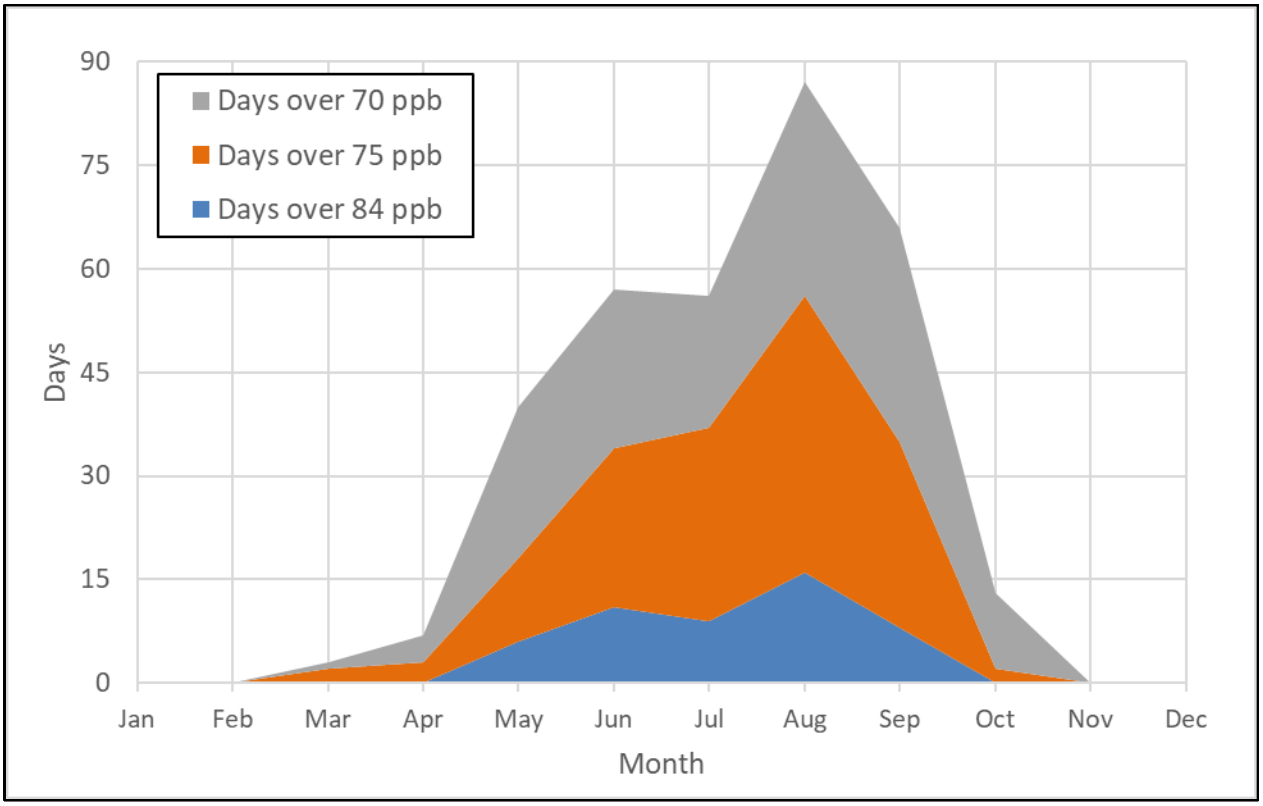

Figure 3-2: Exceedance Days by Month from 2012 through 2021 in the DFW 2015 Ozone NAAQS Nonattainment Area

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.

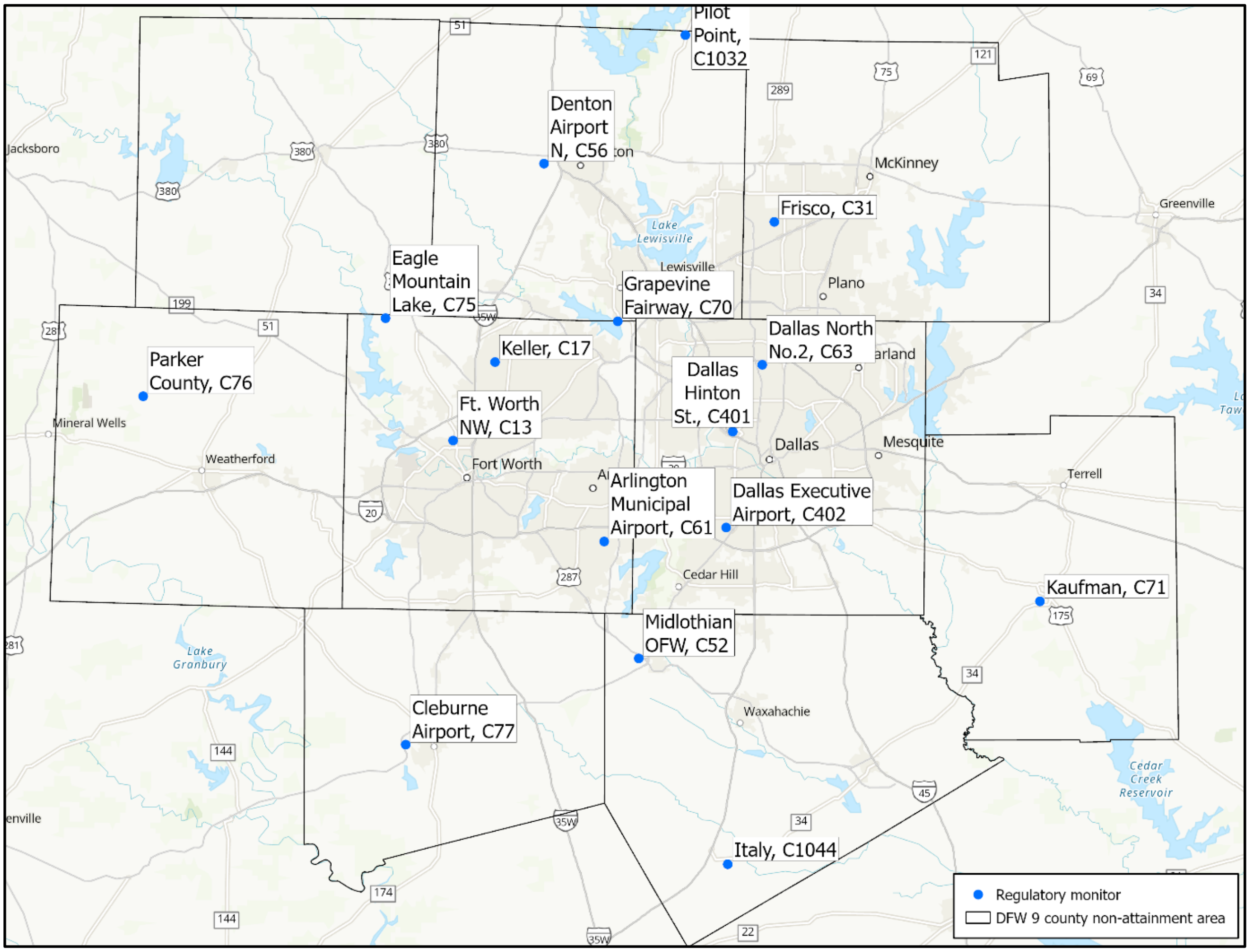

Figure 3-3: Regulatory Monitors that Measure Ozone in the DFW 2015 Ozone NAAQS Nonattainment Area

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 St.	0401	70	7	0	73
Dallas North No.2	0063	83	22	5	77
Denton Airport North	0056	79	28	5	73
Eagle Mountain Lake	0075	82	27	10	73
Frisco	0031	88	24	8	72
Ft. Worth Northwest	0013	75	19	2	76

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)
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 the TCEQ's 2019 modeling platform are provided in Section 1.2: *Modeling Episode* of Appendix A.

3.3 PHOTOCHEMICAL MODELING

The 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). The 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 tx_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

