TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

AGENDA ITEM REQUEST

for Proposed State Implementation Plan Revision

AGENDA REQUESTED: July 9, 2025

DATE OF REQUEST: June 20, 2025

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

CAPTION: Docket No. 2025-0522-SIP. Consideration for publication of, and hearing on, the Bexar County Serious Area Attainment Demonstration State Implementation Plan (SIP) Revision for the 2015 Eight-Hour Ozone National Ambient Air Quality Standard.

The proposed SIP revision would include a photochemical modeling analysis, a weight-of-evidence analysis, a reasonably available control technology (RACT) analysis, a reasonably available control measures analysis, motor vehicle emissions budgets for 2026, and a contingency plan. This SIP revision would also incorporate revisions to rules in 30 Texas Administrative Code Chapters 115 and 117 to address major source RACT requirements for volatile organic compounds and nitrogen oxides associated with reclassification from moderate to serious. (Richard Garza, Terry Salem; Project No. 2024-041-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:** June 20, 2025

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

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

Docket No.: 2025-0522-SIP

Subject: Commission Approval for Proposed Bexar County Serious Area Attainment Demonstration (AD) State Implementation Plan (SIP) Revision for the 2015 Eight-Hour Ozone National Ambient Air Quality Standard (NAAQS)

Bexar County 2015 Ozone NAAQS Serious AD SIP Revision
Non-Rule Project No. 2024-041-SIP-NR

Background and reason(s) for the SIP revision:
The Bexar County nonattainment area, consisting of Bexar County, was previously classified as moderate nonattainment for the 2015 eight-hour ozone NAAQS of 0.070 part per million (ppm) with a September 24, 2024, attainment date and a 2023 attainment year. On October 12, 2023, Texas Governor Greg Abbott signed and submitted a letter to the U.S. Environmental Protection Agency (EPA) to voluntarily reclassify the Bexar County area, along with the Dallas-Fort Worth and Houston-Galveston-Brazoria 2015 eight-hour ozone NAAQS moderate nonattainment areas, to serious. On June 20, 2024, EPA published reclassification of the areas from moderate to serious nonattainment for the 2015 eight-hour ozone NAAQS, effective July 22, 2024 (89 *Federal Register* (FR) 51829).

Bexar County is now subject to the serious nonattainment requirements in federal Clean Air Act (FCAA), §172(c) and §182(c), and the Texas Commission on Environmental Quality (TCEQ or commission) is required to submit serious area AD and reasonable further progress (RFP) SIP revisions to EPA by January 1, 2026. As indicated in EPA's *Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area Classifications Approach; Final Rule* published on March 9, 2018, the attainment deadline for the Bexar County serious classification is September 24, 2027, with a 2026 attainment year (83 FR 10376).

Scope of the SIP Revision:
This proposed SIP revision addresses AD SIP elements consistent with FCAA requirements for areas classified as serious nonattainment for the 2015 eight-hour ozone NAAQS. This Bexar County AD SIP revision is scheduled to be proposed in conjunction with the Bexar County Serious Area RFP SIP Revision for the 2015 Eight-Hour Ozone NAAQS (Non-Rule Project No. 2024-040-SIP-NR), and revisions to rules in 30 Texas Administrative Code (TAC) Chapters 115 (Rule Project No. 2025-006-115-AI) and 117 (Rule Project No. 2025-007-117-AI).

A.) Summary of what the SIP Revision would do:
This proposed SIP revision includes a photochemical modeling analysis and a weight-of-evidence (WoE) analysis that demonstrates that Bexar County will attain the 2015 ozone NAAQS by the September 24, 2027, attainment date. This proposed SIP revision also includes a reasonably available control measures (RACM) analysis, a reasonably available control technology (RACT) analysis, and a contingency plan. To ensure that emissions from transportation projects that use federal transportation funding conform to the SIP, this proposed Bexar County AD SIP revision contains nitrogen oxides (NO_X) and volatile organic compounds (VOC) motor vehicle emissions budgets (MVEB) for the 2026 attainment year.

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This proposed SIP revision incorporates concurrently proposed revisions to rules in 30 TAC Chapters 115 (Rule Project No. 2025-006-115-AI) and 117 (Rule Project No. 2025-007-117-AI). Proposed rules in both chapters address major source RACT requirements for NO_x and VOC associated with reclassification of the Bexar County nonattainment area from moderate to serious.

Additionally, this proposed SIP revision includes certification statements to confirm that enhanced vehicle inspection and maintenance program requirements, enhanced monitoring network requirements, nonattainment new source review requirements, and clean fuel fleet program requirements have been met for the Bexar County 2015 eight-hour ozone NAAQS serious nonattainment area.

B.) Scope required by federal regulations or state statutes:
This proposed SIP revision is consistent with the requirements of FCAA, §182(c)(2) 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; 83 FR 62998). 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 Bexar County AD SIP revision also includes a modeled attainment demonstration and a WoE analysis.

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 section 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 would also be proposed under the commission's general authority under Texas Water Code, §5.102, General Powers and §5.105, General Policy. The SIP revision would also be 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:
The affected regulated community would be impacted by the concurrently proposed Chapter 115 rulemaking (Rule Project No. 2025-006-115-AI) and Chapter 117 rulemaking (Rule Project No. 2025-007-117-AI) that, if adopted, will be incorporated as part of this SIP revision to satisfy major source VOC and NO_x RACT for the Bexar County ozone nonattainment area under the serious classification. The regulated community would be obligated to comply with any new requirements adopted by the commission and would incur costs associated with meeting those requirements.

This proposed SIP revision would also impact the regulated community by changing the SIP emissions year for emissions banking and trading credit generation for the Bexar County 2015 ozone nonattainment area to 2019. On April 9, 2021, TCEQ communicated this change to regulated entities to ensure accurate emissions inventory information prior to SIP development.

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

C.) Agency programs:
The 30 TAC Chapters 115 and 117 rulemakings associated with this proposed SIP revision would affect certain parts of the agency. Air Permits Division staff would be required to update Title V Operating Permits if new rules became applicable to more major sources. Additionally, staff in the Office of Compliance and Enforcement may be required to conduct additional or expanded investigations as a result of any new or amended regulations in Chapters 115 or 117.

Stakeholder meetings:
TCEQ hosted a virtual Bexar County Stakeholder Meeting on January 19, 2024, relating to the development of this proposed SIP revision. If this proposed Bexar County 2015 Ozone NAAQS Serious AD SIP Revision is approved by the commission for public comment and public hearing, then a formal comment period would be opened, and a public hearing would be offered.

Public Involvement Plan
Yes.

Alternative Language Requirements
Yes. Spanish.

Potential controversial concerns and legislative interest:
There is currently litigation surrounding 2015 ozone moderate classification SIP requirements.

On December 3, 2024, EPA released its *Guidance on the Preparation of State Implementation Plan Provisions that Address the Nonattainment Area Contingency Measure Requirements for Ozone and Particulate Matter.*[1] The final guidance stated, "*CMs must be conditional and prospective, not already implemented, per the statute and relevant court decisions."* EPA has characterized its final guidance as "*nonbinding.*" Current and future proposed revisions to Texas' SIP and related rulemakings that depend on surplus reductions from fleet turnover as contingency measures may be at risk of disapproval by EPA.

This proposed SIP revision uses TCEQ's historically approved approach and proposes to maintain reliance on surplus reductions from already implemented measures to fulfill the contingency measure requirements outlined in FCAA, §172(c)(9) and §182(c)(9), consistent with past practices.

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 SIP revision?
The commission could choose not to comply with the requirements to develop and submit this proposed serious area AD SIP revision to EPA by the January 1, 2026, deadline. Not submitting a timely or complete SIP revision would lead to EPA issuing a finding of failure to submit, which would start sanctions and federal implementation plan (FIP) clocks. EPA would be required to promulgate a FIP any time within two years after finding TCEQ failed to make the required submission. EPA could impose sanctions until the state submitted, and EPA determined complete,

[1] https://www.epa.gov/air-quality-implementation-plans/final-contingency-measures-guidance

a replacement Bexar County 2015 ozone NAAQS serious AD SIP revision for the area. These sanctions could include transportation funding restrictions, grant withholdings, and 2 to 1 emissions offsets requirement for new construction and major modifications of stationary sources in the Bexar County nonattainment area.

Key points in the proposal rulemaking schedule:
Anticipated proposal date: July 9, 2025
Anticipated public hearing date: August 19, 2025
Anticipated public comment period: July 11, 2025 through August 25, 2025
Anticipated adoption date: December 17, 2025

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

BEXAR COUNTY 2015 EIGHT-HOUR OZONE STANDARD NONATTAINMENT AREA

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

BEXAR COUNTY SERIOUS AREA ATTAINMENT DEMONSTRATION STATE IMPLEMENTATION PLAN REVISION FOR THE 2015 EIGHT-HOUR OZONE NATIONAL AMBIENT AIR QUALITY STANDARD

PROJECT NUMBER 2024-041-SIP-NR

Proposal
July 9, 2025

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EXECUTIVE SUMMARY

The Bexar County area, consisting of Bexar County, was originally designated nonattainment with a marginal classification for the 2015 eight-hour ozone National Ambient Air Quality Standard (NAAQS) of 0.070 parts per million, or 70 parts per billion (ppb), with a September 24, 2021, attainment date. The area did not attain the standard by the attainment date and was reclassified from marginal to moderate nonattainment on October 7, 2022 (87 *Federal Register* (FR) 60897). As indicated in the U.S. Environmental Protection Agency's (EPA) *Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area Classifications Approach; Final Rule* published on March 9, 2018, the attainment date for the Bexar County moderate classification was September 24, 2024, with a 2023 attainment year (83 FR 10376).[1] EPA set a January 1, 2023, deadline for states to submit SIP revisions to address the 2015 eight-hour ozone standard moderate nonattainment area requirements.

On October 12, 2023, Texas Governor Greg Abbott signed and submitted a letter to EPA to voluntarily reclassify the Bexar County, Dallas-Fort Worth, and Houston-Galveston-Brazoria 2015 eight-hour ozone NAAQS moderate nonattainment areas to serious. On June 20, 2024, EPA published the final reclassification of the 2015 eight-hour ozone NAAQS nonattainment areas to serious, effective July 22, 2024 (89 FR 51829). Bexar County is now subject to the serious nonattainment requirements in federal Clean Air Act (FCAA), §182(c), and the Texas Commission on Environmental Quality (TCEQ) is required to submit serious area attainment demonstration (AD) and reasonable further progress (RFP) state implementation plan (SIP) revisions to EPA by January 1, 2026. The attainment deadline for the Bexar County serious nonattainment area is September 24, 2027, with a 2026 attainment year.

This proposed Bexar County AD SIP revision uses photochemical modeling and a corroborative weight-of-evidence (WoE) analysis to demonstrate attainment of the 2015 eight-hour ozone standard by the September 24, 2027, attainment date based on projected reductions in nitrogen oxides (NO_x) and/or volatile organic compounds (VOC) emissions. The peak ozone design value for the Bexar County nonattainment area is estimated to be 70 ppb in 2026. The quantitative and qualitative analyses in Chapter 5: *Weight of Evidence* supplement the photochemical modeling analysis presented in Chapter 3: *Photochemical Modeling* to characterize future ozone conditions.

For the photochemical modeling analysis, this proposed Bexar County AD SIP revision includes a base case modeling 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 Bexar County 2015 ozone NAAQS 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

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

modeling a 2019 base case and 2026 future case to estimate 2026 eight-hour ozone design values.

Table ES-1: *Summary of 2019 Base Case and 2026 Future Case Anthropogenic Modeling Emissions for Bexar County 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 case and 2026 future case ozone modeling. The differences in modeling emissions between the 2019 base case and the 2026 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 Case and 2026 Future Case Anthropogenic Modeling Emissions for Bexar County 2015 Ozone NAAQS Nonattainment Area for the June 12 Episode Day

Source Category	2019 NO_X (tpd)	2026 NO_X (tpd)	2019 VOC (tpd)	2026 VOC (tpd)
On-Road	33.51	21.46	15.63	10.80
Non-Road	7.82	6.53	11.36	12.41
Off-Road – Airport	1.89	2.00	0.62	0.64
Off-Road Locomotives	1.98	1.22	0.09	0.05
Area Source	5.34	5.66	77.41	83.65
Oil and Gas – Drilling	0.00	0.00	0.00	0.00
Oil and Gas – Production	1.71	1.71	6.38	4.02
Point – Electric Generating Unit (EGU)	8.34	10.18	0.33	0.33
Point – Non-EGU	8.73	9.86	3.94	5.00
Bexar County Total	**69.32**	**58.62**	**115.76**	**116.90**

The future year on-road mobile source emission inventories for this proposed Bexar AD SIP revision were developed using the EPA Motor Vehicle Emission Simulator version 4 (MOVES4). These 2026 attainment year inventories establish the NO_X and VOC motor vehicle emissions budgets (MVEB) that, once found adequate or approved by EPA, must be used in transportation conformity analyses. The attainment MVEBs represent the 2026 on-road mobile source emissions that have been modeled for the attainment demonstration and include all the on-road control measures. The MVEBs are provided in Table 4-2: *2026 Attainment Demonstration MVEBs for the Bexar County 2015 Ozone NAAQS Nonattainment Area (tons per day).*

The 2019 base case design value (DVB) and 2026 future case design value (DVF) for the regulatory ozone monitors in the Bexar County 2015 ozone NAAQS nonattainment area are shown in Table ES-2: *Summary of the 2019 DVB and Modeled 2026 DVF for Bexar County 2015 Ozone NAAQS Nonattainment Area Regulatory Monitors.* In accordance with EPA's November 2018 *Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze*,[2] the 2023 DVFs presented have been rounded to one decimal place and then truncated. Based on TCEQ's modeling and available data, the Bexar County 2015

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

ozone NAAQS nonattainment area is expected to attain the 2015 ozone NAAQS by September 24, 2027.

Table ES-2: Summary of the 2019 DVB and Modeled 2026 DVF for Bexar County 2015 Ozone NAAQS Nonattainment Area Regulatory Monitors

Monitor Name	CAMS Number	2019 Base Case DVB (ppb)	2026 Pre-rounded DVF (ppb)	2026 Truncated DVF (ppb)
Camp Bullis	0058	72.00	70.58	70
Calaveras Lake	0059	65.67	64.50	64
San Antonio Northwest	0023	72.00	70.64	70

This proposed Bexar County AD SIP revision documents a photochemical modeling analysis and a WoE assessment that meet EPA modeling guidance.

This proposed Bexar County AD SIP revision also includes a contingency plan, a reasonably available control measures (RACM) analysis, including reasonably available control technology (RACT), and provides MVEBs for the 2026 attainment year. Additionally, this SIP revision includes certification statements to confirm that enhanced vehicle inspection and maintenance program requirements, enhanced monitoring network requirements, nonattainment new source review requirements, and clean fuel fleet program requirements have been met for the Bexar County 2015 eight-hour ozone NAAQS serious nonattainment area.

The attainment contingency plan is provided in Section 4.9: *Contingency Plan*. Contingency measures are control requirements that would take effect if an area fails to attain a NAAQS by the applicable attainment date or fails to demonstrate RFP. EPA has interpreted recent court decisions to have invalidated key aspects of EPA's historical approach to implementing the contingency measure requirement. EPA's December 3, 2024, *Guidance on the Preparation of State Implementation Plan Provisions that Address the Nonattainment Area Contingency Measure Requirements for Ozone and Particulate Matter* indicates that contingency measures must be conditional and prospective (not previously implemented) based on the recent court rulings.[3] The guidance also establishes an entirely new scheme for determining the amount of emissions reductions necessary to address the contingency requirement. EPA has characterized its guidance as "nonbinding." This SIP revision relies on the historically approved approach of using surplus emissions reductions from previously implemented measures to fulfill the contingency measure requirements outlined in FCAA, §172(c)(9), consistent with past practices.

This Bexar County AD SIP revision is scheduled to be proposed in conjunction with the Bexar County 2015 Ozone NAAQS Serious RFP SIP Revision (Project No. 2024-040-SIP-NR) and revisions to rules in 30 Texas Administrative Code Chapters 115 (Rule Project No. 2025-006-115-AI) and 117 (Rule Project No. 2025-007-117-AI).

[3] https://www.epa.gov/air-quality-implementation-plans/final-contingency-measures-guidance

SECTION V-A: LEGAL AUTHORITY

General

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

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

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

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

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

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

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

Applicable Law

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

Statutes

All sections of each subchapter are included, unless otherwise noted.