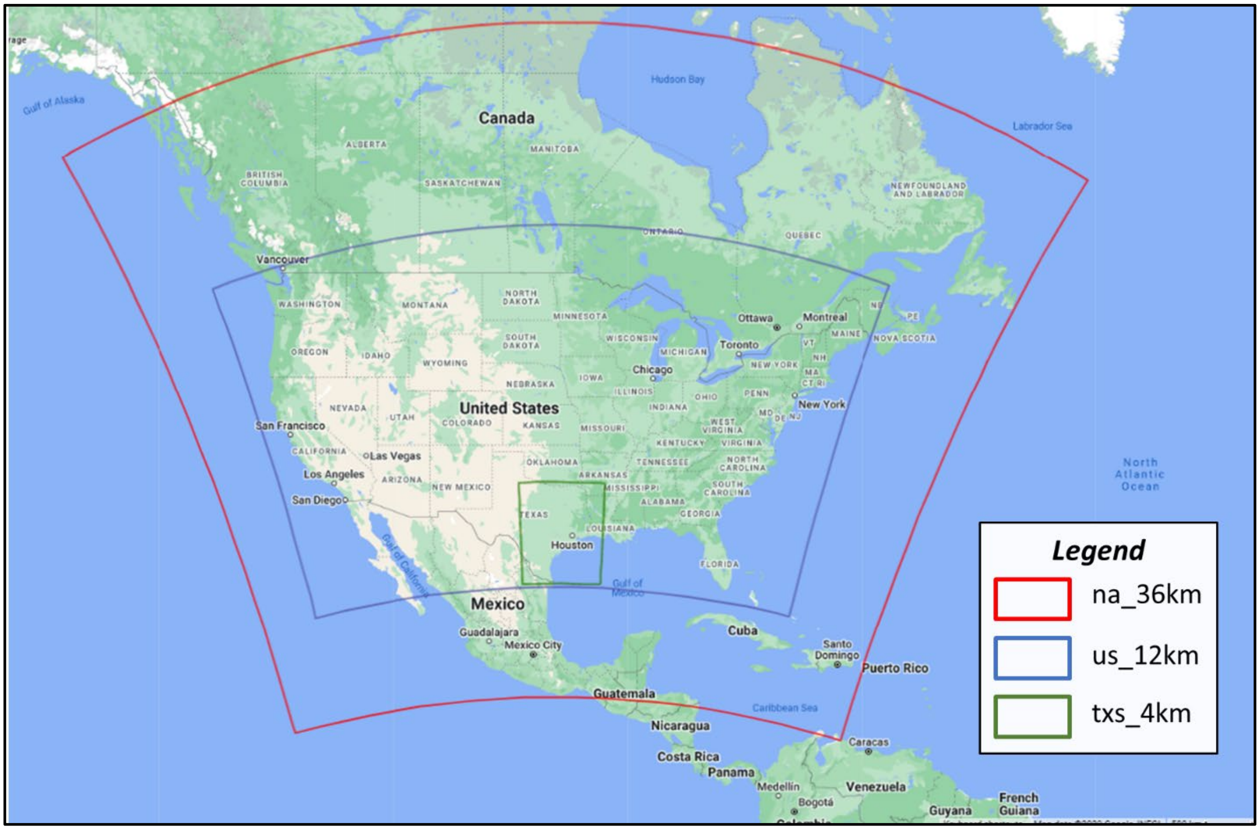

Figure 3-4: CAMx Domains

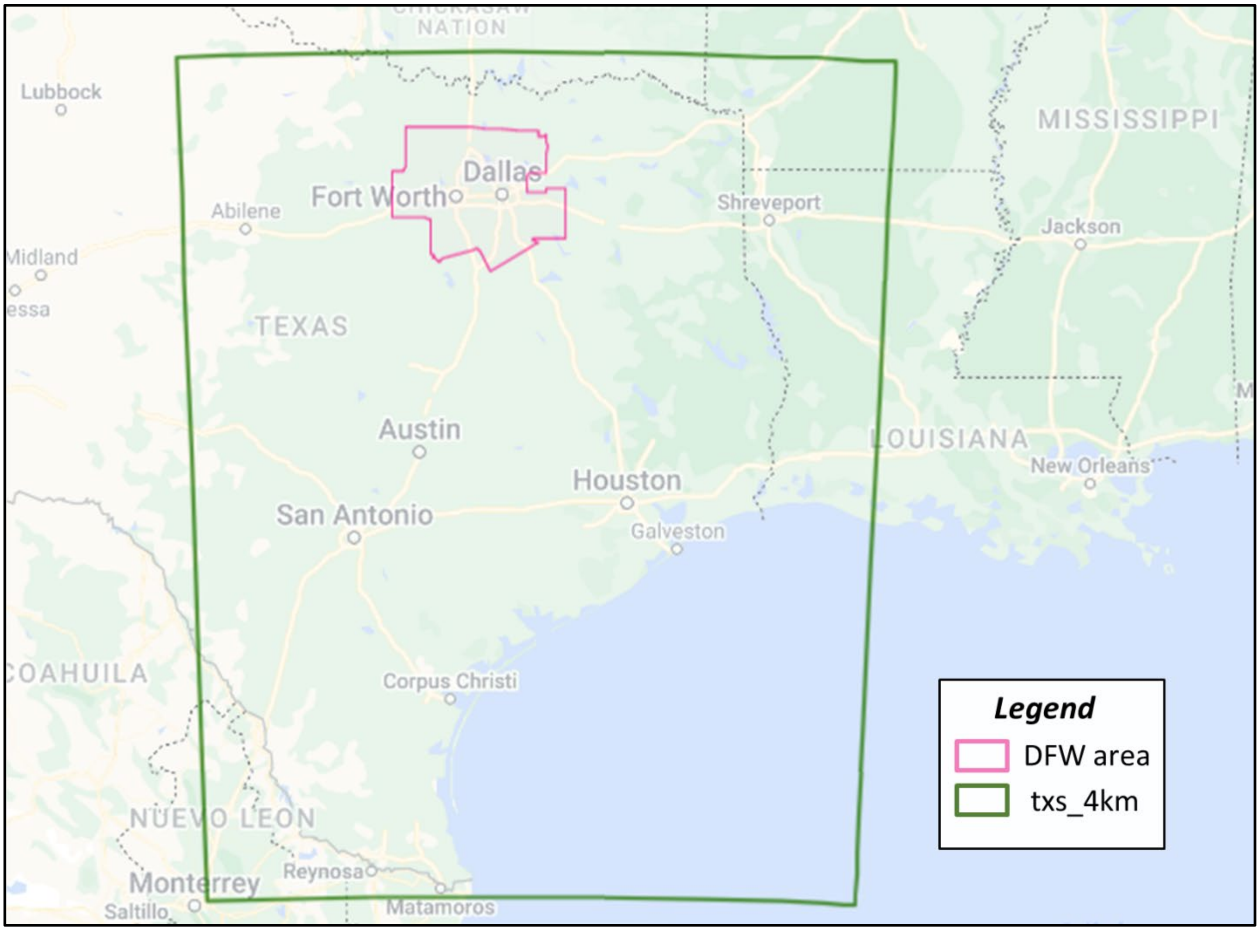

Figure 3-5: DFW 2015 Ozone NAAQS Nonattainment Area and CAMx 4 km Modeling Domain

3.3.2 CAMx Options

The TCEQ used the CAMx options summarized in Table 3-3: *CAMx Configuration Options* for this SIP revision. Details regarding the configuration testing conducted by the 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.*

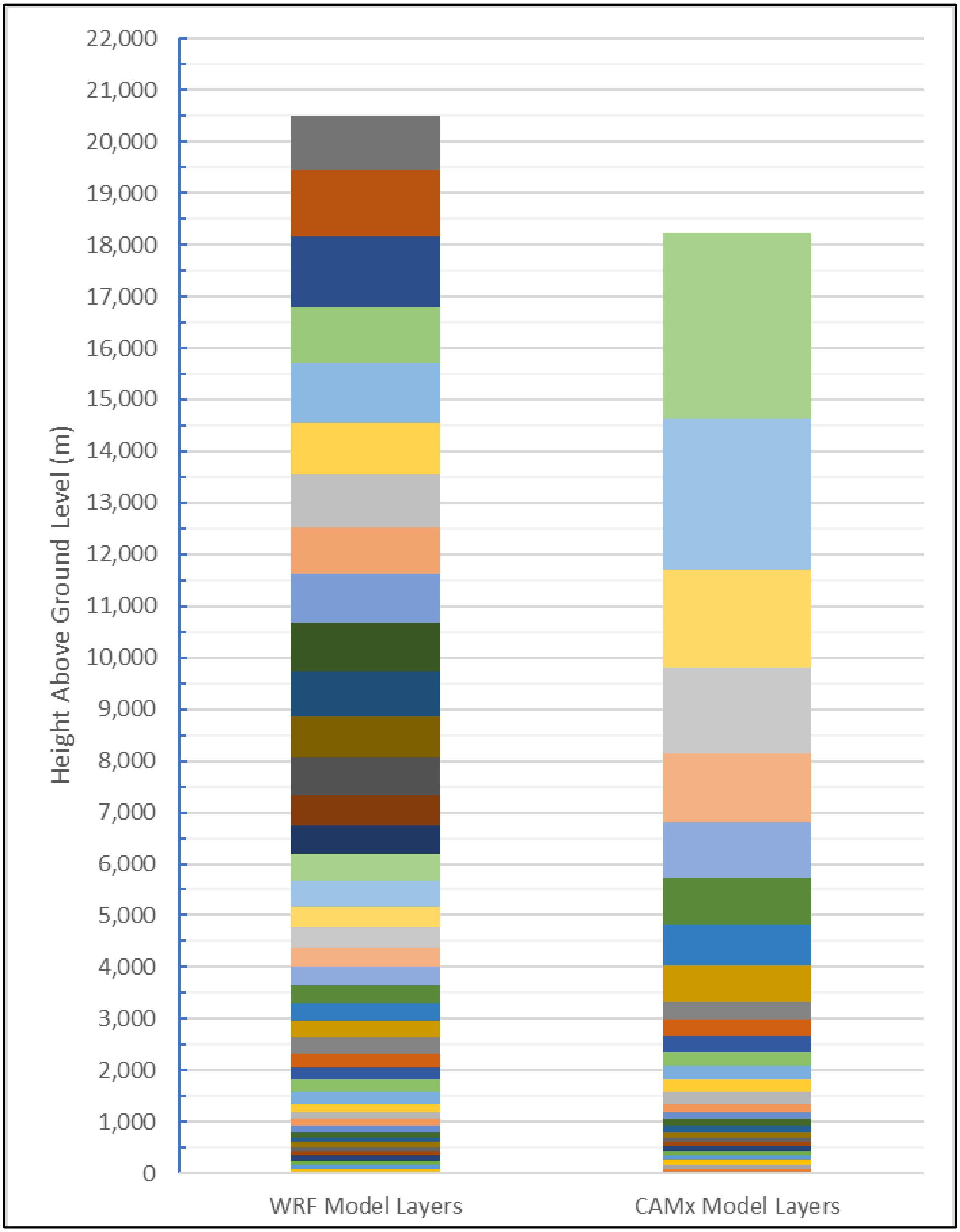

Figure 3-7: WRF and CAMx Vertical Layers for the txs_4km Domain

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 proposed AD SIP 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 the 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 the 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.

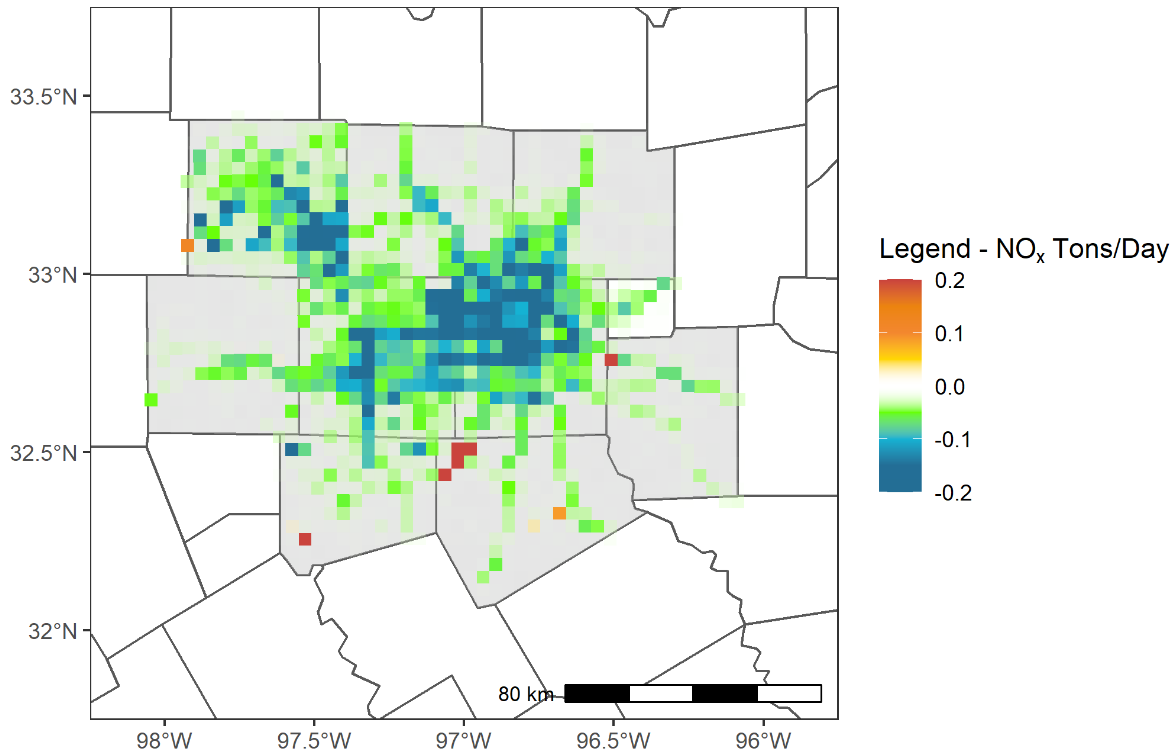

Figure 3-8: Difference in Anthropogenic NO_x between 2023 Future and 2019 Base Case on June 12 Modeled Episode Day

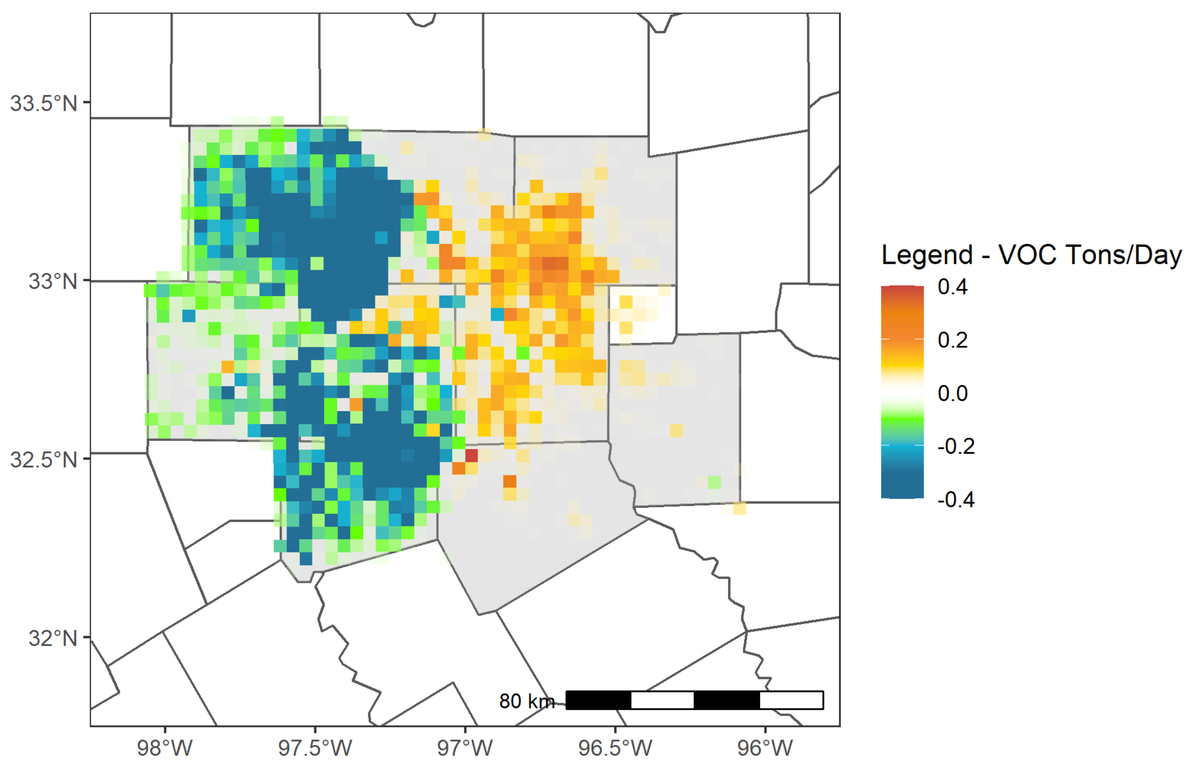

Figure 3-9: Difference in Anthropogenic VOC between 2023 Future and 2019 Base Case on June 12 Modeled Episode Day

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.

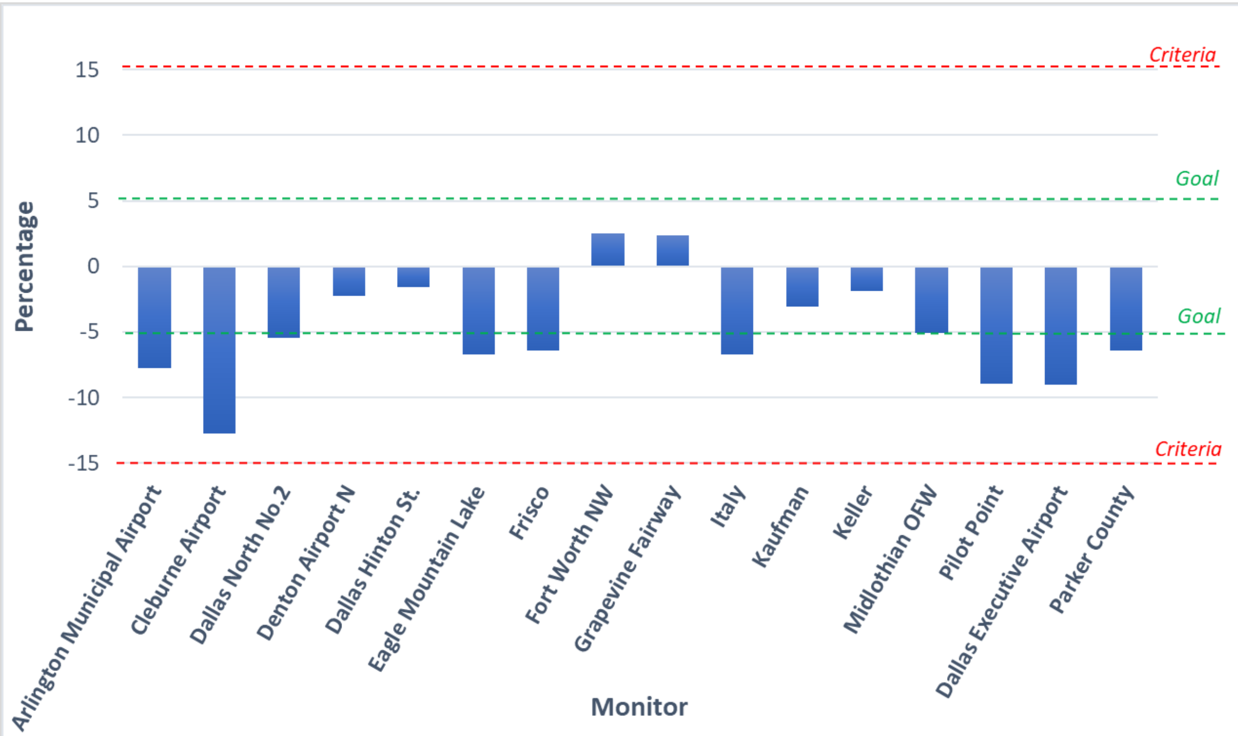

Figure 3-10: NMB of MDA8 Ozone ≥ 60 ppb by Monitor

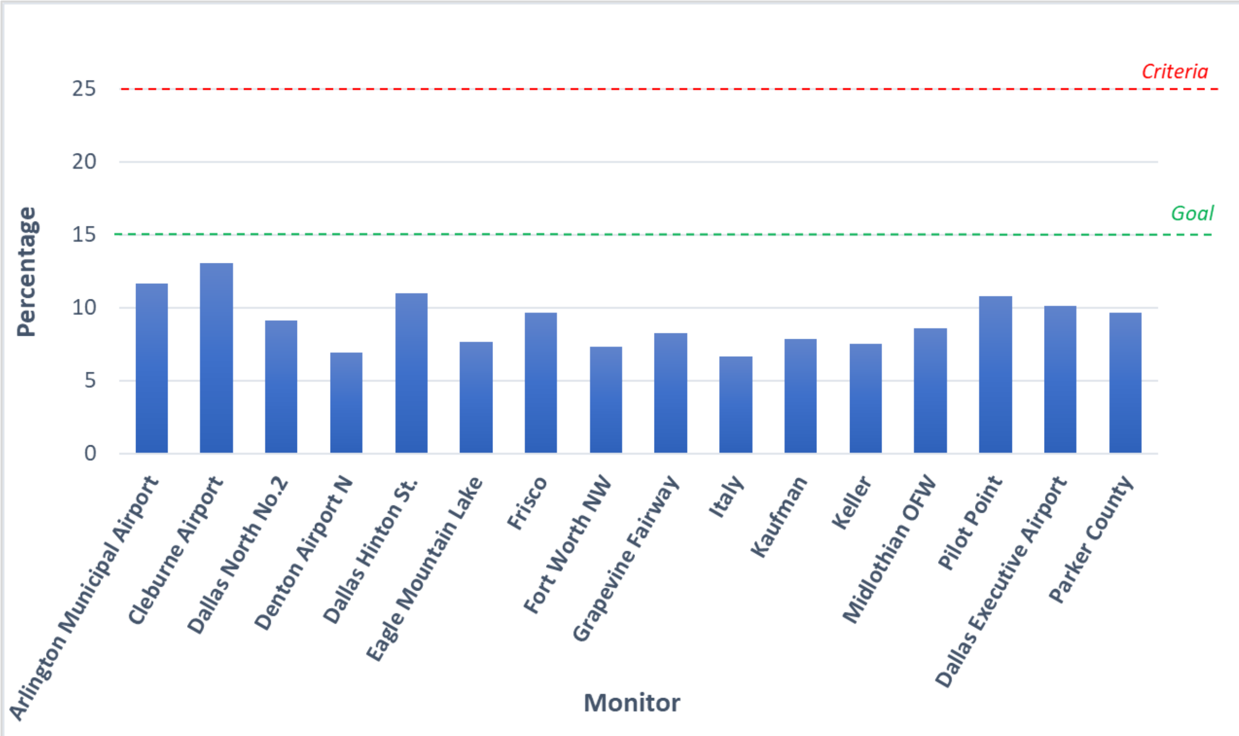

Figure 3-11: NME of MDA8 Ozone ≥ 60 ppb by Monitor

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 St.	0401	72.70	71.25	0.980
Dallas North No.2	0063	74.06	72.43	0.978
Denton Airport North	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*.