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

Chapter 5: Texas Natural Resource Conservation Commission
- Subchapter A: General Provisions
- 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, 2002, respectively

Chapter 19: Electronic Reporting March 1, 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 December 21, 2023

Chapter 115: Control of Air Pollution from Volatile Organic Compounds December 12, 2024

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 May 16, 2024

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

Chapter 122: Federal Operating Permits Program
§122.122: Potential to Emit February 23, 2017

SECTION VI: CONTROL STRATEGY

A. Introduction (No change)
B. Ozone (Revised)
    1. Dallas-Fort Worth (No change)
    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 (Revised)
    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 techniques
AD	attainment demonstration
AEDT	Aviation Environmental Design Tool
AGL	above ground level
APU	auxiliary power unit
AQRP	Air Quality Research Program
AQS	Air Quality System
auto-GC	automated gas chromatograph
BEIS	Biogenic Emission Inventory System
BELD5	Biogenic Emissions Land-use Database
CAMS	continuous ambient monitoring station
CAMx	Comprehensive Air Quality Model with Extensions
CEDS	Community Emission Data System
CFR	Code of Federal Regulations
CMV	commercial marine vessel
CO	carbon monoxide
CSAPR	Cross-State Air Pollution Rule
CTG	control techniques guidelines
D.C.	District of Columbia
DERI	Diesel Emissions Reduction Incentive program
DFW	Dallas-Fort Worth
DVB	base case design value
DVF	future case design value
ECLIPSE	Evaluating the Climate and Air Quality Impact of Short-Lived Pollutants
EE	energy efficiency
EGU	electric generating unit
EI	emissions inventory
EIA	Energy Information Administration
EPA	U.S. Environmental Protection Agency
ESL	Energy Systems Laboratory
FAA	Federal Aviation Administration
FCAA	federal Clean Air Act

FIP	federal implementation plan
FINN	Fire Inventory of National Center for Atmospheric Research
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
km	kilometer
m	meter
MERRA	Modern-Era Retrospective analysis for Research and Applications
MDA8	maximum daily average eight-hour ozone
MODIS	Moderate-Resolution Imaging Spectroradiometer
MOVES3	Motor Vehicle Emission Simulator version 3
MPE	model performance evaluation
MVEB	motor vehicle emissions budget
MW	megawatt
MWh	megawatt-hours
NAAQS	National Ambient Air Quality Standard
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
PAMS	Photochemical Assessment Monitoring Stations
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
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
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
TCAA	Texas Clean Air Act
TCEQ	Texas Commission on Environmental Quality (commission)
TCFP	Texas Clean Fleet Program
TDM	travel demand model
TERP	Texas Emissions Reduction Plan
TexN	Texas NONROAD
TexN2	Texas NONROAD version 2 utility
TNGVGP	Texas Natural Gas Vehicle Grant Program
TNMHC	total non-methane hydrocarbon
TNRCC	Texas Natural Resource Conservation Commission
tpd	tons per day
TSD	technical support document
TTI	Texas Transportation Institute
TWC	Texas Water Code
TX	Texas
TxDOT	Texas Department of Transportation
U.S.	United States
VMT	vehicle miles traveled
VOC	volatile organic compounds
WoE	weight of evidence
WRF	Weather Research and Forecasting

LIST OF PREVIOUS STATE IMPLEMENTATION PLAN (SIP) REVISION 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/airquality/sip/sipplans.html).

2023 Bexar County Inspection and Maintenance (I/M) SIP Revision (TCEQ Non-Rule Project No. 2022-027-SIP-NR, adopted November 29, 2023) Bexar County I/M State Implementation Plan (SIP) Revision

2024 Bexar County 2015 Eight-Hour Ozone Moderate Classification Reasonably Available Control Technology (RACT) SIP Revision (TCEQ Non-Rule Project No. 2023-132-SIP-NR, adopted April 24, 2024) Bexar County 2015 Eight-Hour Ozone Moderate Classification Reasonably Available Control Technology (RACT) State Implementation Plan (SIP) Revision

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CHAPTER 1: GENERAL

1.1 BACKGROUND

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

1.2 INTRODUCTION

The following history of the 2015 eight-hour ozone National Ambient Air Quality Standard (NAAQS) for Bexar County is provided to give context and greater understanding of the complex issues involved in the area's ozone challenge.

1.2.1 2015 Eight-Hour Ozone NAAQS History

On October 1, 2015, the U.S. Environmental Protection Agency (EPA) lowered the primary and secondary eight-hour ozone standards to 0.070 parts per million (ppm), effective December 28, 2015 (80 *Federal Register* (FR) 65291). On June 4, 2018, EPA published final designations for areas under the 2015 eight-hour ozone NAAQS (83 FR 25766), effective August 3, 2018; however, EPA did not designate Bexar County as part of that action. EPA designated Bexar County as nonattainment for the 2015 ozone NAAQS with a marginal classification on July 25, 2018, effective September 24, 2018 (83 FR 35136).

1.2.1.1 Marginal Classification for the 2015 Eight-Hour Ozone NAAQS

Under the marginal classification, Bexar County was required to attain the 2015 ozone NAAQS by the end of 2020, the attainment year, to meet a September 24, 2021, attainment date.[4] On January 15, 2020, the commission approved proposal of a federal Clean Air Act (FCAA), §179B Demonstration SIP revision that demonstrated that the Bexar County marginal ozone nonattainment area would attain the 2015 eight-hour ozone standard by its attainment deadline "but for" anthropogenic emissions emanating from outside the United States. On January 9, 2020, EPA issued draft guidance for the development of §179B demonstrations. On July 1, 2020, the commission adopted the Bexar County §179B Demonstration SIP revision. It was submitted to EPA on July 13, 2020. On December 21, 2020, EPA issued final guidance for the development of §179B demonstrations.

On June 10, 2020, the commission adopted an emissions inventory (EI) SIP revision for the 2015 eight-hour ozone NAAQS marginal nonattainment areas, including Bexar County (Non-Rule Project No. 2019-111-SIP-NR). It was submitted to EPA on June 24, 2020. The revision satisfied FCAA EI reporting requirements for areas designated nonattainment for the 2015 eight-hour ozone NAAQS and included certification statements to confirm that emission statements and nonattainment new source review (NSR) SIP requirements had been met for the 2015 eight-hour ozone marginal nonattainment areas. On June 29, 2021, EPA published final approval of the EI for the Bexar County 2015 ozone NAAQS nonattainment area (86 FR 34139). On September 9,

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

2021, EPA published final approval of the emissions statement and nonattainment NSR certification statements (86 FR 50456).

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

Based on monitoring data from 2018, 2019, and 2020, Bexar County 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).[5] On October 7, 2022, EPA published the final notice reclassifying the Bexar County 2015 ozone NAAQS nonattainment area from marginal to moderate, effective November 7, 2022 (87 FR 60897). The attainment date for the Bexar County moderate nonattainment area was September 24, 2024, with a 2023 attainment year. In this same action, EPA also disapproved the Bexar County §179B Demonstration SIP Revision. EPA set a January 1, 2023, deadline for states to submit attainment demonstration (AD) and reasonable further progress (RFP) SIP revisions to address the 2015 eight-hour ozone standard moderate nonattainment area requirements.

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

On October 12, 2023, Texas Governor Greg Abbott signed and submitted a letter to EPA to reclassify the Bexar County, Dallas-Fort Worth, and Houston-Galveston-Brazoria moderate 2015 eight-hour ozone NAAQS nonattainment areas to serious. On June 20, 2024, EPA published a final notice reclassifying the areas from moderate to serious, effective July 22, 2024 (89 FR 51829).

Since the Bexar County nonattainment area has been reclassified by EPA, it is now subject to the serious nonattainment area requirements in FCAA, §182(c), and TCEQ is required to submit serious area AD and RFP SIP revisions to EPA. As indicated in EPA's *Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area Classifications Approach; Final Rule*, published on March 9, 2018 (83 FR 10376), the Bexar County attainment date for a serious classification is September 24, 2027, with a 2026 attainment year. EPA set a January 1, 2026, deadline for states to submit SIP revisions to address the 2015 eight-hour ozone standard serious nonattainment area requirements (89 FR 51829).

1.2.2 Ozone Design Value Trends

The eight-hour ozone design values for the Bexar County 2015 ozone NAAQS nonattainment area from 2000 through 2024 are illustrated in Figure 1-1: *Eight-Hour Ozone Design Values and Population in Bexar County*. The design value has decreased over the past 24 years. The 2024 eight-hour ozone design value of 75 parts per billion (ppb) represents a 13% decrease from the 2000 value of 86 ppb. This decrease in design values occurred despite an 47% increase in area population from 2000 through 2023.

[5] 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)); Bexar County's fourth-highest daily maximum eight-hour average for 2020 was 72 ppb.

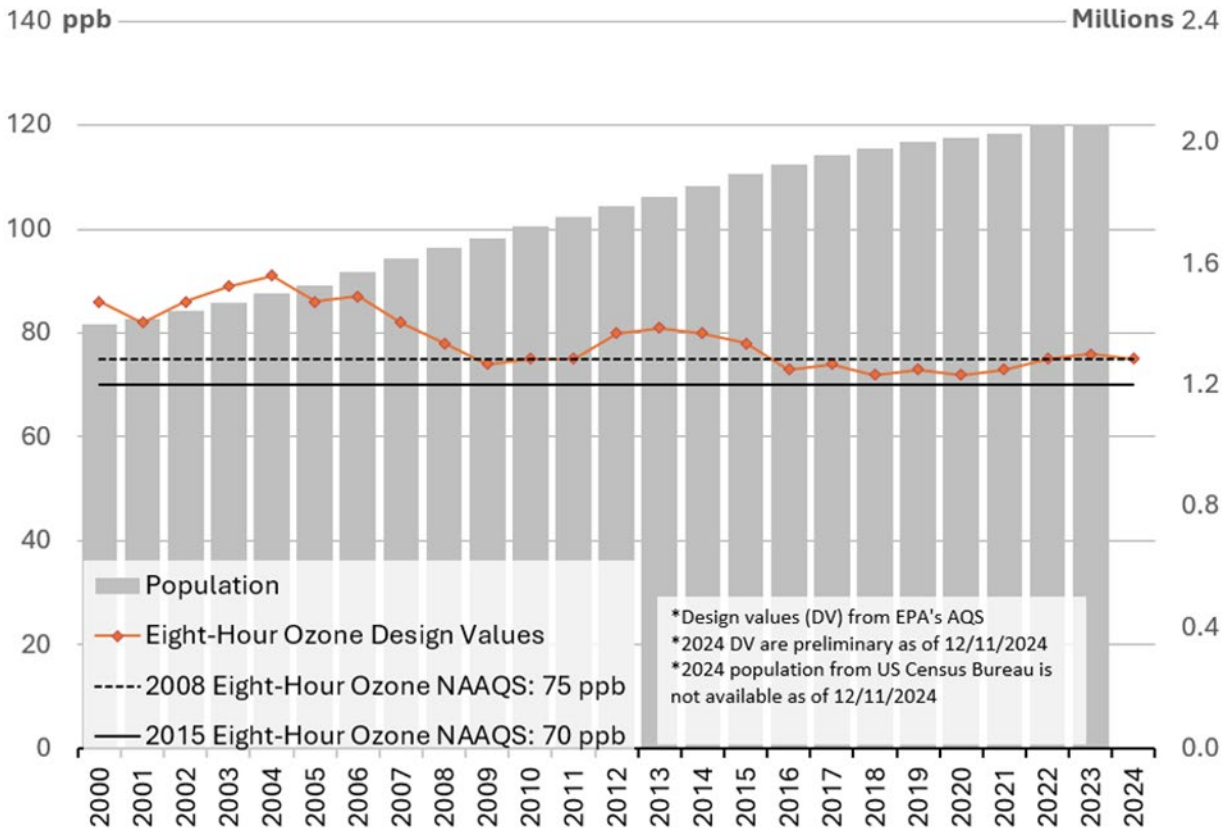

Figure 1-1: Eight-Hour Ozone Design Values and Population in Bexar County

1.3 HEALTH EFFECTS

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

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

1.4 STAKEHOLDER PARTICIPATION AND PUBLIC MEETING

1.4.1 Bexar County Virtual Technical Information Meeting (TIM)

The Bexar County Air Quality TIMs are provided to present technical and scientific information related to air quality modeling and analysis in the Bexar County nonattainment area. TCEQ hosted two virtual TIMs on August 16, 2021, and August 22, 2022. During these TIMs presentations provided details of the TCEQ 2019 modeling platform such as modeling episode selection, meteorological model performance, etc., that was used to conduct the attainment demonstration modeling for this SIP revision. More information is available on the San Antonio Air Quality TIM webpage (https://www.tceq.texas.gov/airquality/airmod/meetings/aqtim-sa.html).

1.4.2 Bexar County Stakeholders Meetings

TCEQ hosted a virtual Bexar County Stakeholder Meeting on January 19, 2024, relating to the development of this proposed SIP revision. The purpose of the meeting was to discuss what emission reduction strategies (primarily VOC) are being or could be implemented by different source sectors. This meeting was open to the public but focused on stationary sources of air pollution.

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
San Antonio	August 19, 2025	7:00 p.m.	Alamo Area Council of Governments 2700 NE Loop 410, Suite 101 San Antonio, TX 78217

The public comment period will open on July 11, 2025, and close on August 25, 2025. 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 “Bexar County 2015 Ozone NAAQS Serious AD SIP Revision” and should reference Project Number 2024-041-SIP-NR. Comments submitted via hard copy may be mailed to Richard Garza, 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. Comments must be received by 11:59 pm CDT on August 25, 2025.

1.6 SOCIAL AND ECONOMIC CONSIDERATIONS

Control measures for new and updated nitrogen oxides and volatile organic compound rules (Rule Project Nos. 2025-007-117-AI and 2025-006-115-AI, respectively) were developed concurrently with this proposed SIP revision to achieve required emissions reductions for Bexar County. The general public in the Bexar County ozone nonattainment area may benefit from reduced emissions associated with the new

control measures. Control measures may have direct or indirect costs to the public, which are addressed in the associated rule projects. For a detailed explanation of the social and economic issues involved with the concurrently proposed 30 Texas Administrative Code Chapter 115 and Chapter 117 rule revisions, refer to the rule preambles for each rule project.

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 emissions 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 Bexar County 2015 ozone National Ambient Air Quality Standard (NAAQS) nonattainment area photochemical modeling.

2.2 POINT SOURCE

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 Bexar County 2015 ozone NAAQS nonattainment area. Therefore, some minor sources in the area report to the point source EI.

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

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

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

Stationary sources must have state implementation plan (SIP) emissions and meet other requirements to be able to 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, TCEQ has designated the projection-base year for point sources as 2019 for electric generating units (EGU) with emissions recorded in the U.S. Environmental Protection Agency's (EPA) Clean Air Markets Program Data and 2019 for all other stationary point sources (non-EGUs) with emissions recorded in TCEQ's STARS database. For more detail on the projection-base year for point sources, see Chapter 3, Section 3.4.2: *Emissions Inputs* and Appendix B: *Conceptual Model for the Bexar County Nonattainment Area for the 2015 Eight-Hour Ozone National Ambient Air Quality Standards*.

On April 9, 2021, TCEQ requested regulated entities submit any revisions to the 2019 point source EI by July 9, 2021. The point source emissions in this proposed AD SIP revision reflect all updates submitted by the due date. TCEQ provided notification to regulated entities and the public through its e-mail distribution system and by posting the notice on TCEQ's website.[6]

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.

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

The emissions data for the different area source categories are developed, reviewed for quality assurance, stored in the Texas Air Emissions Repository database, and compiled to develop the statewide area source EI. The area source EI is reported every third year (triennially) to EPA for inclusion in the National Emissions Inventory. TCEQ submitted the most recent emissions for calendar year 2023.

2.4 NON-ROAD MOBILE SOURCES

Non-road vehicles (and non-road emissions 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: Motor Vehicle Emission Simulator (MOVES) model categories (as described further below), airports, locomotives, and drilling rigs used in upstream oil and gas exploration activities. Since no CMV activities occur in the Bexar County 2015 ozone nonattainment area, CMV EIs were not developed. The airport subcategory includes estimates for emissions from the aircraft, auxiliary power units (APUs), and ground support equipment (GSE) subcategories relevant for airports. The following sections describe the emissions estimate methodologies used for the non-road mobile source subcategories.