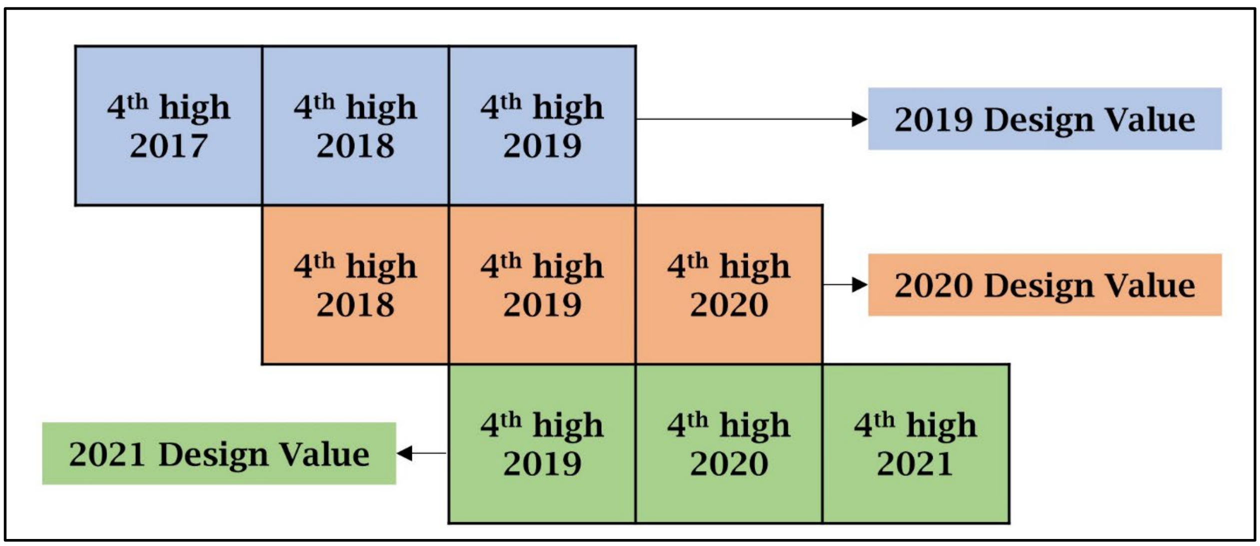

Figure 3-12: Example Calculation for the 2019 DVB

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 No.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 St.	0401	69.67	68.25	68
Dallas North No.2	0063	74.00	72.34	72
Denton Airport North	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

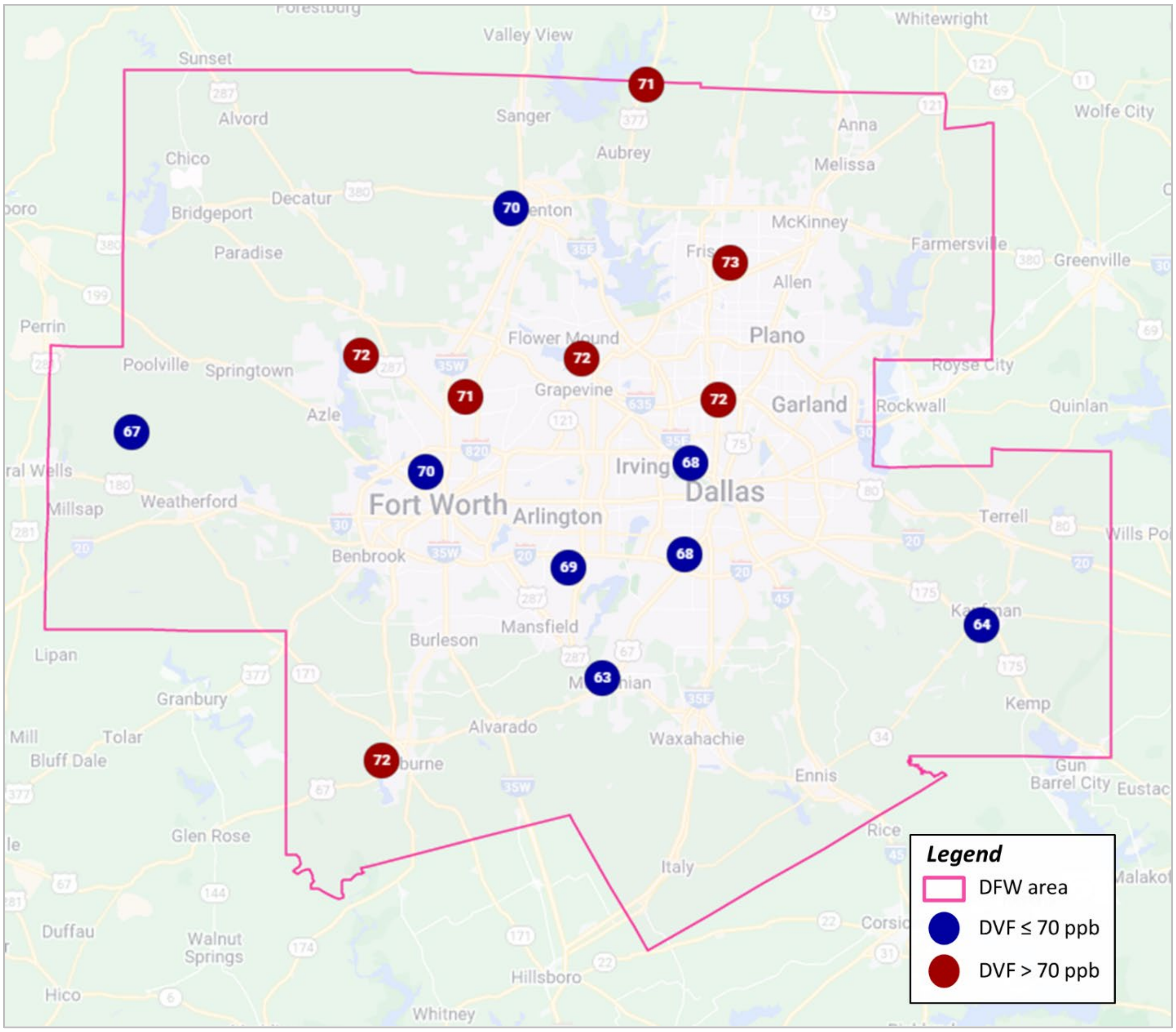

Figure 3-13: 2023 DVF in the DFW 2015 Ozone NAAQS Nonattainment Area

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 North 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 St.	0401	68.37	0.12	68
Dallas North No.2	0063	72.46	0.12	72
Denton Airport North	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.

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 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 the 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	Yearly computer checks 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 the 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 the 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

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.

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.

4.3.3 Updates to Mobile Source Control Measures

Concurrent with this SIP revision, the commission will consider a proposed rulemaking (2022-026-114-AI) and associated SIP revision (2022-027-SIP-NR) to expand, the state's vehicle inspection and maintenance (I/M) requirements to Bexar County. The proposed rulemaking would also remove 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 Texas Administrative Code (TAC) Chapter 114, Subchapter H, Division 1.

On April 15, 2022, the 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 and will be submitted to the EPA for consideration and approval with the 30 TAC Chapter 114 rulemaking (2022-026-114-AI), if adopted in November 2023, to implement I/M for Bexar County. 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) being proposed concurrent with this DFW AD SIP revision.

4.4 RACT ANALYSIS

The RACT analysis submitted as part of this proposed 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 proposed 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 proposed SIP revision for the DFW 2015 ozone NAAQS moderate nonattainment area and will assess the need for any updates to existing control measures required to satisfy RACT for the DFW 2008 ozone NAAQS severe nonattainment area in a forthcoming attainment demonstration SIP revision proposal (Project No. 2023-107-SIP-NR).

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, the TCEQ uses the general criteria specified by the 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 the 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 January 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 proposed 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 January 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 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 have been 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. The TCEQ 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. The 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 the 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 the 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 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 reasonable further progress. Recent court decisions have invalidated key aspects of EPA's historical approach to implementing the contingency measure requirement. At the time the proposed SIP revision was being developed, the EPA had historically accepted the use of surplus mobile source emissions reductions from previously implemented federal rules to fulfill the contingency measure requirements. However, the 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 the 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 mobile source 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*, the 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, the 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 proposed 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), which is scheduled to be proposed concurrently with this proposed 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)[1], 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 the 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.

The EPA initially approved Texas' nonattainment NSR regulation for ozone on November 27, 1995 (60 FR 49781). The 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, the 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, the 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 the 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 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, the 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 the 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

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 the EPA, the new SIP emissions year will be 2019 for point source electric generating units with emissions recorded in the 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, the TCEQ sent notice to point sources through agency email system and posted notice on the TCEQ 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, the 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 the 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 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). The 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
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

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?
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

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 proposed 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 proposed 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 proposed 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 the 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 the

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.

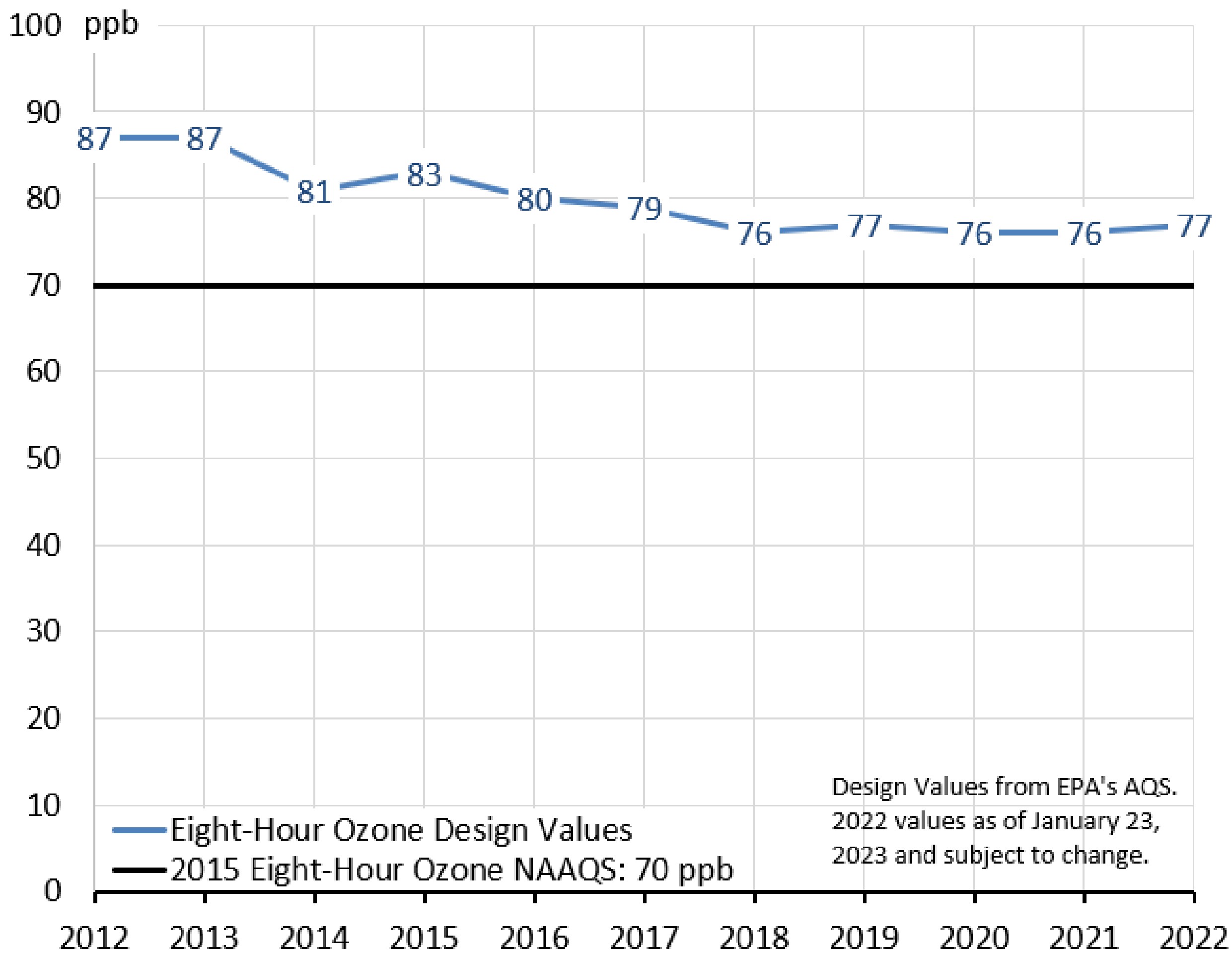

Figure 5-1: Eight-Hour Ozone Design Values in the DFW Area

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 No.2 in 2019, then Grapevine Fairway again in 2020. Finally, in 2021 and 2022, Pilot Point recorded the highest design values.

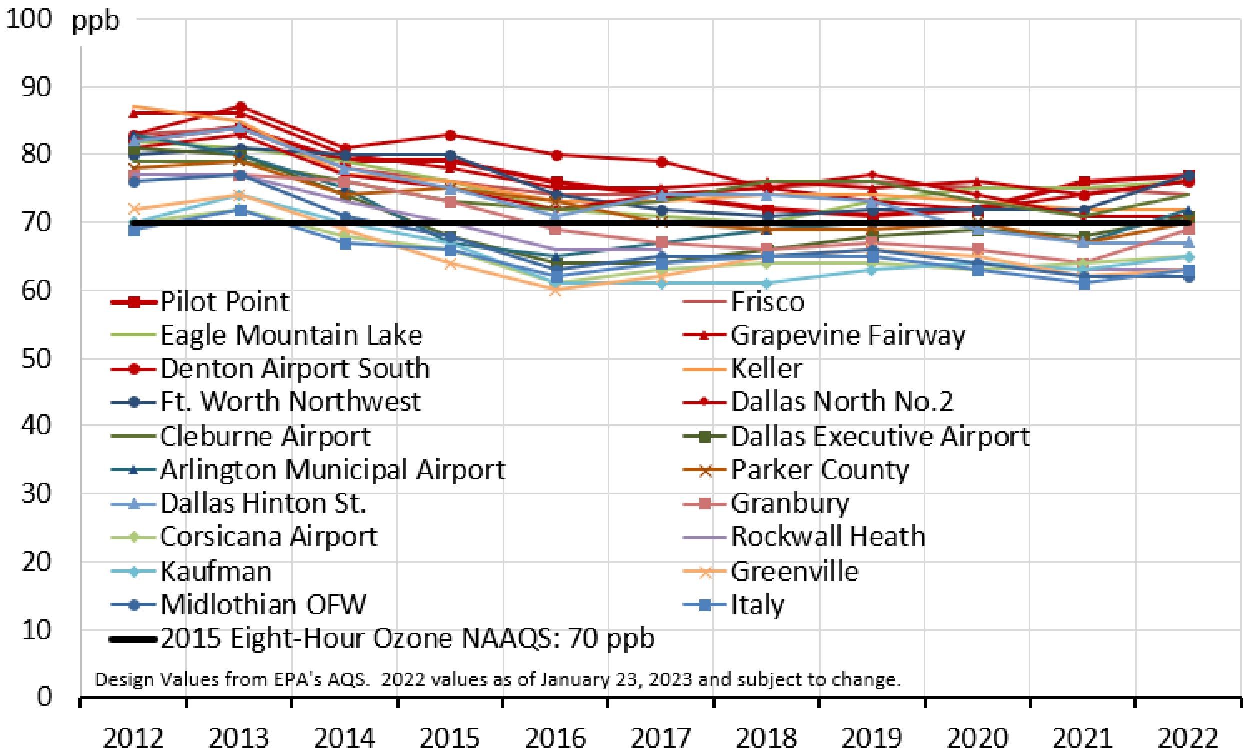

Figure 5-2: Eight-Hour Ozone Design Values by Monitor in the DFW Area

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.

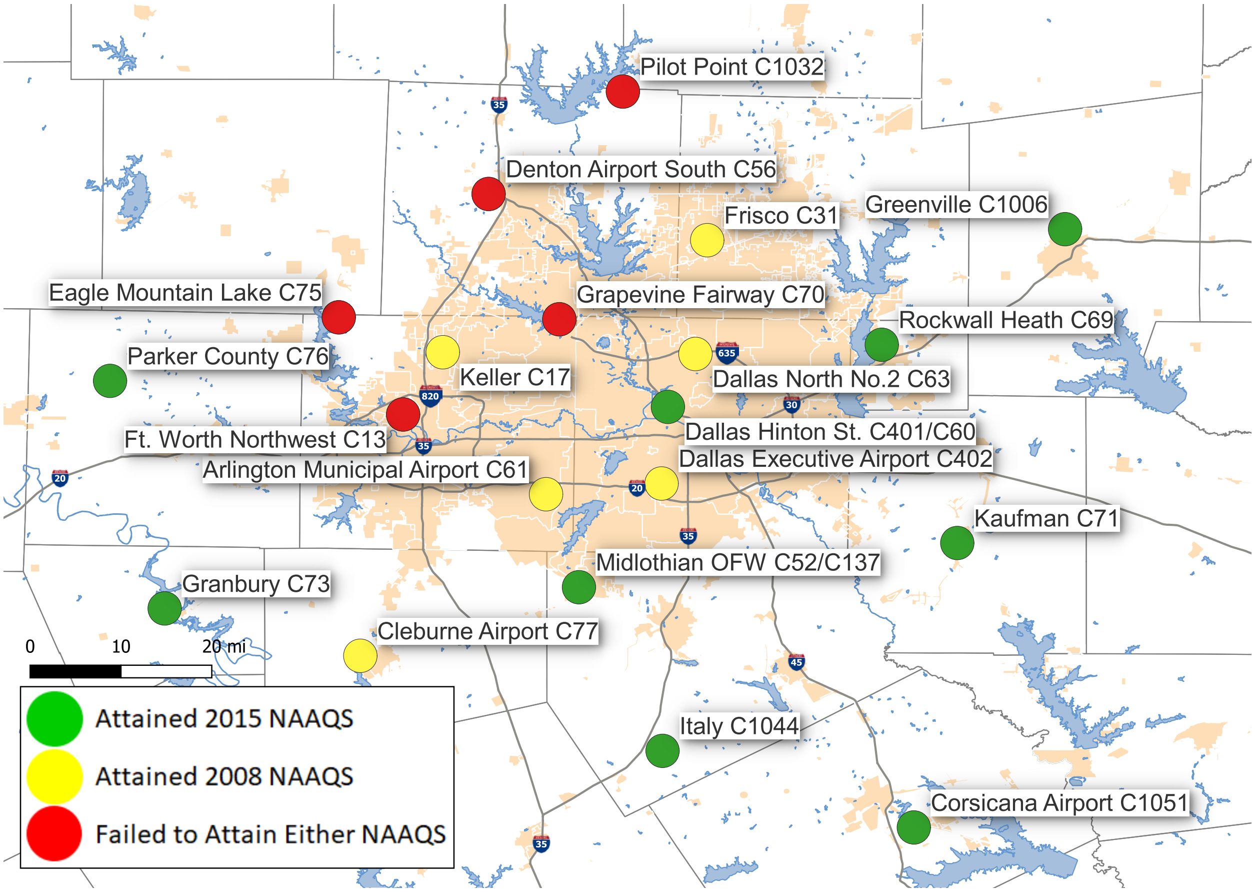

Figure 5-3: Map of 2022 Design Values at DFW Area Monitors

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.

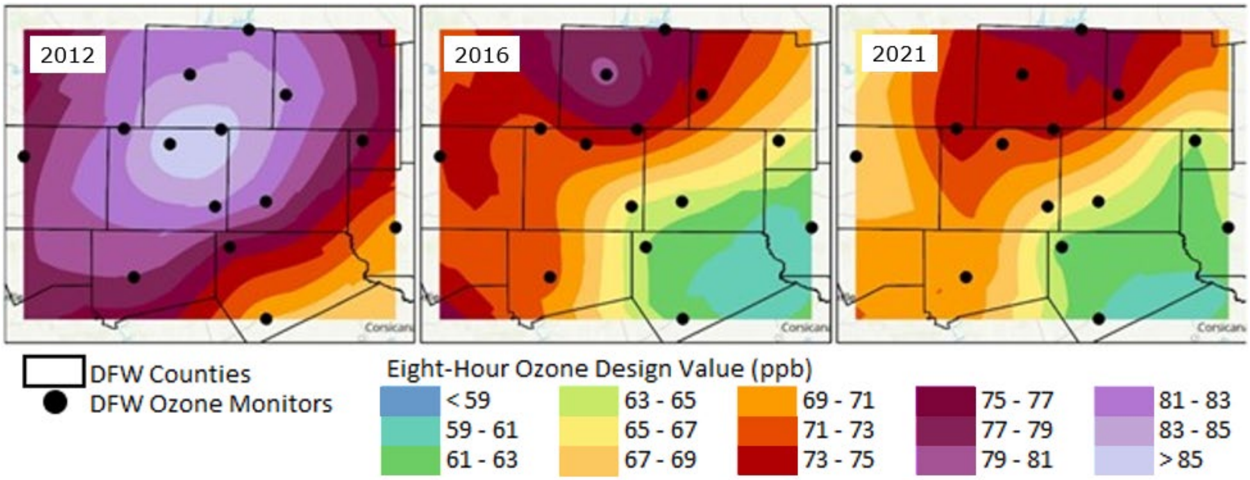

Figure 5-4: Map of Eight-Hour Ozone Design Values for the DFW Area

<u>5.2.1.2 Fourth-Highest Eight-Hour Ozone Trends</u>

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.