2.4.1 Non-Road Model Categories Emissions Estimation Methodology

MOVES is EPA's mobile source emissions model for estimating non-road source category emissions. TCEQ has invested significant time and resources to develop a Texas-specific version of the non-road sources called Texas NONROAD utility version 2 (TexN2) that replaces EPA defaults used to determine emissions with county-specific activity data.[7] TCEQ used TexN2 to estimate 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 MOVES model or the TexN2 utility, the emissions for these categories are estimated using other EPA-approved methods and guidance. Although emissions for drilling rigs are included in the MOVES model and TexN2 utility, alternate emissions estimates were developed for that source category 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 MOVES model category "Other Oilfield Equipment." However, due to significant growth in the oil and gas exploration and production industry starting around 2008, a 2015 survey of oil and gas exploration and production companies was

[7] https://www.tceq.texas.gov/downloads/air-quality/research/reports/emissions-inventory/5822345976-20240731-development-of-texas-nonroad-model-mobile-source-2023-air-emissions-reporting-requirements-and-reasonable-further-progress-emissions-inventories.pdf

used to develop updated drilling rig emissions characterization profiles.[8] The drilling rig emissions characterization profiles from this study were combined with 2022 drilling activity data obtained from the Texas Railroad Commission to develop the EI 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.[9] 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.[10] 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 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 AD SIP revision includes preliminary on-road EIs developed using MOVES4. The MOVES5 model was not used in this SIP revision since TCEQ had already invested significant resources to develop an on-road mobile source EI using MOVES4. Updated on-road EIs and emissions factors were developed using EPA's mobile emissions factor model, MOVES4. The MOVES4 model may be run using national default information, or the default information may be modified to simulate data specific to the Bexar County 2015 ozone NAAQS nonattainment area, such as the control programs, driving behavior, meteorological conditions, and vehicle characteristics.

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[8] 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

[9] https://www.tceq.texas.gov/downloads/air-quality/research/reports/emissions-inventory/582211 0369019-20241031-2023-texas-statewide-locomotive-and-rail-yard-emissions-inventory-and-2011-through-2050-trend-inventories.pdf

[10] https://www.tceq.texas.gov/downloads/air-quality/research/reports/emissions-inventory/582211 036918-20241004-2023-texas-statewide-airport-emissions-inventory-and-2011-through-2050-trend-inventories.pdf

The TCEQ parameters reflect local conditions to the extent that local values are available; these local values are reflected in the emission factors calculated by the MOVES4 model. The localized inputs used for the on-road mobile EI development include vehicle speeds for each roadway link, vehicle populations, vehicle hours idling, temperature, humidity, vehicle age distributions for each vehicle type, percentage of miles traveled for each vehicle type, fuel control programs, and gasoline vapor pressure controls.

To estimate on-road mobile source emissions, emission factors estimated by the MOVES4 model must be multiplied by the level of vehicle activity. On-road mobile source emission 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 and/or by the local metropolitan planning organization. The TDMs are validated against ground count data, i.e., traffic passing over counters placed in various locations throughout a county or area. For SIP inventories, 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 MOVES4 model, are estimated by using the activity volumes from the TDMs and a post-processor speed model.

2.6 EI IMPROVEMENT

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

CHAPTER 3: PHOTOCHEMICAL MODELING

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 U.S. Environmental Protection Agency's (EPA) November 2018 *Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze* (EPA, 2018; referred to as the EPA modeling guidance).[11]

For the photochemical modeling analysis, this SIP revision includes a base case modeling 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 parts per billion (ppb) have historically been monitored within the nonattainment area. 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 and indicates the modeling is suitable for use in conducting the modeling attainment test.

The photochemical modeling analysis also includes a future case modeling analysis. Future case modeling estimates the change in ozone concentrations due to changes in anthropogenic emissions in a future year, the attainment year of 2026, 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 estimated ozone concentrations be in the future if the same meteorological conditions (that resulted in a high ozone episode in the past) were to repeat?

Results of the 2019 base case and the 2026 future case photochemical modeling runs are presented, which were used to estimate the 2026 attainment year eight-hour ozone design values. This chapter summarizes the components of the AD modeling, such as episode selection, modeling domain, and model inputs. A detailed description of the various modeling elements can be found in Appendix A: *Modeling Technical Support Document (TSD)*.

3.2 MODELING EPISODE

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

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

One recommended criterion for selecting a modeling episode is that the episode be in the recent past and contain 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 Average Eight-Hour (MDA8) ozone concentration that exceeded the 2015 ozone NAAQS of 70 ppb. Figure 3-1: *Exceedance Days in the Bexar County 2015 Ozone NAAQS Nonattainment Area by Year from 2012 through 2021* shows the number of exceedance days for the 2015 ozone NAAQS over a 10-year period in the Bexar County 2015 ozone NAAQS nonattainment area. While there were a higher number of ozone exceedance days earlier in the decade shown below, 2019 had four exceedance days, which is not significantly fewer than the number of exceedance days in 2016 and 2017 but is significantly fewer than in the years 2018, 2020, and 2021. While 2020 and 2021 had a greater number of exceedance days, 2019 was the most recent year available with complete data when development of the TCEQ modeling platform began.

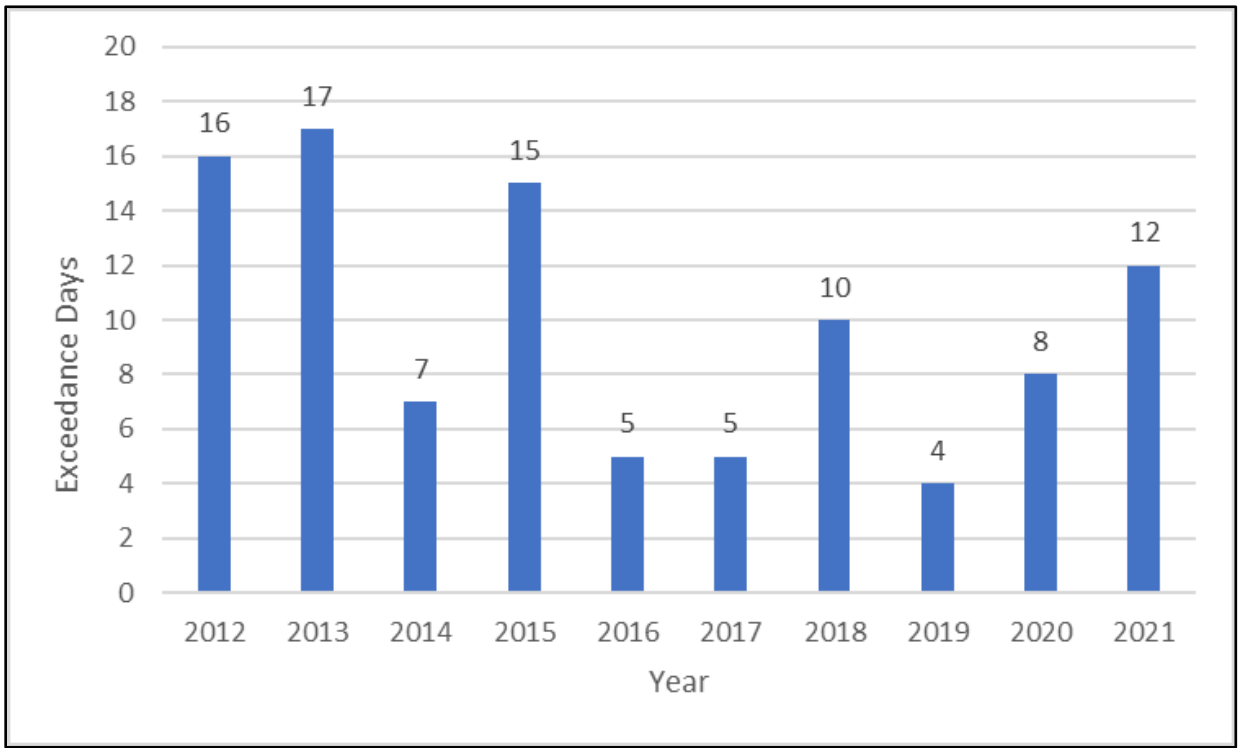

Figure 3-1: Exceedance Days in the Bexar County 2015 Ozone NAAQS Nonattainment Area by Year from 2012 through 2021

In selecting a modeling episode, EPA also recommends that the exceedance days follow historically observed temporal trends. Figure 3-2: *Exceedance Days by Month from 2012 through 2021 in the Bexar County 2015 Ozone NAAQS Nonattainment Area* shows the frequency of exceedance days for three eight-hour ozone standards from 2012 through 2021. This analysis shows that, similar to the Houston-Galveston-Brazoria (HGB) and Dallas-Fort Worth (DFW) nonattainment areas, the ozone season in Bexar County exhibits two peaks, with the mid-summer minimum usually occurring in July. Exceedances in the Bexar County 2015 Ozone NAAQS nonattainment area during March are quite rare, only one has occurred in this 10-year period. Most exceedance days typically occur in the latter half of the ozone season, August through October.

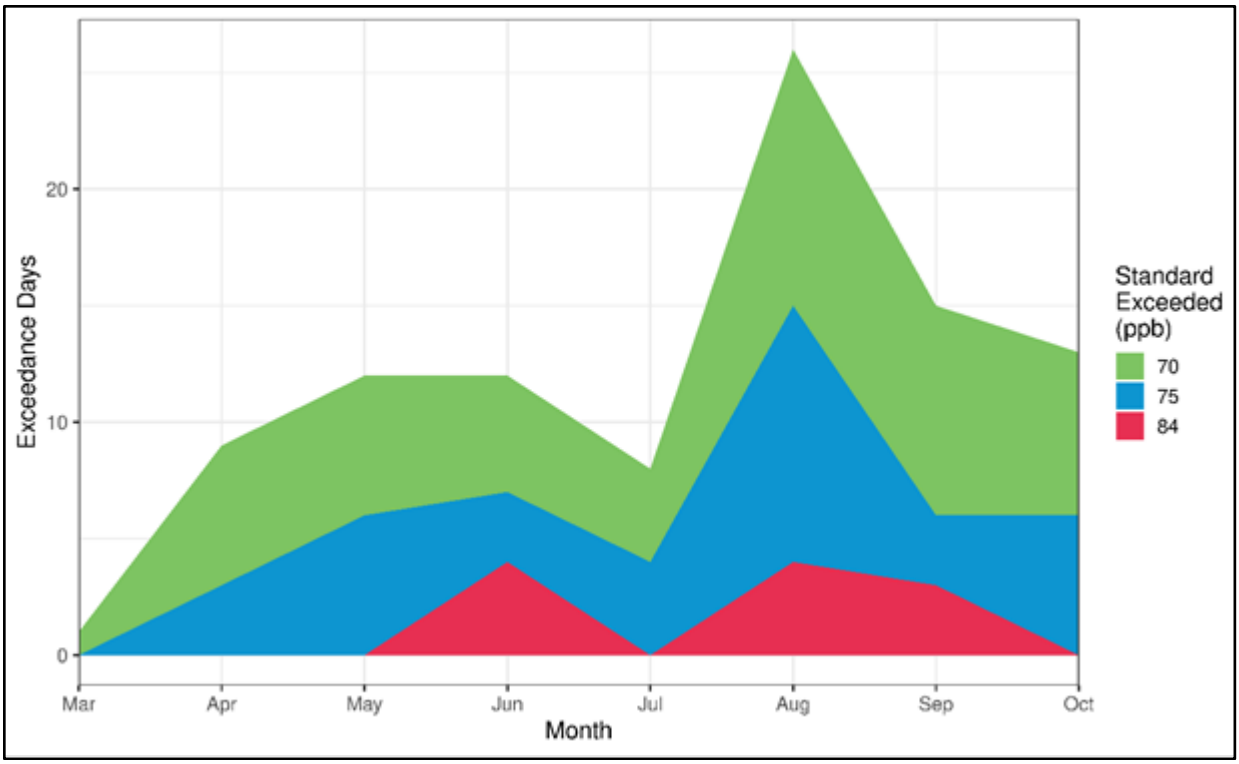

Figure 3-2: Exceedance Days by Month from 2012 through 2021 in the Bexar County 2015 Ozone NAAQS Nonattainment Area

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 modeled attainment test. There are three regulatory monitors that measure ozone concentrations within the Bexar County 2015 ozone NAAQS nonattainment area, shown in Figure 3-3: *Map of Regulatory Ozone Monitors in Bexar County 2015 Ozone NAAQS Nonattainment Area*, labeled with their name and Continuous Ambient Monitoring Station (CAMS) number.[12] Each of the three 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 modeled 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. The MDA8 ozone values observed at the three regulatory monitors in Bexar County included four days with exceedances of the 70 ppb 2015 NAAQS in 2019. The observations summarized in Table 3-1 indicate 10 days above 60 ppb for two regulatory monitors, and only six days

[12]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.

above 60 ppb for the remaining regulatory monitor. All three regulatory monitors in Bexar County have at least the recommended five days over 60 ppb.

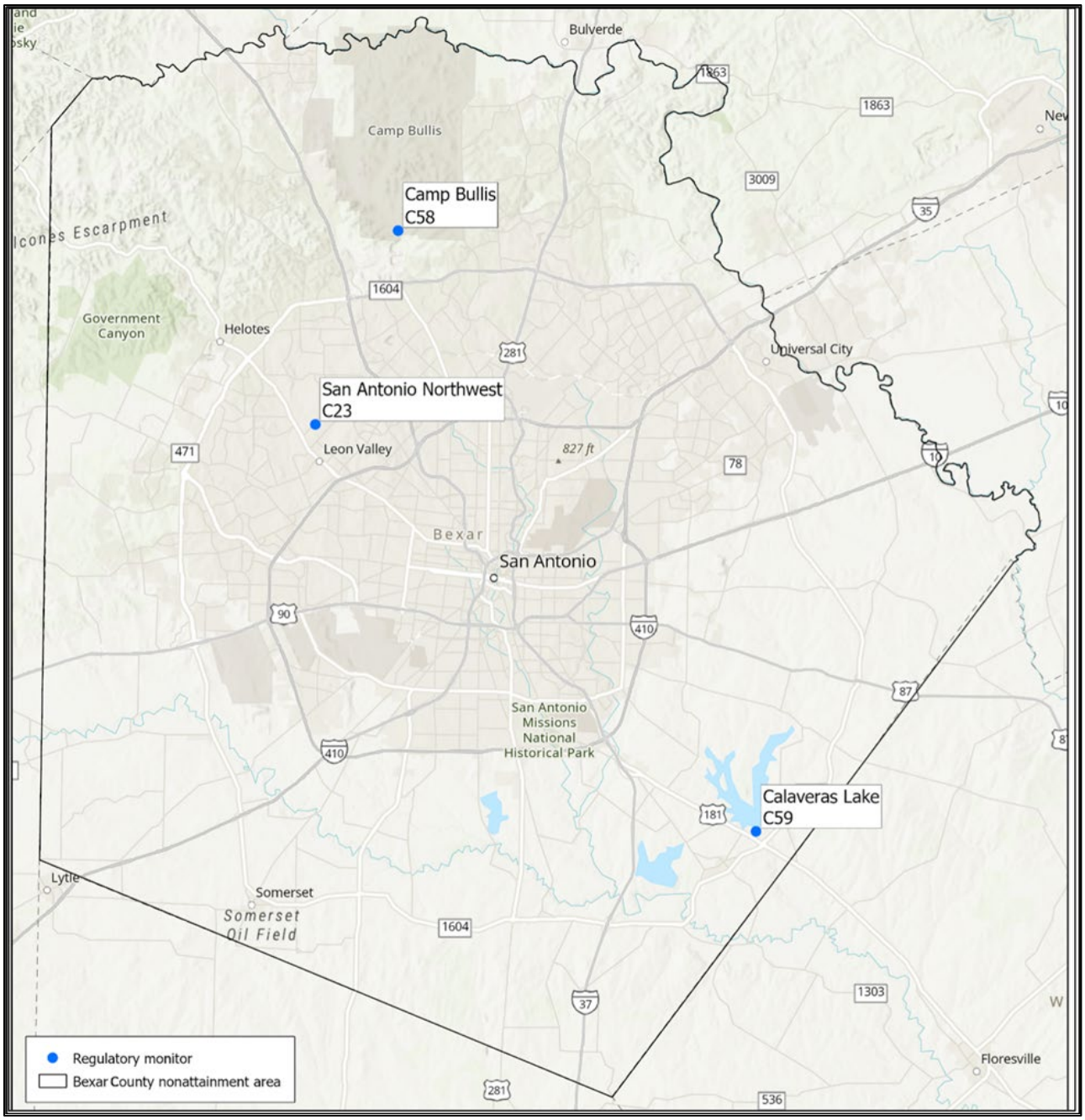

Figure 3-3: Map of Regulatory Monitors in Bexar County 2015 Ozone NAAQS Nonattainment Area

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

Monitor Name	CAMS Number	Episode Maximum Eight-Hour Ozone (ppb)	Number of Days Over 60 ppb	Number of Days Over 70 ppb
Camp Bullis	0058	76	10	1
Calaveras Lake	0059	64	6	0
San Antonio Northwest	0023	78	10	4

As shown in Table 3-1, the monitor with the highest number of exceedance days in the April through October 2019 episode was San Antonio Northwest (four 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 Bexar County 2015 ozone NAAQS nonattainment area in 2019 showed that the year was not atypical and therefore was reasonable for modeling ozone. Details of the episode selection process for TCEQ's 2019 modeling platform are provided in Section 1.2: *Modeling Episode Selection* of Appendix A.