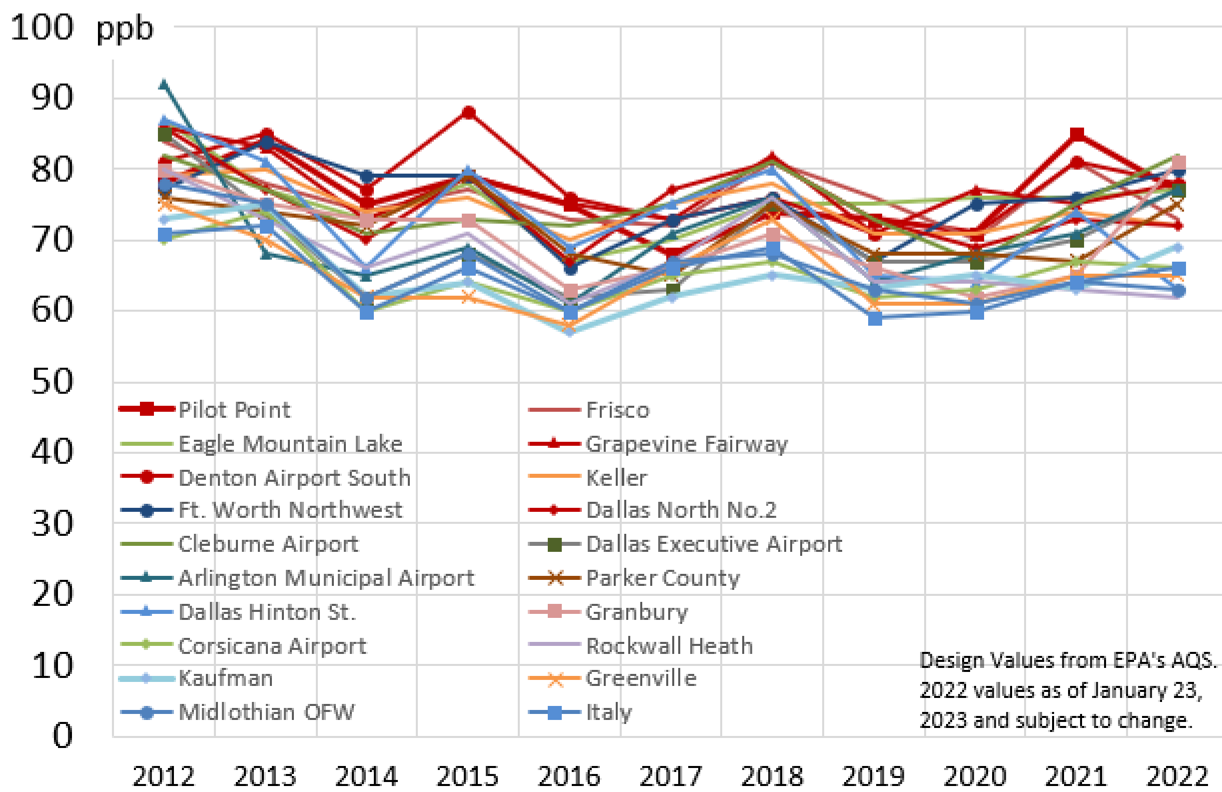

Figure 5-5: Fourth-Highest MDA8 Ozone Concentration by Monitor in the DFW Area

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.

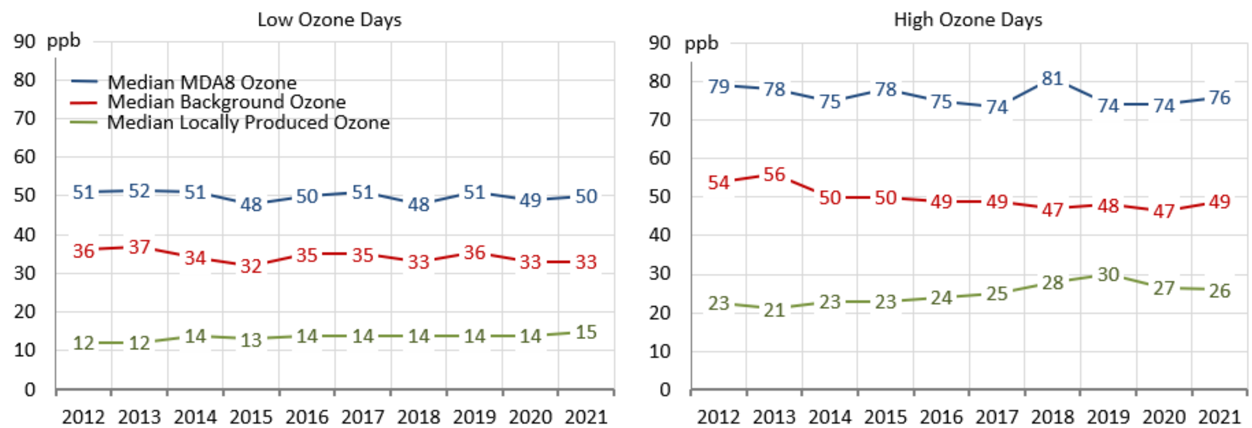

Figure 5-6: Ozone Season Trends in MDA8 Ozone, Background Ozone, and Locally Produced Ozone for High versus Low Ozone Days in the DFW Area

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 the 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.

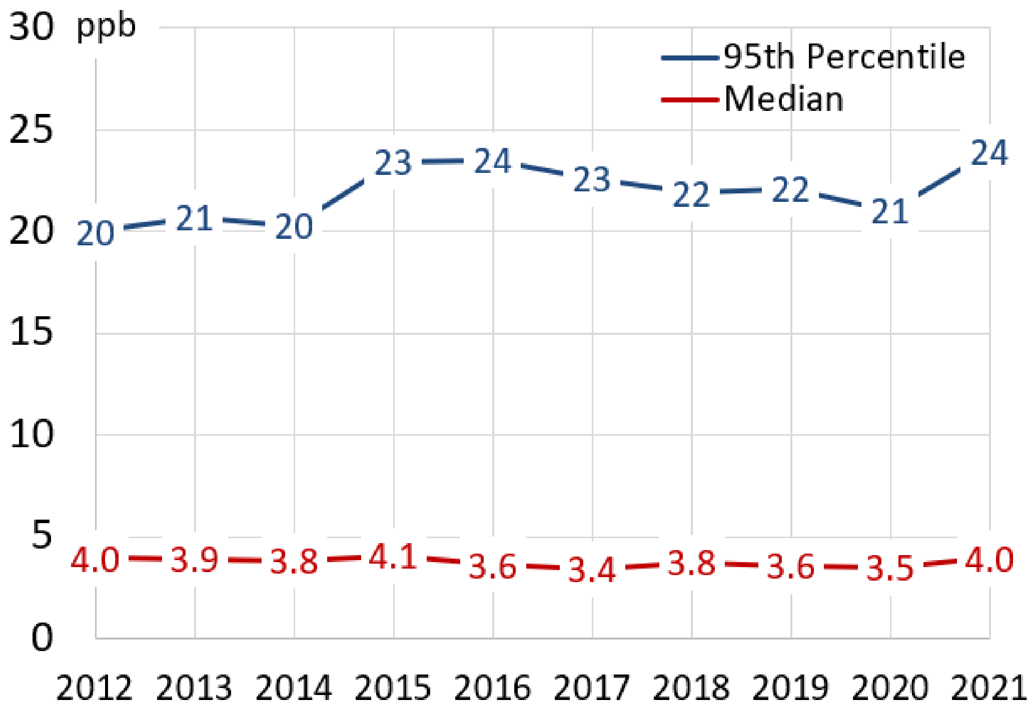

Figure 5-7: Ozone Season NO_x Trends in the DFW Area

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.

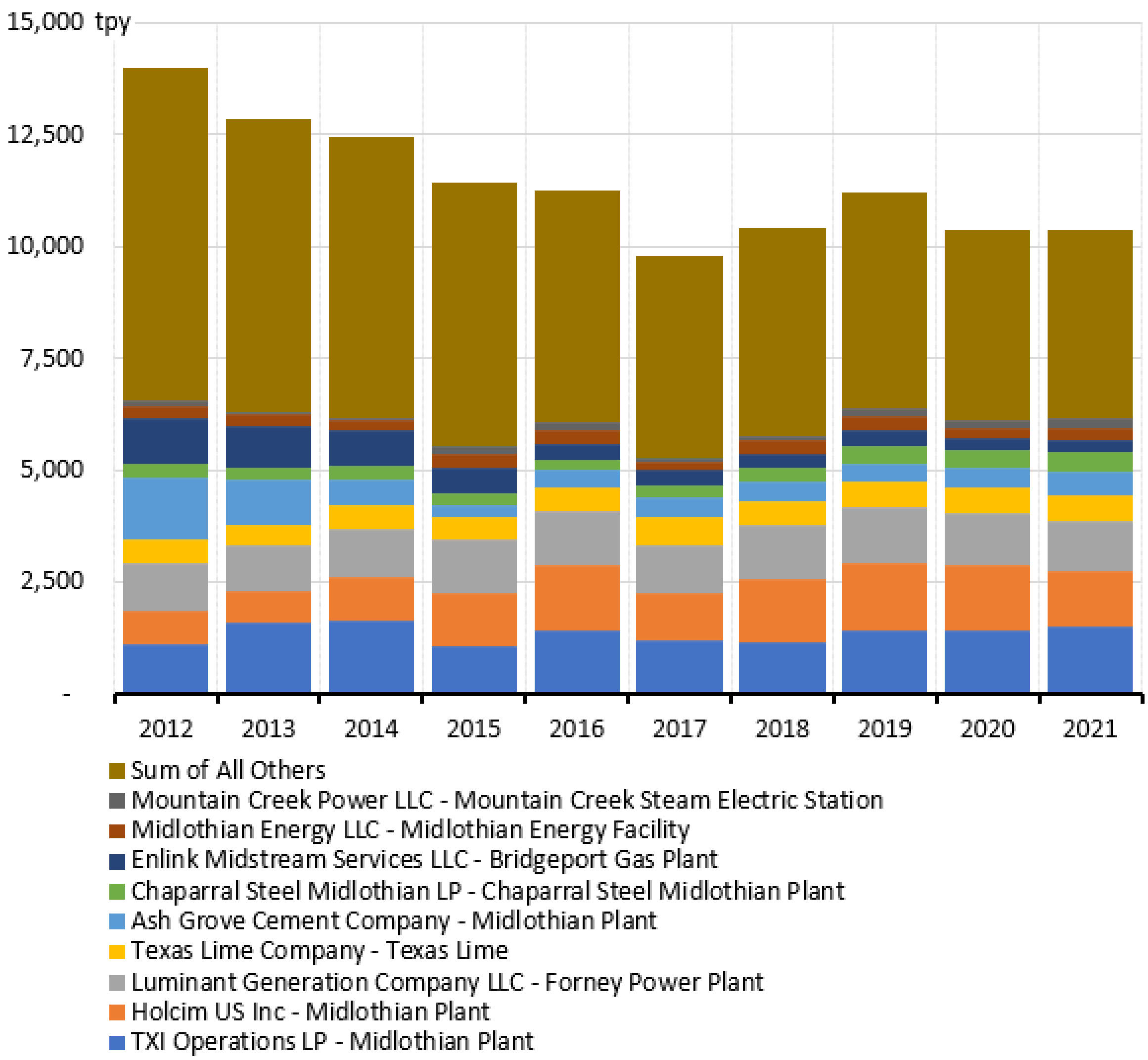

Figure 5-8: DFW Area Point Source NO_x Emissions by Site

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).

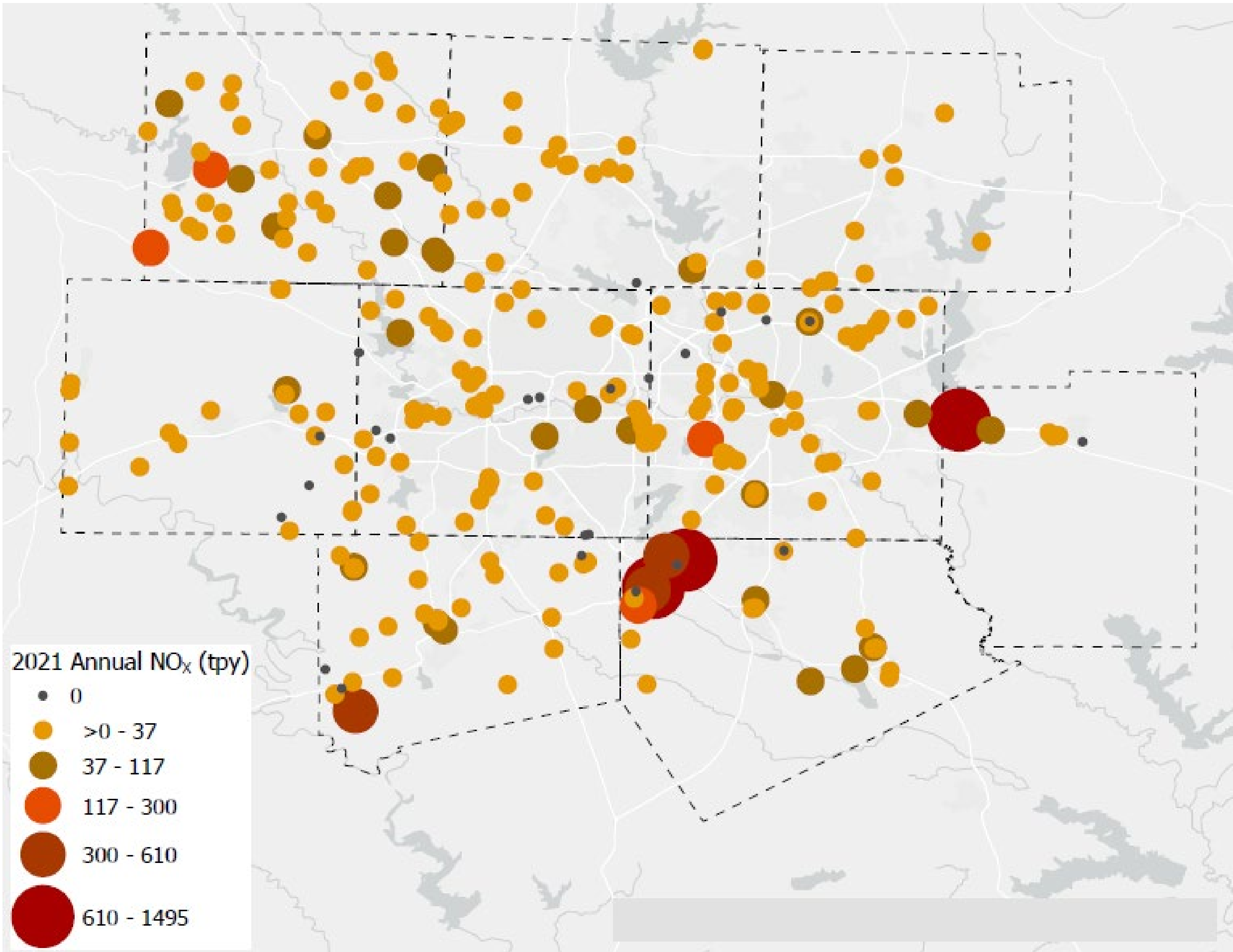

Figure 5-9: Map of Stationary NO_x Emissions Sources in the DFW Area

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.

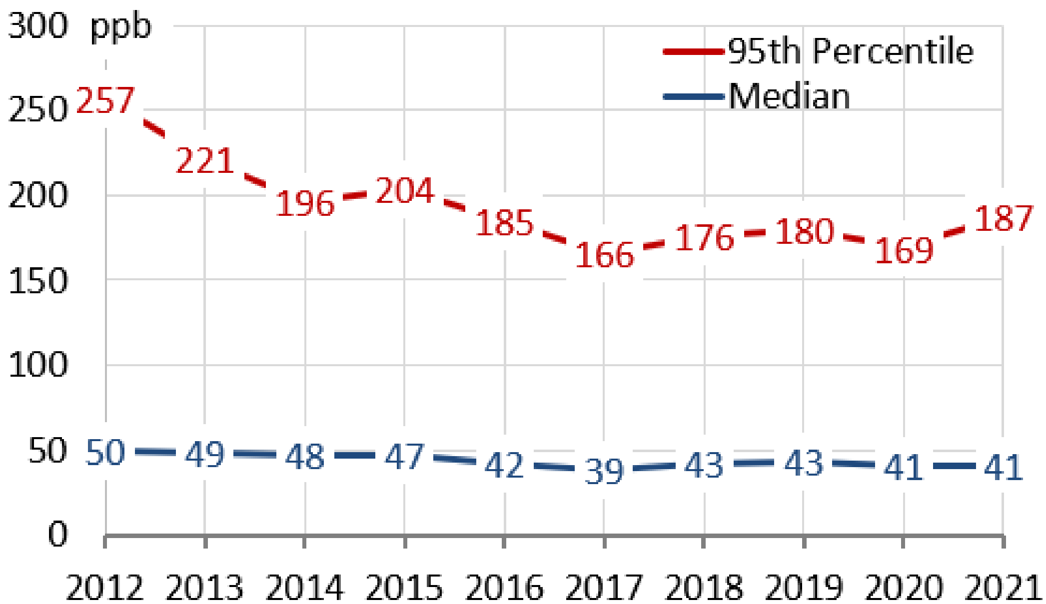

Figure 5-10: Ozone Season Median and 95th Percentile TNMOC Trends in the DFW Area

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.

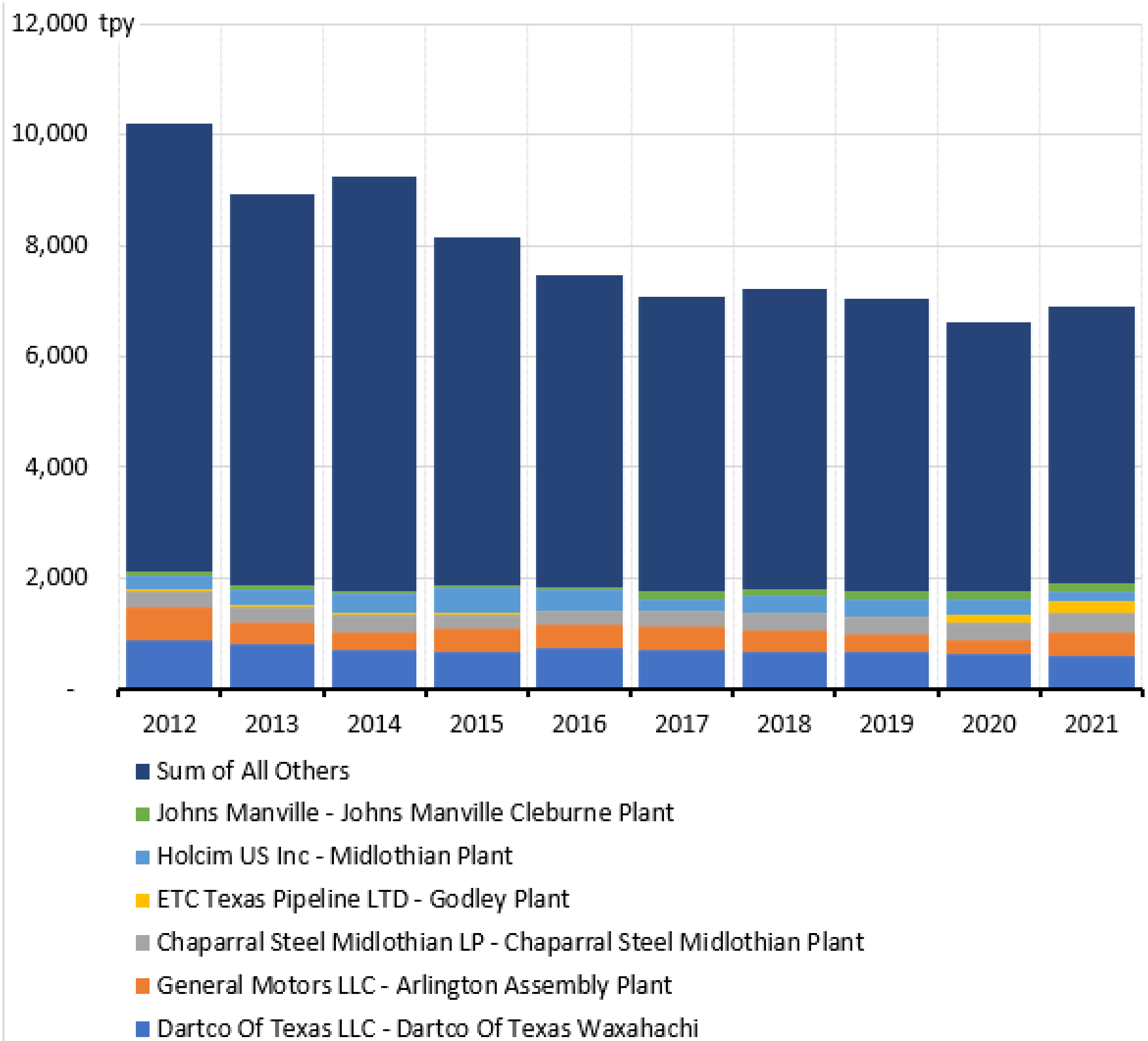

Figure 5-11: DFW Area Point Source VOC Emissions by Site

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.