3.3 PHOTOCHEMICAL MODELING

TCEQ used the Comprehensive Air Quality Model with Extensions (CAMx), version 7.20, for this AD modeling. The model software and the CAMx user's guide are publicly available (Ramboll, 2022). TCEQ's choice of CAMx meets 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 4 km grid resolution domain (named txs_4km) covering central and east Texas. The 4 km fine grid domain is focused on metropolitan areas designated nonattainment under one or more of the eight-hour ozone NAAQS. Dimensions of the CAMx domains are shown in Table 3-2: *CAMx Horizontal Domain Parameters*. The geographic extent of each domain is mapped in Figure 3-4: *CAMx Domains*. As shown in Table 3-2 and Figure 3-4, each CAMx grid domain embeds a finer resolution domain. The us_12km grid encompasses the south boundary of the txs_4km domain by 36 km. The Bexar County 2015 ozone NAAQS nonattainment area is contained within all three domains and is located in the western half of the txs_4km domain, as shown in Figure 3-5*: The Bexar County 2015 Ozone NAAQS Nonattainment Area and the txs_4km CAMx 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

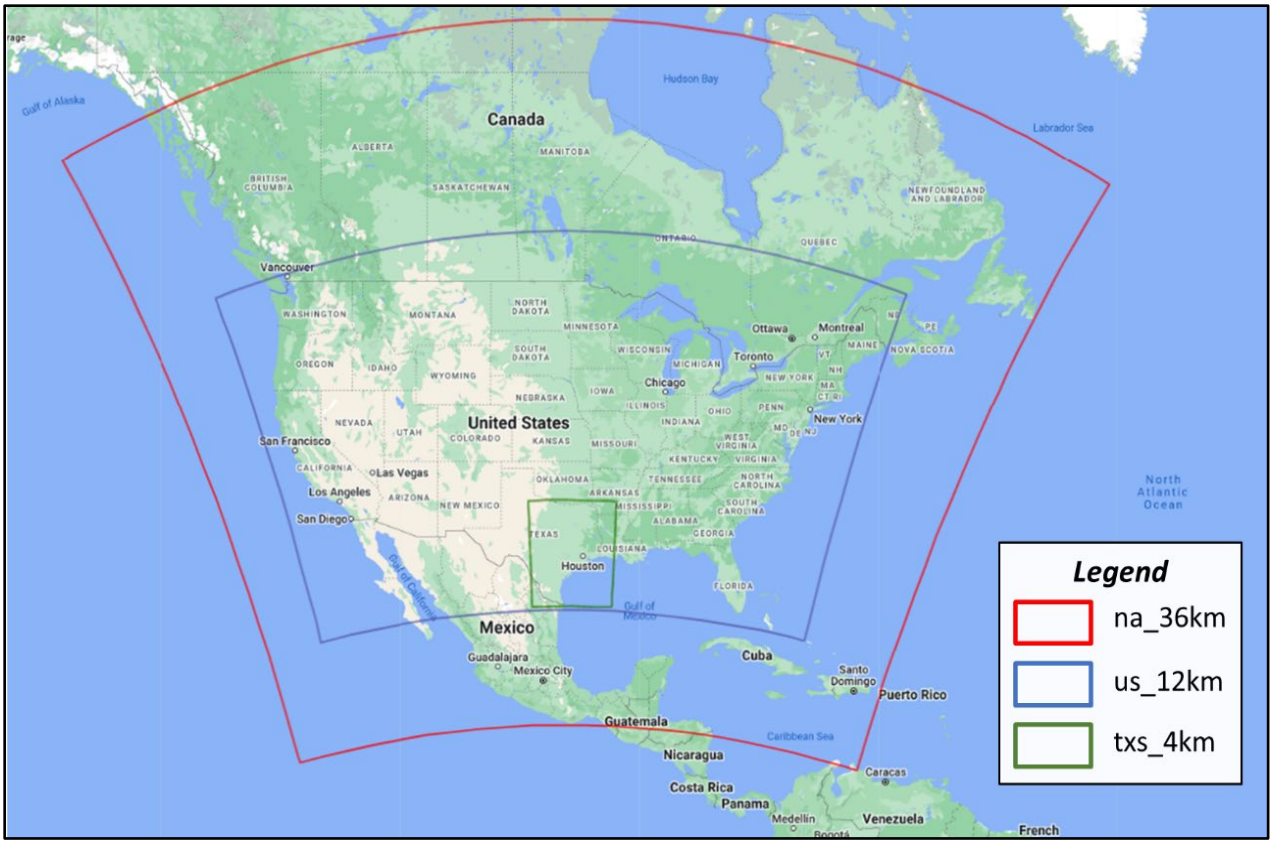

Figure 3-4: CAMx Domains

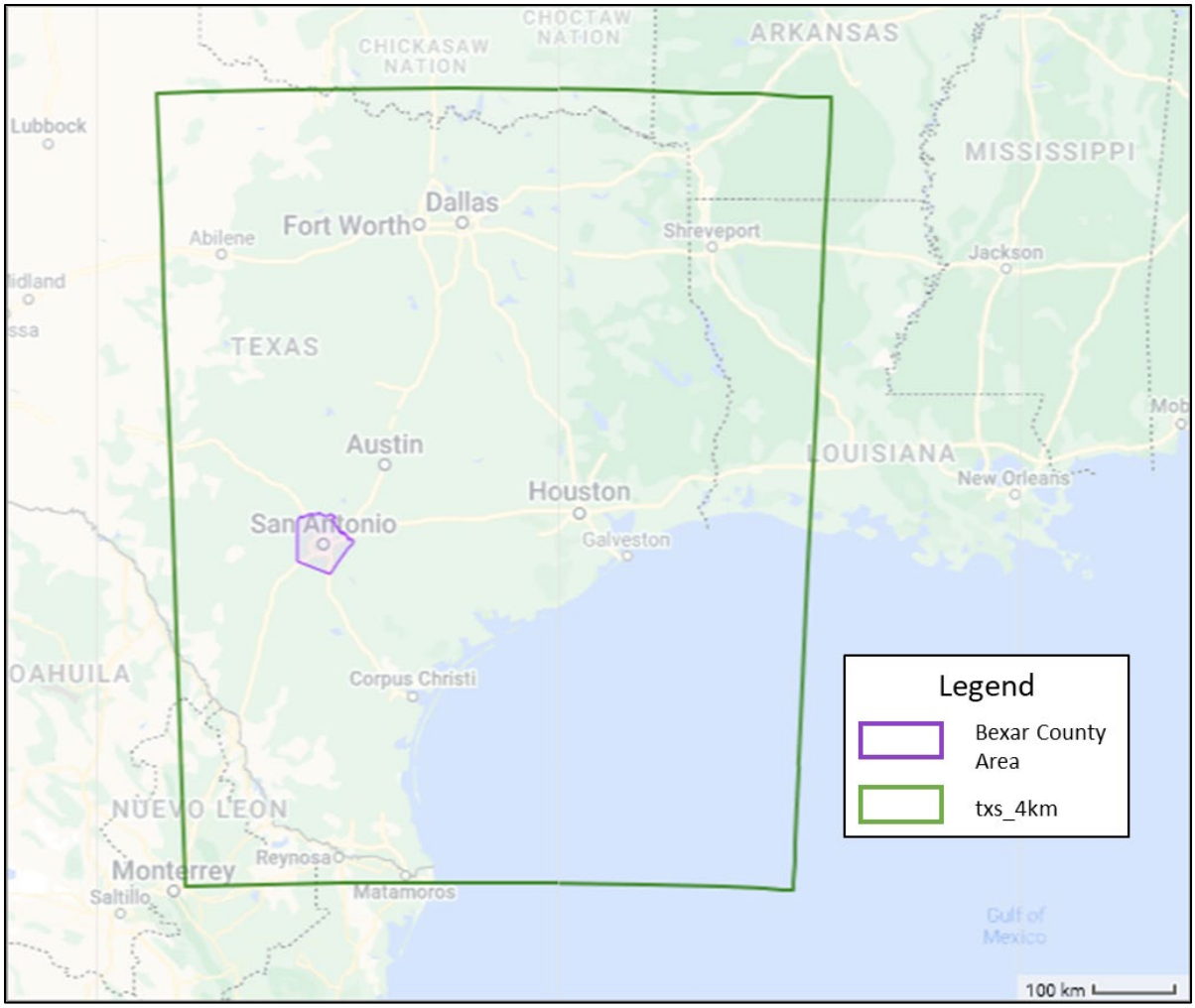

Figure 3-5: The Bexar County 2015 Ozone NAAQS Nonattainment Area and the txs_4km CAMx Domain

3.3.2 CAMx Options

TCEQ used the CAMx options summarized in Table 3-3: *CAMx Configuration Options* for this SIP revision.

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
Iodine Emissions	Oceanic iodine emission computed from saltwater masks

3.4 MODEL 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, emission 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

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. WRF modeling was conducted for March 15 to November 1, 2019, to cover ramp-up and ramp-down days needed by the CAMx modeling platform. A ramp-up period is the period of days that precede the actual time period of interest for modeling. The ramp-up period is used to ensure that the atmospheric conditions in the model are balanced.

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, Dallas-Fort Worth, 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 44 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. CAMx is set up to have 30 layers. The lowest CAMx layer covers to the first two WRF layers. CAMx layers 2 through 21 align with WRF layers 3 through 22. CAMx layers 22 through 30 encompass multiple WRF layers as displayed in Figure 3-7: *WRF and CAMx Vertical Layers for txs_4km Domain*.

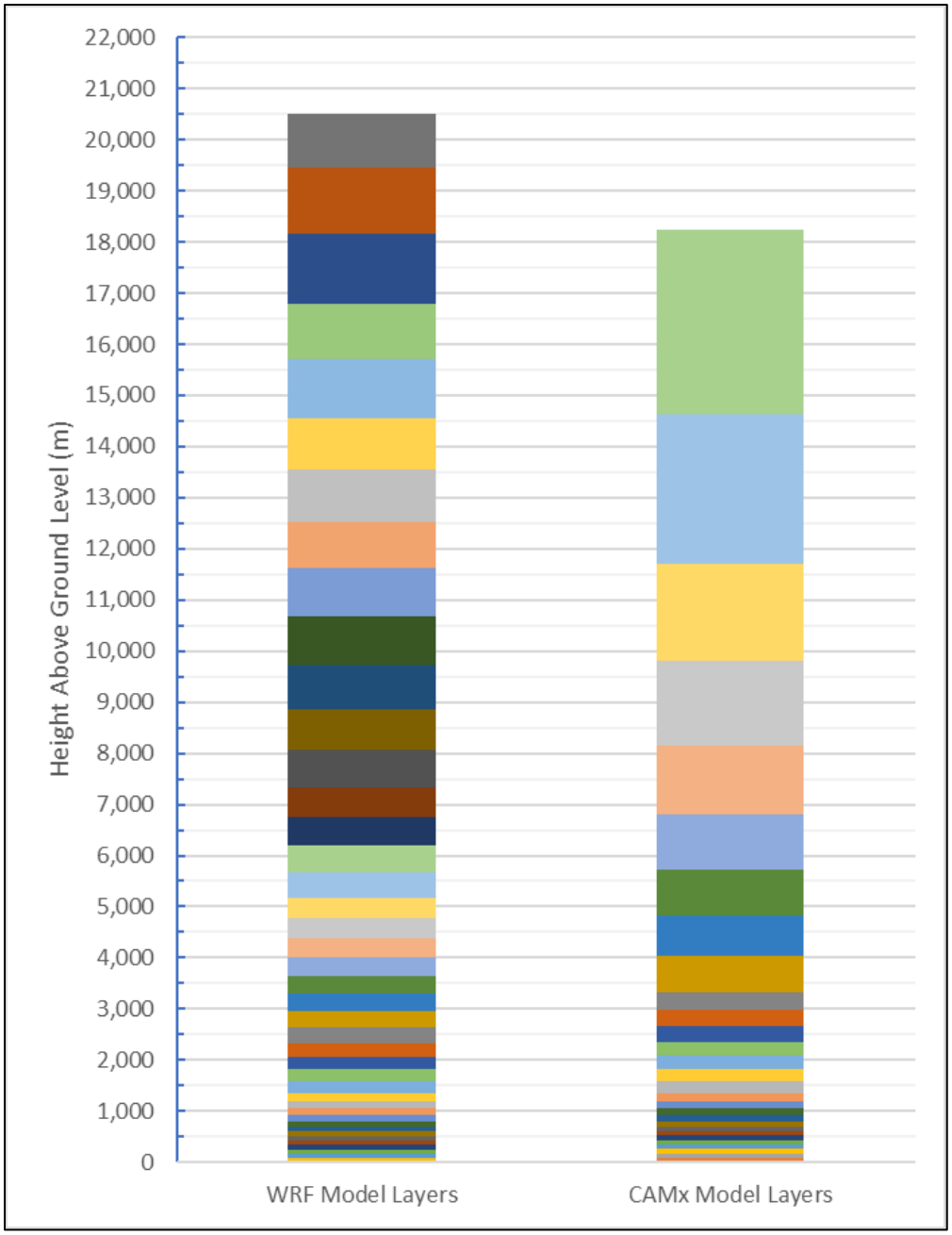

Figure 3-7: WRF and CAMx Vertical Layers for txs_4km Domain

Details of the grid boundaries, horizontal and vertical grid cell geometry, land surface data, meteorological parameterizations, and WRF model performance 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 2026 future case. This section provides an overview of the emission inputs used in this AD SIP modeling. Details about emissions inventory development are provided in Section 3: *Emissions Modeling* of Appendix A.

Emission 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). Based on the EPA modeling guidance, EI for each sector was 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 EIs for the 2026 future case, which are described in Section 3 of Appendix A.

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

EI Source Category	Sector/Geographic Area	Datasets and/or Models used for 2019 EI
Point	EGU	2019 Clean Air Market Program Data[13]
Point	Non-EGU, Texas (TX)	2019 State of Texas Air Reporting System[14]
Point	Non-EGU, non-TX	EPA 2016v1 Modeling Platform[15]
Non-Point	Oil & Gas, TX	2019 Railroad Commission of Texas
Non-Point	Oil & Gas, non-TX	EPA 2017 Modeling Platform[16]
Non-Point	Off-Shore	2017 Bureau of Ocean Energy Management[17]
Mobile	On-Road, TX	MOVES4[18]
Mobile	On-Road, non-TX	MOVES3
Mobile	Non-Road, TX	TexN2.2
Mobile	Non-Road, non-TX	MOVES3
Mobile	Off-Road Shipping, txs_4km domain	2019 Automatic Identification System (AIS) and vessel characteristic IHS 2020; MARINER v1
Mobile	Off-Road Shipping, us_12km domain	EPA 2016v1 modeling platform
Mobile	Off-Road Airports, TX	Texas Transportation Institute (TTI) 2019 data
Mobile	Off-Road Airports, non-TX	EPA 2016v1 modeling platform
Mobile	Off-Road Locomotives, TX	TTI 2019 data;

[13] https://campd.epa.gov/
[14] https://www.tceq.texas.gov/airquality/point-source-ei/psei.html
[15] https://www.epa.gov/air-emissions-modeling/2016v1-platform
[16] https://www.epa.gov/air-emissions-modeling/2017-emissions-modeling-platform
[17] https://www.boem.gov/environment/environmental-studies/ocs-emissions-inventory-2017
[18] https://www.epa.gov/moves/moves-versions-limited-current-use#note

EI Source Category	Sector/Geographic Area	Datasets and/or Models used for 2019 EI
Mobile	Off-Road Locomotives, non-TX	EPA 2016v1 modeling platform
Area	Area TX	2020 Air Emissions Reporting Requirements (AERR)
Area	Area non-TX	EPA 2016V1 modeling platform
Natural	Biogenic	Biogenic Emissions Land-use Database (BELD5); BEIS v3.7[19] and SMOKEv4.8
Natural	Fires	2019 MODIS and VIIRS; FINN v2.2
Other	International EI	2019 Community Emission Data System (CEDS)[20]; SMOKEv4.7_CEDS

Total anthropogenic emissions for a sample model episode day of June 12 in the 2019 base case and 2026 future case from within the Bexar County 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 Bexar County 2015 Ozone NAAQS Nonattainment Area* and Table 3-6: *June 12 Episode Day 2026 Future Case Anthropogenic EI in the Bexar County 2015 Ozone NAAQS Nonattainment Area.* Emissions from some categories differ on a daily basis and therefore a summary was prepared for a sample model day from the modeling episode that had high monitored ozone concentrations during a typical high ozone month in the nonattainment area and therefore the June 12 sample episode day was chosen.