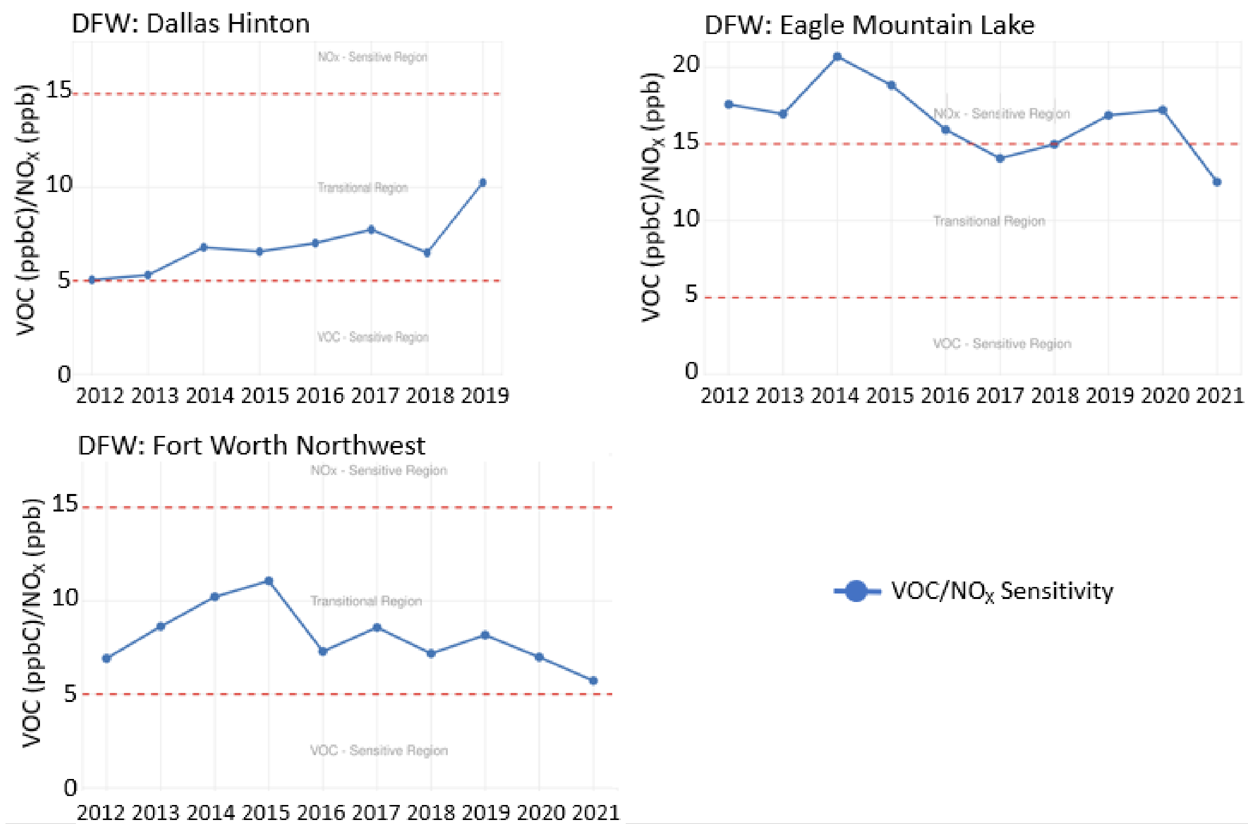

Figure 5-12: Median VOC-to-NO_x Ratios During the Ozone Season in the DFW Area

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.

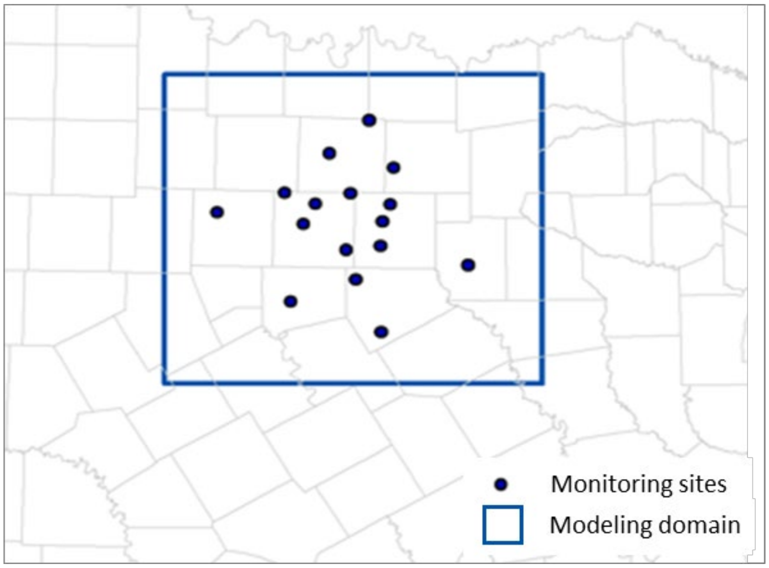

Figure 5-13: Modeling Domain and Monitors for DFW VOC and NO_X Sensitivity Analysis

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.

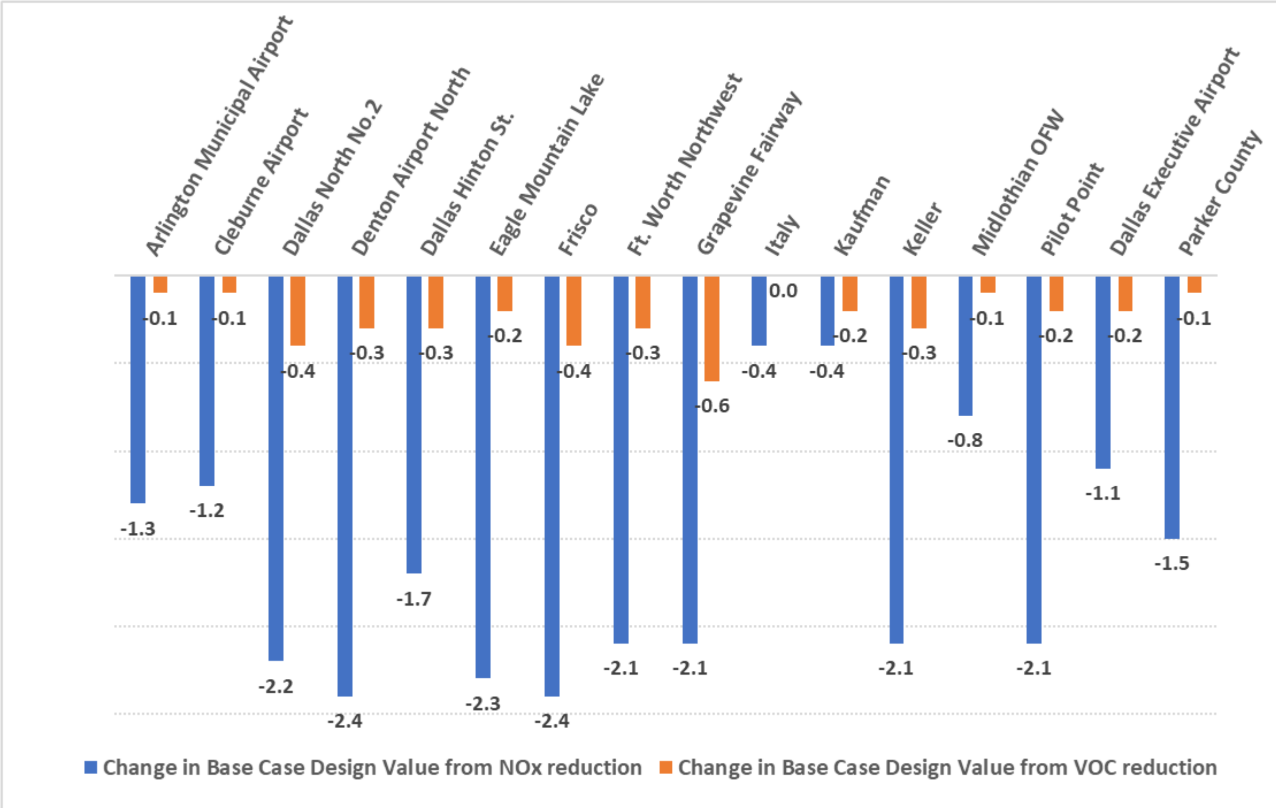

Figure 5-14: Modeled Impact of VOC and NO_X Reductions on 2019 Ozone DVB

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.

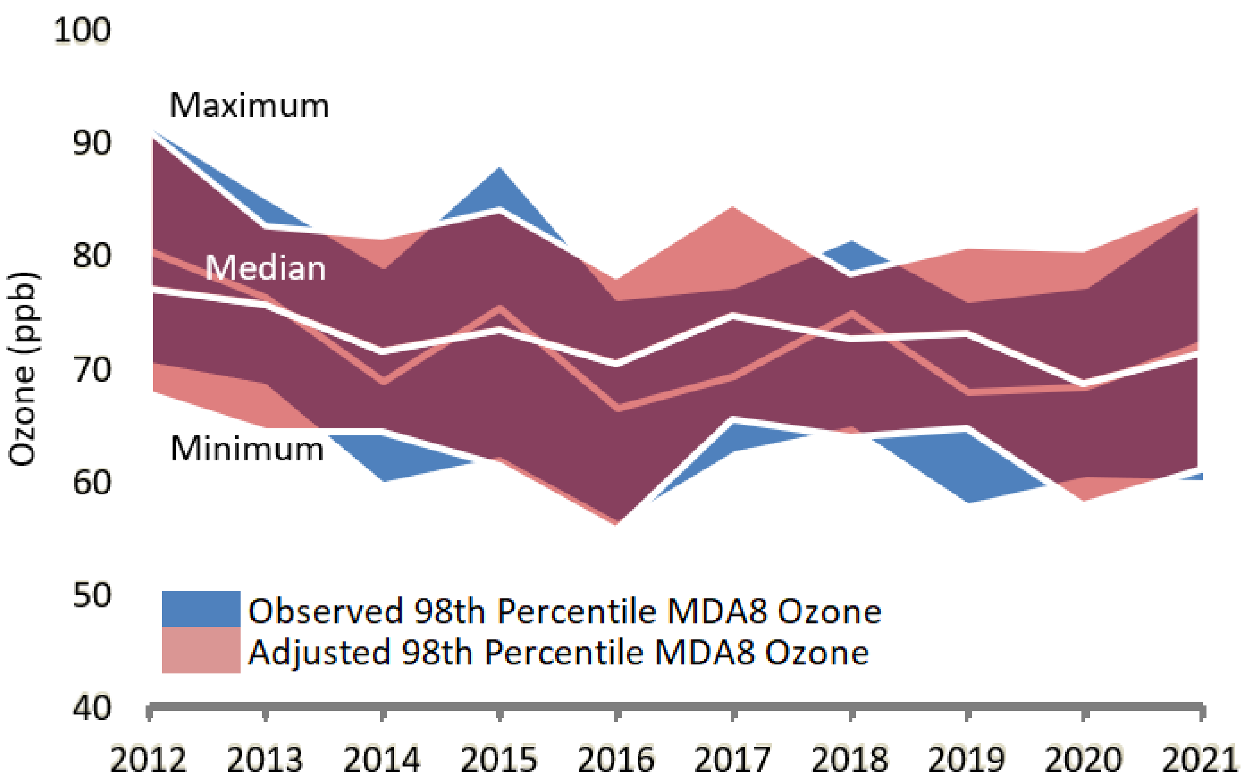

Figure 5-15: Meteorologically Adjusted Ozone Trends for May through September in the DFW Area

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, the TCEQ continues to promote two voluntary programs in cooperation with the 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] https://www.epa.gov/smartway/smartway-trends-indicators-and-partner-statistics-tips
[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 the 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 the EPA's CSAPR Update Rule to address transport obligations under the 2008 eight-hour ozone standard and the EPA's transport FIP for the 2015 eight-hour ozone standard.

On September 7, 2016, the 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, the 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 the 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 the 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, the 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, the 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, the 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, the 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, the TCEQ 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 the 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 the 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

The 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 the 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

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, the TCEQ is working with the United States 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

The 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 the 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

The 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 the 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

The TCEQ is reviewing ambient air monitoring data from monitors in the DFW area. The 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

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