For the June 12 sample model episode day, Table 3-5 and Table 3-6 show 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, there is an overall decrease in NO_X and CO emissions between the 2019 base case and 2026 future case with a slight increase in VOC emissions.

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

Source Category	NO_X (tpd)	VOC (tpd)	CO (tpd)
On-Road	33.51	15.63	306.03
Non-Road	7.82	11.36	222.94
Off-Road - Airports	1.89	0.62	5.63
Off-Road - Locomotives	1.98	0.09	0.50
Area Sources	5.34	77.41	9.66
Oil and Gas - Drilling	0.00	0.00	0.00
Oil and Gas - Production	1.71	6.38	2.59
Point - EGU	8.34	0.33	3.41
Point - Non-EGU	8.73	3.94	5.82

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

Source Category	NO_X (tpd)	VOC (tpd)	CO (tpd)
Bexar County Total	**69.32**	**115.76**	**556.58**

Table 3-6: June 12 Episode Day 2026 Future Case Anthropogenic EI in the Bexar County 2015 Ozone NAAQS Nonattainment Area

Source Category	NO_X (tpd)	VOC (tpd)	CO (tpd)
On-Road	21.46	10.80	251.96
Non-Road	6.53	12.41	254.05
Off-Road - Airports	2.00	0.64	5.71
Off-Road - Locomotives	1.22	0.05	0.45
Area Sources	5.66	83.65	10.41
Oil and Gas - Drilling	0.00	0.00	0.00
Oil and Gas - Production	1.71	4.02	2.59
Point - EGU	10.18	0.33	3.41
Point - Non-EGU	9.86	5.00	6.27
Bexar County Total	**58.62**	**116.90**	**534.85**
Difference between 2026 and 2019 Bexar County Totals	**-10.70**	**1.14**	**-21.73**

While emissions for categories described in Table 3-6 are projected to 2026, the anthropogenic emissions from other categories such as non-U.S., non-Canada, and non-Mexico are held constant with the 2019 values used for 2026 future case. This is because emissions are projected to 2019 using a 2010 inventory and further projection to a future year would increase uncertainty in the model. The emissions from non-U.S., non-Canada, and non-Mexico countries within the modeling domain and from natural source categories, including fire and biogenic categories, are also held constant. Since fire and biogenic emissions are dependent of the meteorological conditions on a given day, it is recommended in the EPA modeling guidance that emissions from these categories are held constant. Additional details on the development of emissions inputs are presented in Section 3: *Emissions Modeling* of Appendix A.

A map showing the spatial distribution changes in anthropogenic emissions of NO_X and VOC between the 2026 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 2026 Future Case and 2019 Base Case on June 12 Modeled Episode Day* and Figure 3-9: *Difference in Anthropogenic VOC between 2026 Future Case and 2019 Base Case on June 12 Modeled Episode Day*.

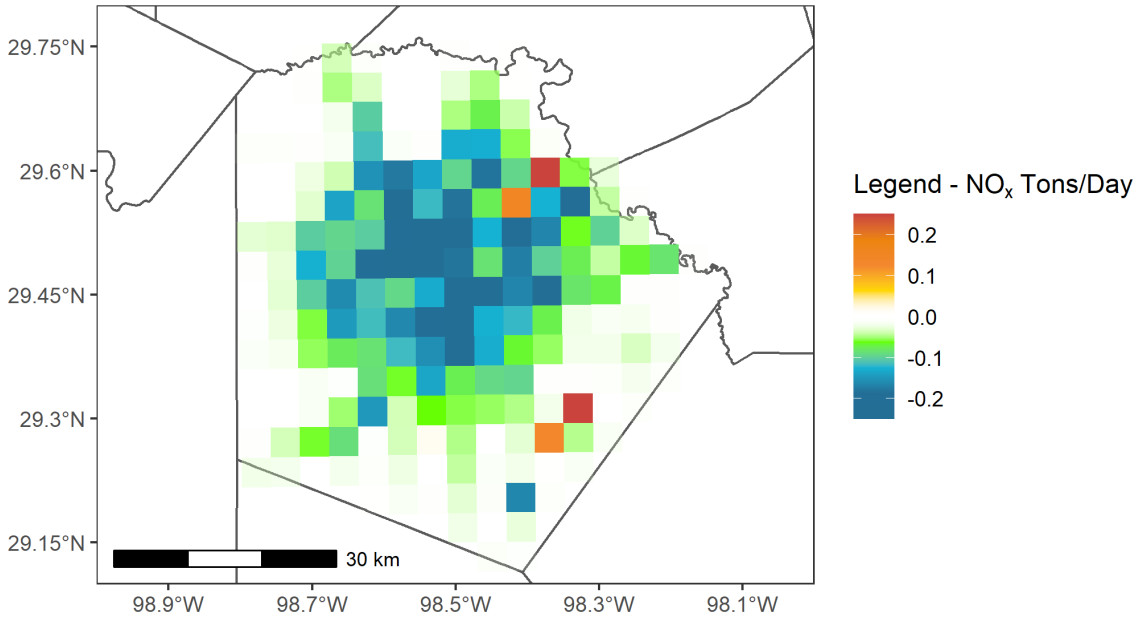

Figure 3-8: Difference in Anthropogenic NO_x between 2026 Future Case and 2019 Base Case on June 12 Modeled Episode Day

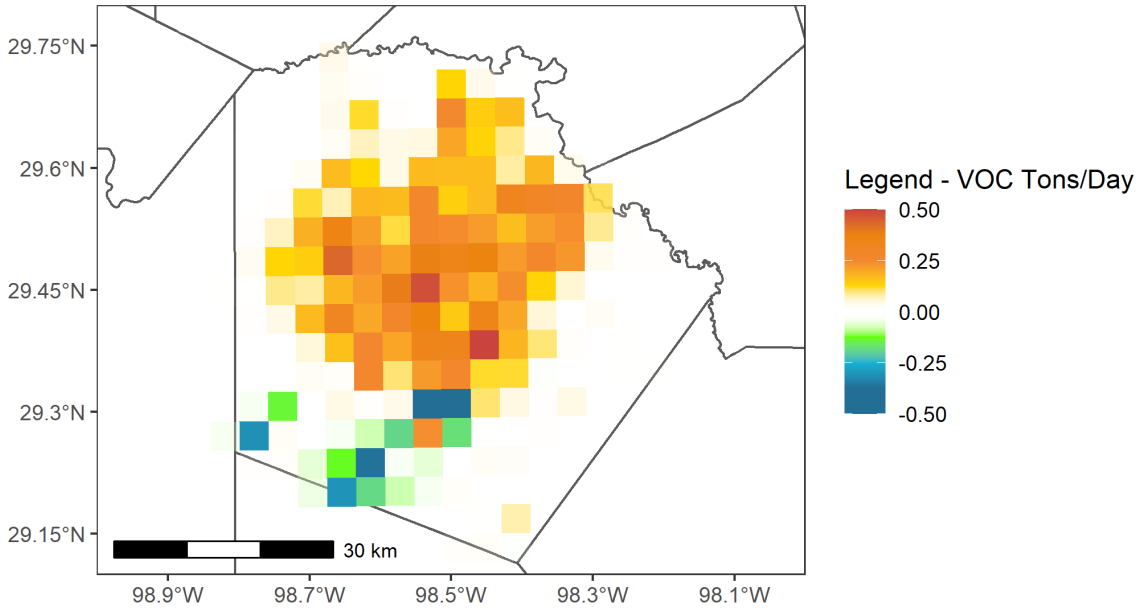

Figure 3-9: Difference in Anthropogenic VOC between 2026 Future Case and 2019 Base Case on June 12 Modeled Episode Day

While Figure 3-8 shows decreases in NO_x emissions between the 2026 future case and 2019 base case for almost all grid cells in Bexar County for the June 12 modeled episode day, there are a few grid cells in the northeast and southeast that show increases. In the northeast, the change corresponds to non-EGU increases (1.13 tpd), while increases in the southeast are due to an increase in EGU emissions (1.84 tpd), as presented in Table 3-5 and Table 3-6. Emissions plots showing non-EGU and EGU

emissions concentrated in these grid cells can be found in Section 3.3: *Point Sources* of Appendix A.

In line with the overall increase in VOC emissions between the 2019 base case and the 2026 future case, Figure 3-9 shows increases in most grid cells in Bexar County, with the increases spread evenly over the urban geographic area and indicating the VOC emissions increases come mostly from the area source sector. The southwestern portion of the county shows decreases in VOC emissions, which corresponds to oil and gas production VOC decreases (2.36 tpd) shown in Table 3-5 and Table 3-6.

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 four lateral edges of a domain (North, South, East, West) and the 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 2026. Lateral boundary conditions were developed for each grid cell along all four lateral boundaries of the outer 36 km modeling. Top boundary conditions were also developed to represent pollutant concentrations from atmospheric layers above the highest CAMx vertical layer.

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 ramp-up time (January and February). For both modeled years (2019 and 2026), 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 2026 future anthropogenic emissions were interpolated using regional scaling factors for the United States, Canada, Mexico, and Asia and according to emission scaling factors from Representative Concentration Pathways (RCP4.5) for the rest of the world. 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, gridded 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 MODEL PERFORMANCE EVALUATION

The purpose of model performance evaluation (MPE) is to determine how well the model reproduces measured concentrations of pollutants. The EPA modeling guidance recommends performing an operational model evaluation consisting of calculating multiple statistical parameters and graphical analyses. In addition, EPA also recommends comparing MPE results against other similar model applications, such as those reported in the Emery et al. (2017) paper. The paper provides benchmarks for normalized mean bias (NMB), normalized mean error (NME), and correlation of one-

hour and MDA8 ozone based on performance of many modeling applications in the U.S. Table 3-7: *Benchmarks for Photochemical Model Performance Evaluation Statistics* lists these benchmarks. The goal benchmarks correspond to the performance demonstrated by the top third of model runs evaluated and should be viewed as the best a model can be expected to achieve. The criteria benchmarks correspond to the performance achieved by the top two-thirds of model runs evaluated and should be viewed as what a majority of models can be expected to achieve.

In TCEQ's evaluation of the 2019 base case, statistical values near the goal or criteria benchmarks were used as indications that the model performance was good or acceptable, respectively.

Table 3-7: Benchmarks for Photochemical Model Performance Evaluation Statistics

Benchmark	NMB (%)	NME (%)	Correlation
Goal	Within range ± 5	Less than 15	Greater than 0.75
Criteria	Within range ± 15	Less than 25	Greater than 0.50

This section provides a broad overview of model performance in the Bexar County 2015 ozone NAAQS nonattainment area, with a more in-depth analysis available in Section 5: *Photochemical Model Performance Evaluation* of Appendix A.

TCEQ performed MPE by comparing 2019 base case CAMx modeling results to measured ozone concentration at all ozone monitors in Bexar County 2015 ozone NAAQS nonattainment area. For this evaluation, statistical performance measures of NMB and NME were calculated using measured 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).

As discussed in the EPA modeling guidance, operational performance evaluations should be conducted across various temporal and spatial scales. The NMB and NME for high-ozone days with MDA8 ozone concentrations at or above 60 ppb for each monitor in the Bexar County 2015 ozone NAAQS nonattainment area and adjacent counties for the whole modeling episode are presented in Figure 3-10: *NMB of MDA8 Ozone ≥ 60 ppb by Monitor in April through October 2019* and Figure 3-11: *NME of MDA8 Ozone ≥ 60 ppb by Monitor in April through October 2019*.

Regulatory ozone monitors in the Bexar County 2015 Ozone NAAQS nonattainment area are shown in Figure 3-3 and the name and location of non-regulatory ozone monitors in Bexar and adjacent counties are listed in Table 3-8: *Non-Regulatory Monitors in Bexar and Adjacent Counties*. Due to a small number of regulatory ozone monitors in Bexar County, MPE also incorporated non-regulatory monitors, including five in Bexar County and four in adjacent counties to produce more robust statistics, especially for statistics with minimum ozone cutoffs.

Table 3-8: Non-Regulatory Monitors in Bexar and Adjacent Counties

Monitor Name	County	CAMS Number	Longitude (degree)	Latitude (degree)
Bulverde Elementary	Comal	0503	-98.463	29.761
City of Garden Ridge	Comal	0505	-98.299	29.639

Monitor Name	County	CAMS Number	Longitude (degree)	Latitude (degree)
Elm Creek Elementary	Bexar	0501	-98.724	29.277
Fair Oaks Ranch	Bexar	0502	-98.626	29.730
Government Canyon	Bexar	1610	-98.765	29.549
Heritage Middle School	Bexar	0622	-98.333	29.353
New Braunfels Airport	Guadalupe	0504	-98.029	29.704
CPS Pecan Valley	Bexar	0678	-98.431	29.407
Seguin Outdoor Learning Center	Guadalupe	0506	-97.932	29.589

Figure 3-10 shows that all regulatory and non-regulatory ozone monitors in Bexar and adjacent counties have NMB for this data aggregation within the criteria range (± 15%) and all but three monitors show NMB values within the goal range (± 5%). The Bulverde Elementary monitor had a NMB value of 0.0 which does not show on Figure 3-10. Two of the three regulatory monitors, Camp Bullis and San Antonio Northwest, are within the goal range, while Calaveras Lake is within the criteria range. This indicates acceptable model performance for Calaveras Lake and good model performance for Camp Bullis and San Antonio Northwest.

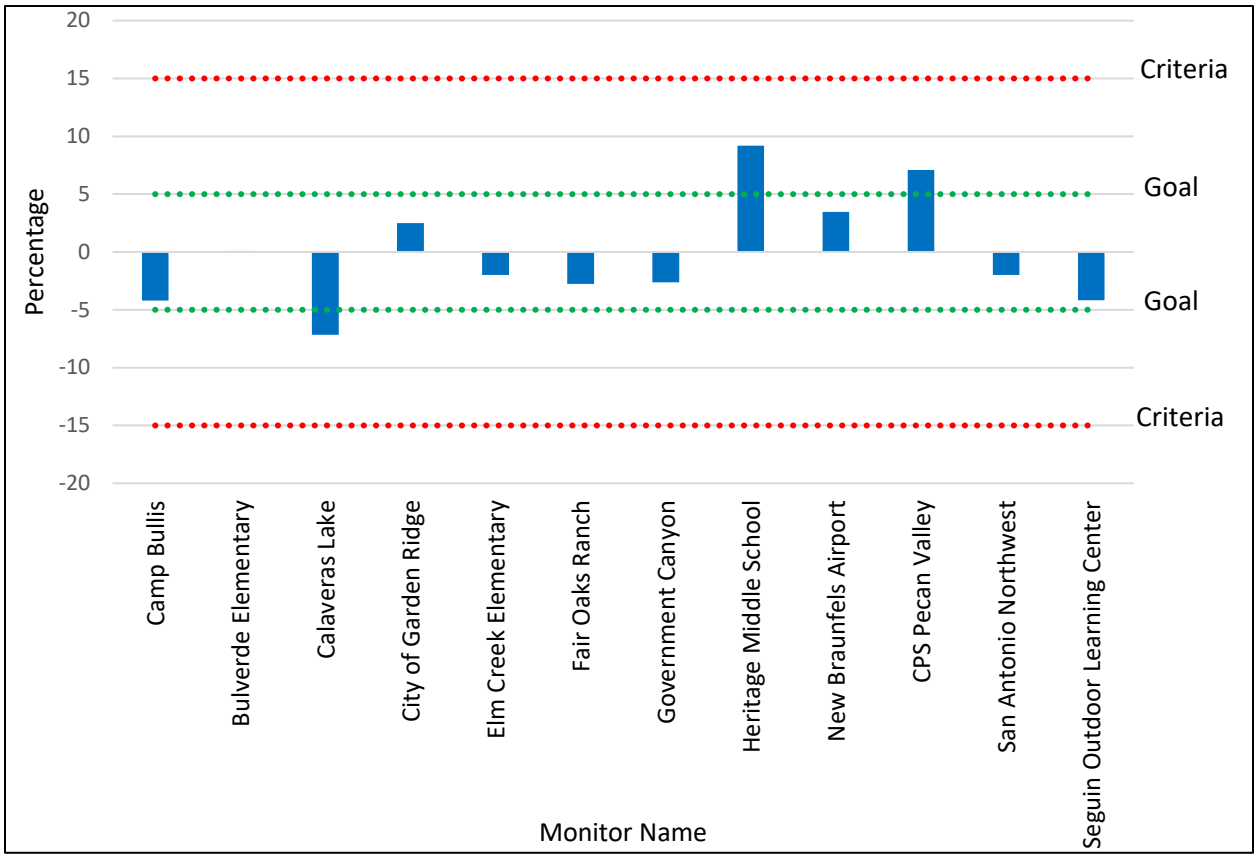

Figure 3-10: NMB of MDA8 Ozone ≥ 60 ppb by Monitor in April through October 2019

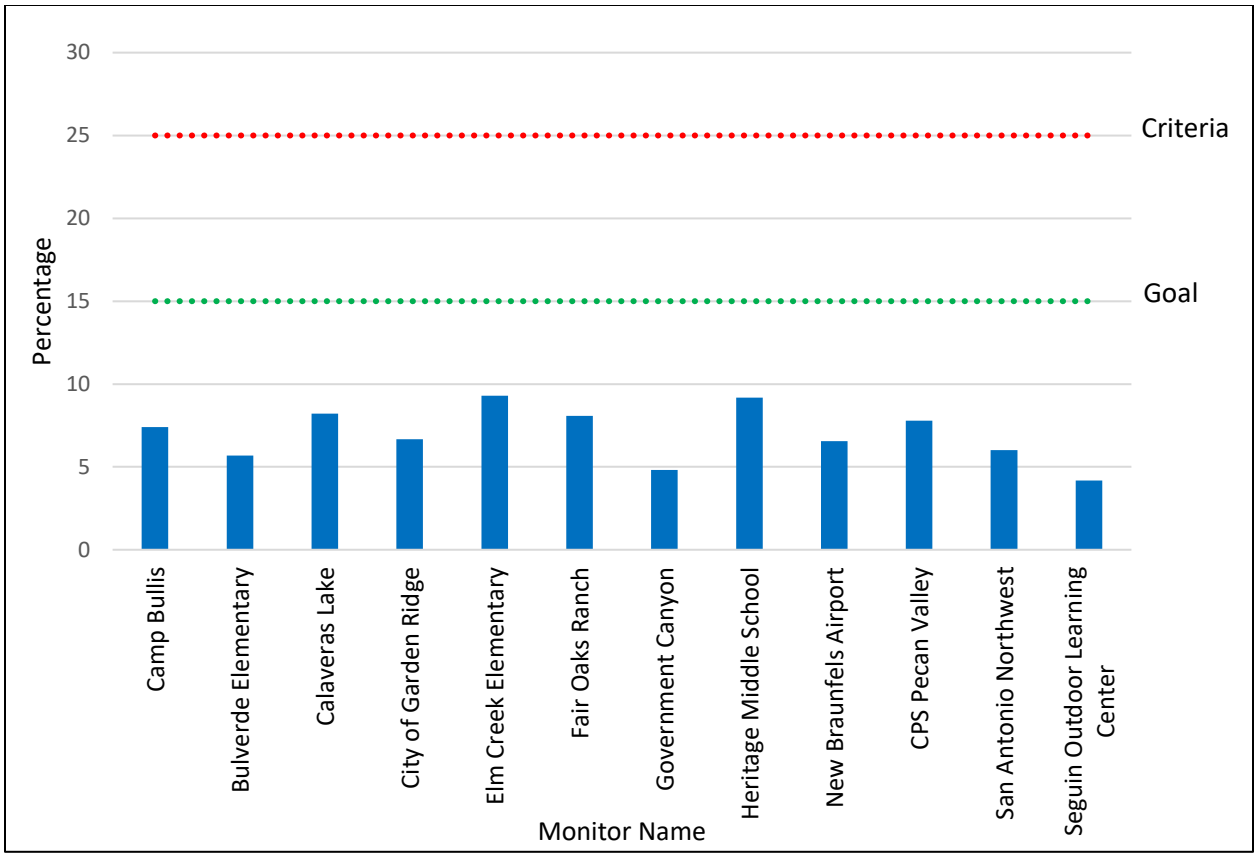

Figure 3-11: NME of MDA8 Ozone ≥ 60 ppb by Monitor in April through October 2019

Figure 3-11 shows that all monitors in Bexar and adjacent counties have NME within the goal range and all less than 15 percent NME. This indicates good model performance for regulatory and non-regulatory monitors in Bexar and adjacent counties.

In addition to the episode-wide evaluation of model performance shown above, an evaluation of modeled eight-hour ozone concentrations for each month and for the entire seven-month episode is presented in Table 3-9: *NMB and NME of Eight-Hour Average Ozone in Bexar and Adjacent Counties*. The values represent monthly and seven-month (April through October) averages from all monitors in Bexar and adjacent counties. Table 3-9 shows NMB and NME for three different subsections of the eight-hour average ozone data:

- all eight-hour averages when ozone observations (obs) was greater than or equal to 40 ppb (NMB all obs ≥ 40 ppb and NME all obs ≥ 40 ppb);
- all MDA8 ozone (NMB MDA8 ozone and NME MDA8 ozone); and
- MDA8 ozone when observed MDA8 ozone is greater than or equal to 60 ppb (NMB MDA8 ozone obs ≥ 60 ppb and NME MDA8 ozone obs ≥ 60 ppb).

When evaluated for eight-hour observations over 40 ppb typical of daytime values, the NMB is positive in all months and within the criteria range (± 15%) in all months except May. The NMB values for MDA8 ozone are within the criteria range except for April

through June and for the entire modeling episode (April through October). The NMB values are positive for all months, with May and April showing the most positive bias. NMB values when the MDA8 ozone observations are over 60 ppb are within the criteria range for each month and for the entire episode and exhibit positive and negative bias. The NME values for MDA8 ozone are within the criteria value (<25%) for each month except May, all months when observed ozone is over 40 ppb, and all months when the observed MDA8 ozone is over 60 ppb. The NME values for the MDA8 ozone ≥ 60 ppb ozone are within the 15% goal range, and as with individual monitors, all under 10%. Model performance is acceptable for each month and the entire episode, with May and June showing the poorest performance.

Table 3-9: NMB and NME of Eight-hour Average Ozone in Bexar and Adjacent Counties

Month	NMB All Obs ≥ 40 ppb (%)	NME All Obs ≥ 40 ppb (%)	NMB MDA8 Ozone (%)	NME MDA8 Ozone (%)	NMB MDA8 Ozone Obs ≥ 60 ppb (%)	NME MDA8 Ozone Obs ≥ 60 ppb (%)
Apr	0.79	10.20	16.39	21.58	-5.65	6.26
May	18.34	20.08	39.31	40.04	(no obs ≥ 60 ppb)	(no obs ≥ 60 ppb)
Jun	3.71	11.66	15.38	21.81	-3.94	8.38
Jul	9.79	11.95	13.93	16.20	4.46	7.55
Aug	1.83	9.08	7.30	11.54	-5.26	9.41
Sep	9.34	12.41	10.17	14.21	-2.51	6.18
Oct	1.94	9.30	7.52	12.63	0.32	5.47
Apr through Oct	5.59	11.66	15.52	19.54	-1.74	7.19

Figure 3-12: *Monthly NMB (for observed MDA8 Ozone ≥ 60 ppb) in the Bexar County 2015 Ozone NAAQS Nonattainment Area* shows that the bias changes depending on the monitor location and the month. Cool colors (light or dark blue) indicate underprediction (negative bias) of MDA8 ozone, and warm colors (yellow, orange, or red) indicate overprediction (positive bias). While all ozone monitors within the Bexar County 2015 ozone NAAQS nonattainment exhibited negative bias in April and August, monitors showed either negative bias or positive bias for the rest of the modeled episode. May was excluded because there were no observations greater than or equal to 60 ppb. For other months, the number of monitors varies because not all monitors recorded MDA8 ozone greater than or equal to 60 ppb, and NMB could not be calculated at those monitors for those months.

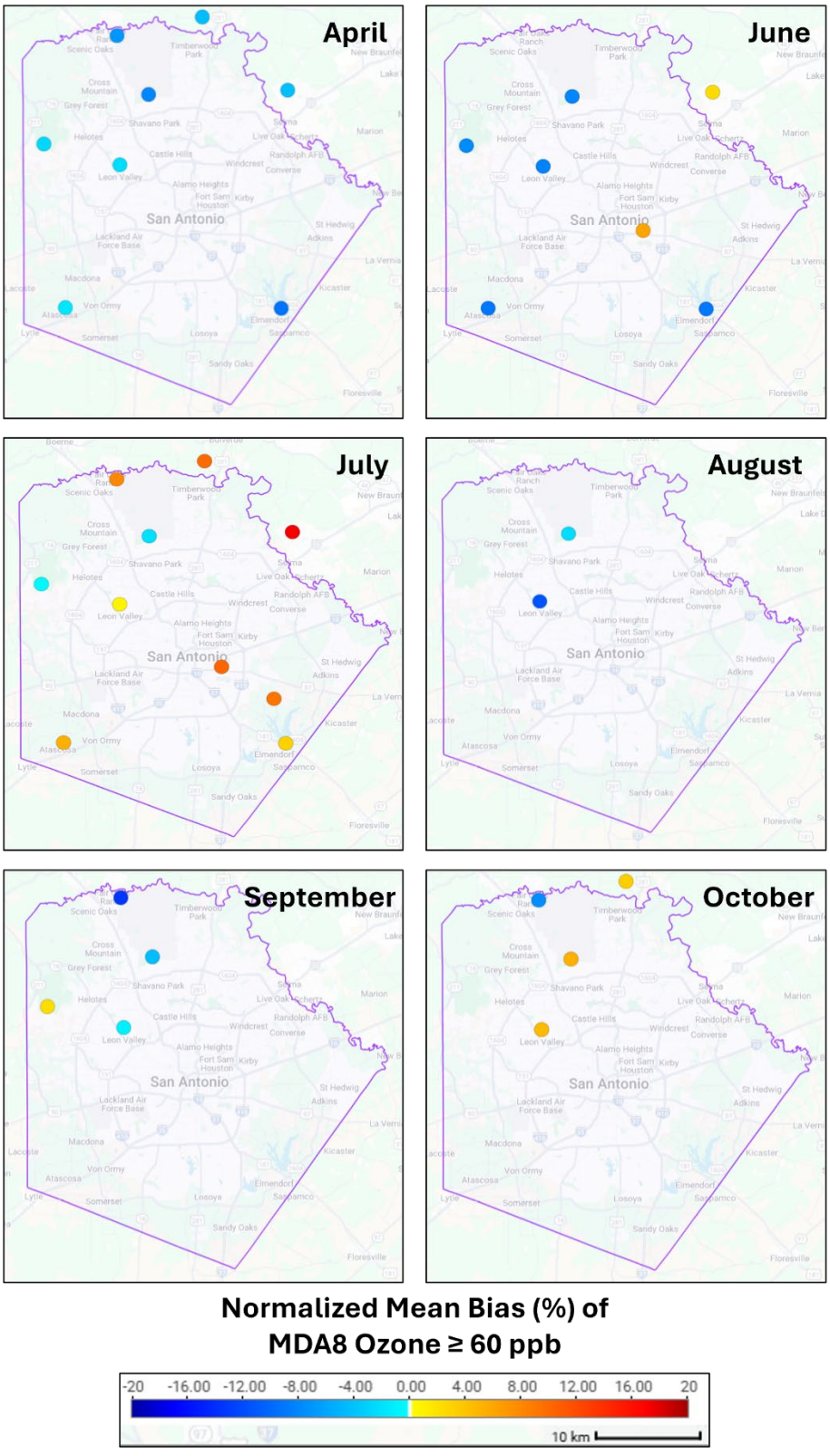

Figure 3-12: Monthly NMB (for observed MDA8 Ozone ≥ 60 ppb) in the Bexar County 2015 Ozone NAAQS Nonattainment Area

The performance evaluation of the base case modeling demonstrates the adequacy of the model to replicate the relationship between ozone levels and the emissions of NO_X and VOC precursors in the atmosphere. The model's ability to suitably replicate this relationship is necessary to have confidence in the model's simulation of the future year ozone and the response to various control measures. Additional detailed evaluations are included in Section 5: *Photochemical Model Performance Evaluation* of Appendix A.

3.6 MODELED 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. All regulatory ozone monitors in Bexar County had 10 modeled base case days above 60 ppb as well as over five days of observed MDA8 ozone over 60 ppb in 2019 and were included in the 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 2019 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 ozone values;
- from the 2026 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 ozone values; and
- the RRF was calculated for each monitor as a ratio of the top-10 day average future MDA8 ozone values to the top-10 day average base case MDA8 ozone values.

RRFs for each monitor included in the modeled attainment test are shown in Table 3-10: *Bexar County Monitor-Specific Relative Response Factors for Modeled Attainment Test.*

Table 3-10: Bexar County Monitor-Specific Relative Response Factors for Modeled Attainment Test

Monitor Name	CAMS Number	2019 Top 10-Days Modeled MDA8 Ozone Mean (ppb)	2026 Top 10-Days Modeled MDA8 Ozone Mean (ppb)	Relative Response Factor
Camp Bullis	0058	70.80	69.38	0.980
Calaveras Lake	0059	67.82	66.59	0.982
San Antonio Northwest	0023	73.62	72.22	0.981

The RRF is then multiplied by the 2019 base case design value (DVB) to obtain the 2026 future case design value (DVF) for each ozone monitor. The 2019 DVB is calculated as the average of the 2019, 2020 and 2021 regulatory design values (DV). The years used in calculating 2019, 2020, and 2021 DV are shown in Figure 3-13: *Years Used for the of 2019 DVB.*

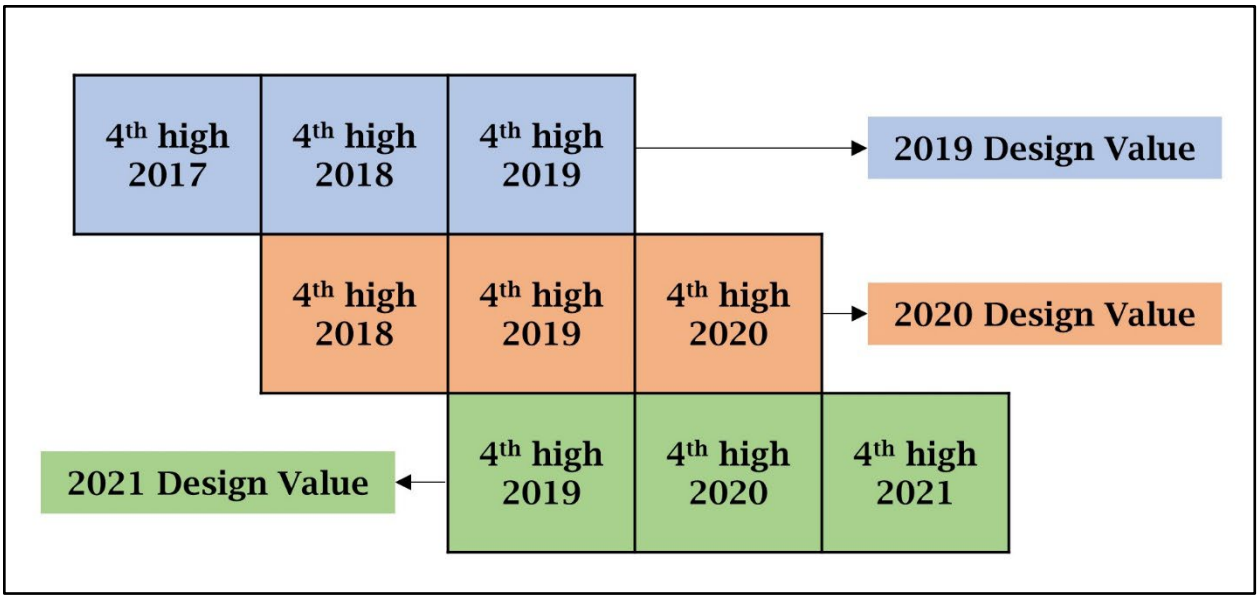

Figure 3-13: Years Used for the Calculation of 2019 DVB

In accordance with the EPA modeling guidance, the final regulatory DVF is obtained by rounding to the tenths digit and truncating to zero decimal places. The 2026 DVFs for the Bexar County 2015 ozone NAAQS nonattainment area are presented in Table 3-11: *Summary of the 2026 DVF for the Modeled Attainment Test.* The monitors are mapped with their projected future year attainment status in Figure 3-14: *2026 DVF in the Bexar County 2015 Ozone NAAQS Nonattainment Area.* Application of the modeled attainment test results in all regulatory monitors attaining the 2015 eight-hour ozone standard of 70 ppb in 2026.

Table 3-11: Summary of the 2026 DVF for the Modeled Attainment Test

Monitor Name	CAMS Number	2019 Base Case DVB (ppb)	2026 Pre-rounded DVF (ppb)	2026 Truncated DVF (ppb)
Camp Bullis	0058	72.00	70.58	70
Calaveras Lake	0059	65.67	64.50	64
San Antonio Northwest	0023	72.00	70.64	70

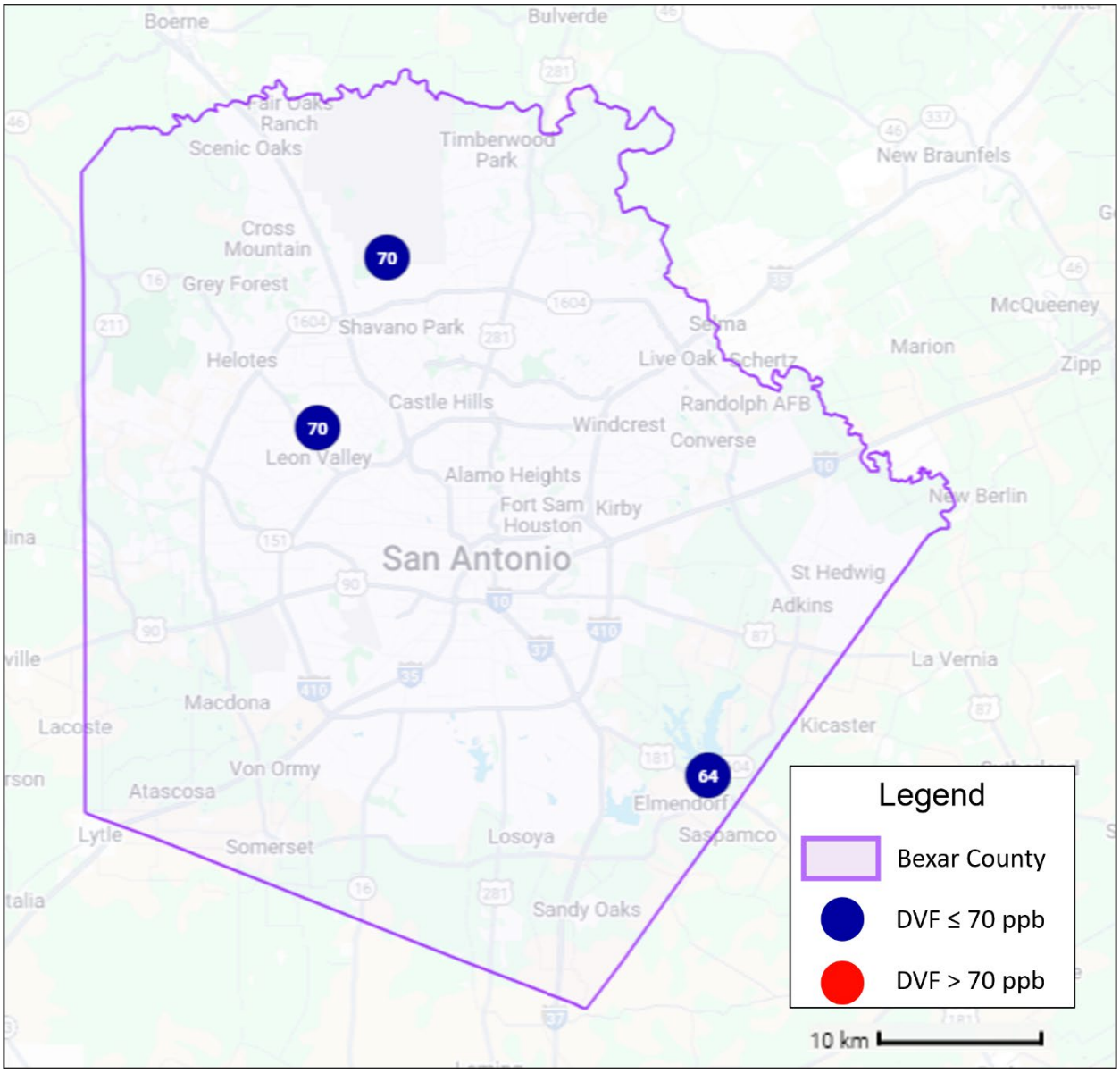

Figure 3-14: 2026 DVF in the Bexar County 2015 Ozone NAAQS Nonattainment Area

3.6.2 Unmonitored Area Analysis

The standard modeled attainment test is applied only at monitor locations. The EPA modeling guidance recommends that areas not near monitoring locations (unmonitored areas) be subject to an unmonitored area (UMA) analysis. The UMA analysis is intended to demonstrate that unmonitored areas are expected to reach attainment by the required attainment date or identify any areas outside monitoring location that are at risk of not meeting the ozone standard.

EPA developed a software called the Software for the Modeled Attainment Test - Community Edition (SMAT-CE), that allows states to perform the recommended UMA analysis. However, EPA also allows states to develop alternative techniques suitable for states' needs. To conduct the UMA analysis, TCEQ developed its own software, the

TCEQ Attainment Test for Unmonitored Areas (TATU), that is integrated into TCEQ's model post-processing stream. Similar to SMAT-CE, TATU uses the Voronoi Neighbor Averaging technique to spatially interpolate modeled DVF from monitored locations to obtain modeled DVF in unmonitored areas.

The 2026 future case design values obtained from the UMA analysis is presented in Figure 3-15: *2026 DVF in the Bexar County 2015 Ozone NAAQS Nonattainment Area*. The figure shows the extent and magnitude of the expected improvements in ozone design values, with all grid cells at or below 70 ppb.

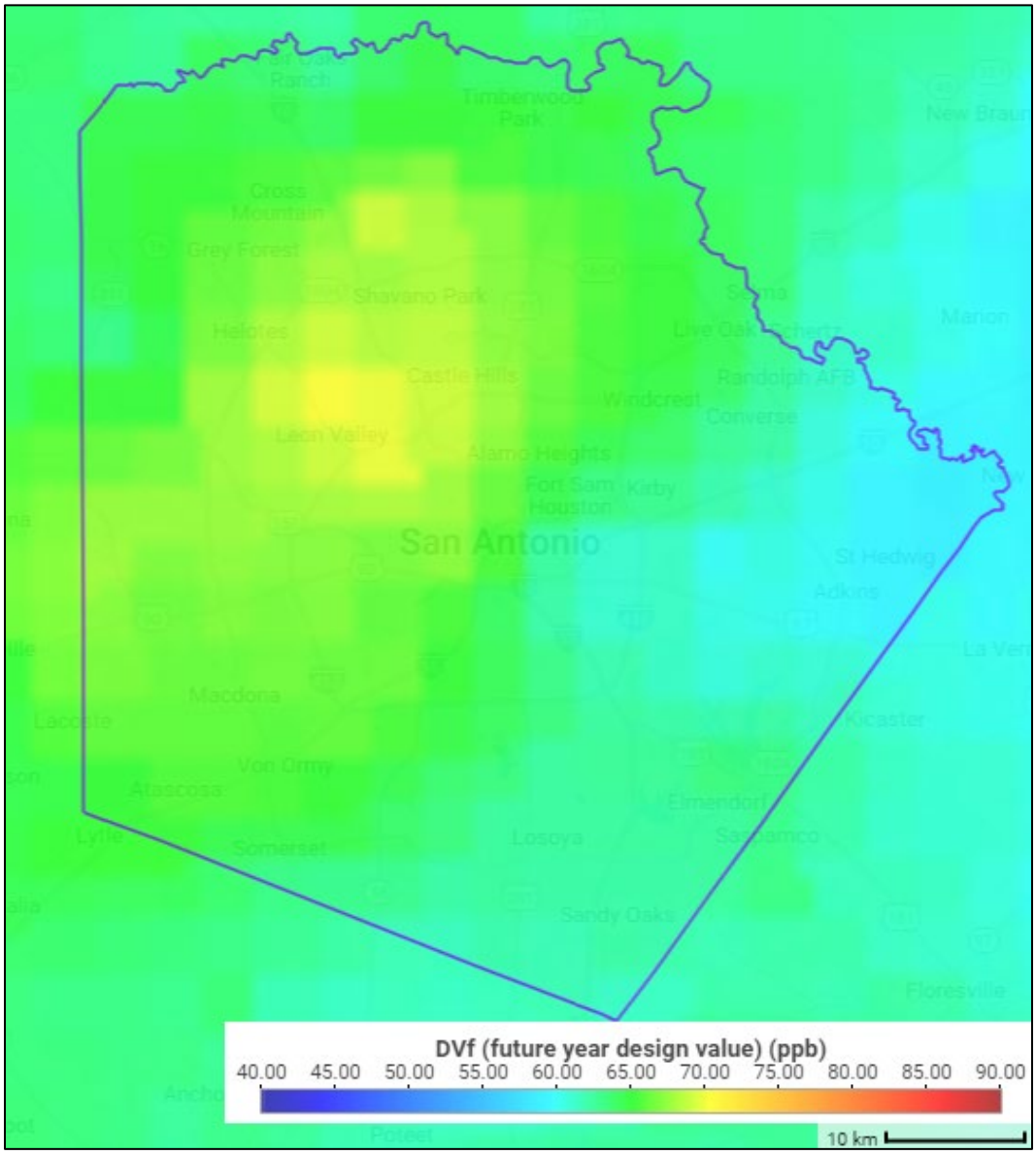

Figure 3-15: 2026 DVF in the Bexar County 2015 Ozone NAAQS Nonattainment Area

3.7 MODELING ARCHIVE AND REFERENCES

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CHAPTER 4: CONTROL STRATEGIES AND REQUIRED ELEMENTS

4.1 EXISTING CONTROL MEASURES

Bexar County has existing VOC and NO_x regulations that were promulgated during the 1970s when the county was not attaining the photochemical oxidants air quality standard, the predecessor to the 1979 one-hour ozone NAAQS. Additional VOC regulations were added as part of the San Antonio early action compact SIP revision for the 1997 eight-hour ozone NAAQS, submitted to EPA in 2004. Bexar County has also been included in regulations affecting east and central Texas and various statewide and inter-regional rules. Several statewide requirements for various consumer-related products also apply to Bexar County. Table 4-1: *Existing Ozone Control and Voluntary Measures Applicable to Bexar County* lists the existing ozone control strategies and the corresponding rules in Title 30 of the Texas Administrative Code (TAC) that are currently applicable in Bexar County for the 1979 one-hour ozone NAAQS and the 1997, 2008 and 2015 eight-hour ozone NAAQS.

Table 4-1: Existing Ozone Control and Voluntary Measures Applicable to Bexar County

Measure	Description	Effective Date(s)
VOC Storage Rules 30 TAC Chapter 115, Subchapter B, Division 1	VOC control requirements applicable to storage tanks to satisfy FCAA requirements for the Metropolitan San Antonio Intrastate Air Quality Control Region.	December 31, 1973; amended to be effective May 16, 2024
VOC Vent Gas Rules 30 TAC Chapter 115, Subchapter B, Division 2	VOC control requirements applicable to stack emissions to satisfy FCAA requirements for the Metropolitan San Antonio Intrastate Air Quality Control Region.	December 31, 1973; amended to be effective May 16, 2024
VOC Water Separation 30 TAC Chapter 115 Subchapter B, Division 3	VOC control amendments satisfy RACT requirements for the Control of Refinery Vacuum Producing Systems, Wastewater Separators, and Process Unit Turnarounds control techniques guidelines category (EPA450/2-77-025).	December 31, 1973; amended to be effective May 16, 2024
VOC Loading and Unloading Rules 30 TAC Chapter 115, Subchapter C, Division 1	VOC control consistent with the EPA's 1977 Control of Volatile Organic Emissions from Bulk Gasoline Plants control techniques guidelines (EPA450/2-77-035).	December 31, 1973; amended to be effective May 16, 2024
VOC Transport Rules 30 TAC Chapter 115, Subchapter C, Division 3	VOC control requirements for VOC transport vessels in covered attainment counties, including Bexar.	April 30, 2000; amended to be effective May 16, 2024
VOC Degreasing Rules 30 TAC Chapter 115, Subchapter E, Division 1	VOC controls to implement RACT requirements for degreasing processes based on the EPA's 1977 Control of Volatile Organic Emissions from Solvent Metal Cleaning control techniques guidelines document (EPA-450/2-77022).	May 7, 1979; amended to be effective May 16, 2024

Measure	Description	Effective Date(s)
VOC Windshield Washer Fluid Rules 30 TAC Chapter 115, Subchapter G, Division 1	VOC content controls for consumer windshield washer fluid sold in Texas. Enacted to generate VOC reductions required for FCAA 15% Rate of Progress requirements. Rules made applicable statewide.	May 27, 1994
Refueling – Stage I 30 TAC, Chapter 115, Subchapter C, Division 2	Requirements for capture of 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.	December 31, 2005
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 Bexar County.	May 1, 2003, through May 1, 2005
Cement Kiln Rule 30 TAC Chapter 117, Subchapter E, Division 2	NO_x emission limits for all Portland cement kilns located in Bexar County.	May 1, 2005; amended to be effective May 16, 2024
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 (statewide rule).	July 1, 2002
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 Bexar County).	November 15, 1999
Texas Emissions Reduction Plan (TERP) 30 TAC Chapter 114, Subchapter K	Voluntary program provides grant funds for on-road and non-road heavy duty diesel engine replacement/retrofit.	January 2002
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
Texas Low Reid Vapor Pressure (RVP) Gasoline 30 TAC Chapter 114, Subchapter H, Division 1	Requires all gasoline for both on-road and non-road use to have RVP of 7.8 pounds per square inch or less from May 1 through October 1 each year.	May 1, 2000
30 TAC Chapter 114, Subchapter I, Division 3	Standards for non-road gasoline engines 25 horsepower and larger.	May 1, 2004

Measure	Description	Effective Date(s)
Federal On-Road Measures	Series of emissions limits implemented by EPA for on-road vehicles. Included in measures: Tier 1, Tier 2, and Tier 3 light-duty and medium- duty passenger vehicle standards, heavy-duty vehicle standards, low sulfur diesel standards, National Low Emission Vehicle standards, and reformulated gasoline.	Phase in through 2010 Tier 3 phase in from 2017 through 2025
Federal Area/Non- Road Measures	Series of emissions limits implemented by EPA for area and non-road sources. Examples: diesel and gasoline engine standards for locomotives and leaf-blowers.	Phase in through 2018
Major industrial, commercial, and institutional (ICI) Combustion RACT Rules 30 TAC Chapter 117, Subchapter B, Division 2	NO_X emission specifications applicable to owners/operators of affected units for major source ICI in Bexar County.	May 16, 2024
Major Electric Generating Combustion RACT Rules 30 TAC Chapter 117, Subchapter C, Division 2	NO_X emission specifications applicable to owners/operators of affected units for major source electric generating units in Bexar County.	May 16, 2024
Cement Kiln RACT Rules 30 TAC Chapter 117, Subchapter E, Division 2	NO_X emission specifications for preheater-precalciner and precalciner kilns on a pound per ton of clinker produced basis applicable to owners/operators of affected units in Bexar County.	May 16, 2024

4.2 INTRODUCTION

The Bexar County 2015 ozone National Ambient Air Quality Standard (NAAQS) nonattainment area includes a 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 many of these sources.

The federal Clean Air Act (FCAA) and 40 Code of Federal Regulations (CFR) Part 51, as amended, require nonattainment areas classified as serious to submit a state implementation plan (SIP) revision that addresses: nonattainment new source review (NSR), reasonable further progress (RFP), an attainment demonstration (AD), a reasonably available control measure (RACM) analysis, a reasonably available control technology (RACT) analysis, contingency measures, and an enhanced vehicle inspection and maintenance (I/M) program.

This chapter describes existing ozone control measures for Bexar County, provides the required RACT analysis and describes the regulations necessary to implement RACT

requirements in Bexar County associated with a serious classification, RACM analysis, contingency plan, NO_X and VOC motor vehicle emissions budgets (MVEB) for the 2026 attainment year, and certification statements to confirm that other requirements have been met for the nonattainment area.

4.3 UPDATES TO EXISTING CONTROL MEASURES

4.3.1 Updates to Vehicle Emissions I/M Control Measures

The FCAA and 40 CFR Part 51, as amended, require a basic vehicle emissions I/M program in ozone nonattainment areas classified as moderate. Rulemaking was required to implement I/M and set the testing fee applicable in Bexar County, and a SIP revision was required to incorporate a Bexar County I/M program into the SIP. On November 29, 2023, the commission adopted a 30 TAC Chapter 114 rulemaking and associated SIP revision (Project Nos. 2022-026-114-AI and 2022-027-SIP-NR) implementing a new low-enhanced I/M program in Bexar County to begin on November 1, 2026. These projects satisfy the basic I/M requirements for Bexar County under the moderate classification as well as the enhanced I/M requirements for Bexar County under the current serious classification. The SIP and rule revisions were submitted to EPA on December 18, 2023. On March 13, 2025, EPA approved the SIP and rule revisions implementing I/M in Bexar County (90 FR 15119).

4.3.2 Updates to NO_X Control Measures

On April 24, 2024, concurrent with the SIP revision for the Bexar County 2015 Eight-Hour Ozone Standard Moderate Nonattainment Area RACT SIP Revision (Non-Rule Project No. 2023-132-SIP-NR), the commission adopted the 30 TAC Chapter 117 NO_X RACT rulemaking (Rule Project No. 2023-117-117-AI) to ensure that NO_X controls and reductions would be implemented for Bexar County to address moderate area RACT requirements under the 2015 eight-hour ozone NAAQS for all NO_X source categories identified in EPA's alternative control techniques (ACT) documents and for all major sources of NO_X. The compliance date for these adopted rules was January 1, 2025.

4.3.3 Updates to VOC Control Measures

On April 24, 2024, concurrent with the SIP revision for the Bexar County 2015 Eight-Hour Ozone Standard Moderate Nonattainment Area RACT SIP Revision (Non-Rule Project No. 2023-132-SIP-NR), the commission adopted the 30 TAC Chapter 115 VOC RACT rulemaking (Rule Project No. 2023-116-115-AI) to ensure that all VOC emission source categories that exist in Bexar County subject to EPA control techniques guidelines (CTG) or ACT documents would be controlled to levels that fulfill moderate area RACT requirements under the 2015 eight-hour ozone NAAQS. The adopted Chapter 115 rulemaking also ensured that VOC controls and reductions would be implemented in the nonattainment area to address moderate area RACT requirements under the 2015 eight-hour ozone NAAQS for all non-CTG and non-ACT major sources of VOC. The compliance date for these adopted rules was January 1, 2025.

4.4 NEW CONTROL MEASURES

4.4.1 New Vehicle Emissions I/M Control Measures

On April 17, 2025, the commission approved proposal of a 30 TAC Chapter 114 I/M rulemaking and associated I/M SIP revision (Project Nos. 2025-012-114-AI and 2025-013-SIP-NR) to implement House Bill (HB) 3297, 88th Texas Legislature, 2023, Regular

Session, which eliminates the mandatory annual vehicle safety inspection program for noncommercial vehicles, and Senate Bill (SB) 2102, 88th Texas Legislature, 2023, Regular Session, which extends the initial registration and inspection period for rental vehicles from two years to three years. The proposed HB 3297 and SB 2102 Implementation I/M SIP Revision (Non-Rule Project No. 2025-013-SIP-NR) also contains required performance standard modeling and analysis demonstrating how the Bexar County I/M program would meet the Enhanced Performance Standard that reflects the I/M program design elements specified in 40 CFR §51.351(i).

4.4.2 New NO_X Control Measures

A concurrent proposed 30 TAC Chapter 117 NO_X rulemaking (Rule Project No. 2025-007-117-AI) satisfies major source NO_X RACT requirements for the Bexar County serious ozone nonattainment area for the 2015 eight-hour ozone NAAQS. While RACT is currently in place through the existing Chapter 117 NO_X rules at the moderate major source threshold of 100 tons per year (tpy), rulemaking was necessary to ensure RACT is in place for all sources that became major sources under the more stringent serious major source threshold of 50 tpy. The concurrent proposed NO_X rulemaking revises Chapter 117 to apply at a major source that emits or has the potential to emit 50 or more tpy of NO_X in the Bexar County 2015 ozone NAAQS nonattainment area. The compliance date for these proposed rules, if adopted, is March 1, 2026. All unit types present at major sources using information reported to the 2022 point source EI and as identified through air permits will be subject to RACT through existing Chapter 117 rules or new rules, as applicable, included in the concurrent proposed rulemaking (Rule Project No. 2025-007-117-AI), if adopted. Details of the RACT analysis are provided in Appendix C: *Reasonably Available Control Technology Analysis*.

4.4.3 New VOC Control Measures

A concurrent proposed 30 TAC Chapter 115 VOC rulemaking (Rule Project No. 2025-006-115-AI) satisfies major source VOC RACT requirements for the Bexar County serious ozone nonattainment area for the 2015 eight-hour ozone NAAQS. While RACT is currently in place through the existing Chapter 115 VOC rules at the moderate major source threshold of 100 tpy, rulemaking was necessary to ensure RACT is in place for all sources that became major sources under the more stringent serious major source threshold of 50 tpy. The concurrent proposed VOC rulemaking revises Chapter 115 to apply at a major source that emits or has the potential to emit 50 or more tpy of VOC in the Bexar County 2015 ozone NAAQS nonattainment area. The compliance date for these proposed rules, if adopted, is March 1, 2026. All unit types present at major sources using information reported to the 2022 point source EI, and as identified through air permits as applicable, will be subject to RACT through existing Chapter 115 rules or new rules included in the concurrent proposed rulemaking (Rule Project No. 2025-006-115-AI), if adopted. Details of the RACT analysis are provided in Appendix C: *Reasonably Available Control Technology Analysis*.

4.5 RACT ANALYSIS

4.5.1 General Discussion

Ozone nonattainment areas classified as moderate and above are required to meet the mandates of the FCAA under §172(c)(1) and §182(b)(2) and (f) to address RACT. According to 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) published on December 6, 2018, states containing areas classified as moderate ozone nonattainment or higher must submit a SIP revision to fulfill RACT requirements for all source categories addressed by CTG or ACT as well as any non-CTG and non-ACT category sources that are classified as major stationary sources of NO_X or VOC (83 FR 62998). Specifically, this SIP revision incorporates RACT regulations, provides certifications where appropriate that existing provisions are RACT, or provides negative declarations affirming that there are no sources within the nonattainment area that are subject to a specific CTG or ACT source category.

RACT is defined as the lowest emissions limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility (44 FR 53762, September 17, 1979). RACT requirements for moderate and higher classification ozone nonattainment areas are included in the FCAA to ensure that significant source categories at major sources of ozone precursor emissions are controlled to a reasonable extent but not necessarily to the best available control technology (BACT) levels expected of new sources or to maximum achievable control technology (MACT) levels required for major sources of hazardous air pollutants.

While RACT and RACM have similar consideration factors like technological and economic feasibility, there is a significant distinction between RACT and RACM. A control measure must advance attainment of the area towards meeting the NAAQS for that measure to be considered RACM. Advancing attainment of the area is not a factor of consideration when evaluating RACT because the benefit of implementing RACT is presumed under the FCAA.

TCEQ reviewed the emission sources in Bexar County and the applicable TCEQ rules to verify that all CTG or ACT emission source categories and non-CTG or non-ACT major emission sources in Bexar County were subject to requirements that meet or exceed RACT requirements associated with a serious classification, or that further emission controls on the sources were either not economically feasible or not technologically feasible. The major source threshold for serious ozone nonattainment areas is a potential to emit (PTE) 50 tpy or more of either NO_X or VOC. To identify major source RACT categories, the 2022 emissions inventories (EI) were screened for all sources within the Bexar County area that demonstrate either a PTE or actual emissions of 25 tpy or more. Emission sources subject to the more stringent BACT or MACT requirements were determined to also fulfill RACT requirements. Additional details are provided in Appendix C: *Reasonably Available Control Technology Analysis* of this SIP revision.

4.5.2 NO_X RACT Determination

TCEQ reviewed the 2022 point source EI and Title V permits to identify all major sources of NO_X emissions in the Bexar County serious ozone nonattainment area. Since the point source EI database reports actual emissions rather than PTE, TCEQ also included in this RACT analysis sources that reported actual emissions as low as 25 tpy of NO_X to account for the possible difference between actual and potential emissions. TCEQ also reviewed air permits to further confirm which sources with actual emissions less than 50 tpy of NO_X in the 2022 point source EI were NO_X major sources due to authorized emissions of 50 or more tpy. Sources from the 2022 point source EI database with emissions of 25 tpy or more but less than 50 tpy that could not be

verified as minor sources by other means were included in the RACT analysis for this proposed SIP revision.

The NO_X controls and reductions implemented through the concurrent proposed 30 TAC Chapter 117 rulemaking (Rule Project No. 2025-007-117-AI) will fulfill RACT requirements for all ACT NO_X emission source categories and all NO_X major emission sources that exist in the Bexar County 2015 ozone NAAQS nonattainment area under a serious classification. Additional NO_X controls on certain major sources were determined to be either not economically feasible or not technologically feasible. Details of this analysis are included in Appendix C, specifically Table A-1: *State Rules Addressing NO_X RACT Requirements in ACT Reference Documents* and Table A-4: *State Rules Addressing NO_X RACT Requirements for Major Emission Sources in Bexar County.*

4.5.3 VOC RACT Determination

All VOC emission source categories in Bexar County subject to an EPA CTG or ACT document will be controlled by existing rules in Chapter 115 and new rules included in the concurrent proposed rulemaking to revise Chapter 115 (Rule Project No. 2025-006-115-AI). Additional information is available in Appendix C, specifically Table A-2*: State Rules Addressing VOC RACT Requirements in CTG Reference Documents* and Table A-3: *State Rules Addressing VOC RACT Requirements in ACT Reference Documents.*

Based on a review of the 2022 point source EI data, the commission is submitting negative declarations for the following CTG source categories for the Bexar County 2015 ozone NAAQS nonattainment area under a serious classification:

- Fiberglass Boat Manufacturing Materials;
- Manufacture of Pneumatic Tubber Tires;
- Shipbuilding and Ship Repair Surface Coating Operations;
- Surface Coating for Insulation of Magnet Wire; and
- Flat Wood Paneling Coatings, Group II issued in 2006.

TCEQ reviewed the 2022 point source EI and Title V permits to identify all major sources of VOC emissions in the Bexar County serious ozone nonattainment area. Since the point source EI database reports actual emissions rather than PTE, TCEQ also included in this RACT analysis sources that reported actual emissions as low as 25 tpy of VOC to account for the possible difference between actual and potential emissions. TCEQ also reviewed air permits to further confirm which sources with actual emissions less than 50 tpy of VOC in the 2022 point source EI were VOC major sources due to authorized emissions of 50 or more tpy. Sources from the 2022 point source EI database with actual emissions of 25 tpy or more but less than 50 tpy that could not be verified as minor sources by other means were included in the RACT analysis for this proposed SIP revision.

For all non-CTG and non-ACT major VOC emission sources for which VOC controls are technologically and economically feasible, RACT associated with a serious classification will be fulfilled by the revisions to rules in Chapter 115 (Rule Project No. 2025-006-115-AI). Additional VOC controls on certain major sources were determined to be either not economically feasible or not technologically feasible. Additional information is available in Appendix C, specifically Table A-5: *State Rules Addressing VOC RACT Requirements for Major Emission Sources in the Bexar County Area.*

VOC RACT requirements for the Bexar County serious nonattainment area have been updated to reflect the area's reclassification from moderate to serious nonattainment. These requirements will be applicable to sources that emit 50 tpy or more of VOCs and apply to offset lithographic printing operations, bakery ovens, and condensate storage tanks. While the proposed RACT requirements are intended to fulfill SIP obligations, they are not expected to yield further reductions in VOC emissions. This is primarily because RACT measures for moderate nonattainment were very recently implemented in the Bexar County area (Rule Project No. 2023-116-115-AI; adopted April 24, 2024), and they already addressed all relevant known emission sources. No condensate storage, offset lithographic, or bakery sites with emissions between 50 and 100 tpy were identified in the 2022 point source EI. Because a majority of VOC emissions in the Bexar County area originate from non-point area sources from sectors associated with solvent utilization, such as smaller surface coating operations, RACT control strategies for major sources may have reduced impact and limited effectiveness in this situation. The proposed VOC RACT compliance date for the Bexar County area is March 1, 2026, the start of the ozone season in Bexar County for the attainment year.

The VOC controls and reductions implemented through the concurrent proposed 30 TAC Chapter 115 rulemaking (Rule Project No. 2025-006-115-AI) will fulfill RACT requirements for all VOC emission source categories covered by an EPA-issued CTG and ACT document and all VOC major emission sources that exist in the Bexar County 2015 ozone NAAQS nonattainment area under a serious classification.

4.6 RACM ANALYSIS

4.6.1 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*, EPA explained that it interprets FCAA, §172(c)(1) as a requirement that states incorporate into their SIPs all RACM that would advance a region's attainment date; however, states are obligated to adopt only those measures that are reasonably available for implementation in light of local circumstances (57 FR 13498).

When performing RACM analyses, TCEQ uses the general criteria specified by EPA in the proposed approval of the New Jersey RACM analysis published in the January 16, 2009, issue of the *Federal Register* (74 FR 2945) and finalized by EPA in the May 15, 2009, issue of the *Federal Register* (74 FR 22837).

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

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

EPA did not provide guidance on how to interpret the criteria "advance the attainment date by at least one year." Considering the September 24, 2027, attainment date for this proposed AD SIP revision, TCEQ evaluated this aspect of RACM based on advancing the attainment date by one year, to September 24, 2026.

4.6.2 Results of the RACM Analysis

TCEQ determined that no potential control measures met the criteria to be considered RACM. As discussed in Chapter 3: *Photochemical Modeling* of this SIP revision, the current modeling results indicate that the Bexar County area will demonstrate attainment by its September 24, 2027, attainment date.

TCEQ conducted an analysis to determine if attainment of the 2015 ozone NAAQS could be achieved a year earlier, by September 24, 2026. This assessment used the modeled 2026 future design value (DVF) of 70 parts per billion (ppb) and the preliminary 2024 monitored design value (2024 DV) of 75 ppb, as of January 14, 2025. Assuming linear changes in design value, the annual reduction needed to reach the 2026 modeled DVF (70 ppb) from the 2024 DV (75 ppb) was calculated to be 2.50 ppb per year. Based on this rate (2.5 ppb/yr), the estimated potential 2025 design value would be 72.50 ppb, requiring an additional reduction of 1.56 ppb to attain the standard a year earlier.

Because the Bexar County area is NO_X limited, earlier attainment would require reduction in NO_X emissions. The analysis considered emissions reductions assuming a linear relationship between NO_X emissions and design values. The annual emissions reduction needed to reach the modeled DVF of 70 ppb from the 2019 base year design value (DVB) was calculated to be 1.53 tons per day (tpd) of NO_X emissions. To achieve the additional 1.56 ppb reduction needed for early attainment, an estimated 0.95 tpd of NO_X emissions reductions would be required.

The analysis concluded that for early attainment by September 24, 2026 (with 2025 as the attainment year), control measure(s) providing a reduction of 0.95 tpd would need to be implemented prior to March 1, 2025, the start of the ozone season in the attainment year, to be considered Reasonably Available Control Measures (RACM). However, the analysis concluded that no control strategies could provide at least 0.95 tpd of NO_X reductions and be implemented by the March 1, 2025, deadline. Consequently, advancing attainment by one year is not feasible.

4.7 MOTOR VEHICLE EMISSIONS BUDGETS

The motor vehicle emissions budget (MVEB) refers to the maximum allowable emissions from on-road mobile sources for each 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. Areas must demonstrate that the estimated emissions from transportation plans, programs, and projects do not exceed applicable MVEBs. An MVEB represents the summer weekday on-road mobile source emissions that have been modeled for the attainment demonstration and include all of the on-road control measures reflected in Chapter 4: *Control Strategies and Required Elements* of the SIP revision. The on-road NO_X and VOC emissions inventories (EI) establishing these MVEBs were developed with the version 4 of the Motor Vehicle Emission Simulator (MOVES4) model. The resulting MVEBs are shown in Table 4-2:

2026 Attainment Demonstration MVEBs for the Bexar County 2015 Ozone NAAQS Nonattainment Area.

Table 4-2: 2026 Attainment Demonstration MVEBs for the Bexar County 2015 Ozone NAAQS Nonattainment Area (tons per day)

Description	NO_x (tpd)	VOC (tpd)
2026 On-Road MVEBs based on MOVES4	21.46	10.80

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

4.8 MONITORING NETWORK

The ambient air quality monitoring network provides data to verify the attainment status of the 2015 eight-hour ozone NAAQS. The TCEQ monitoring network in the San Antonio-New Braunfels metropolitan statistical area (MSA) consists of three regulatory ambient air ozone monitors located in Bexar County. TCEQ operates ozone monitors at the following air monitoring sites:

- Calaveras Lake (480290059);
- Camp Bullis (480290052); and
- San Antonio Northwest (480290032).

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

4.9 CONTINGENCY PLAN

AD SIP revisions for nonattainment areas are required by FCAA, §172(c)(9) to provide for specific contingency measures that take effect and result in emissions reductions if an area fails to attain a NAAQS by the applicable attainment date. EPA has interpreted recent court decisions to have invalidated key aspects of EPA's historical approach to implementing the contingency measure requirement. EPA's December 3, 2024, *Guidance on the Preparation of State Implementation Plan Provisions that Address the Nonattainment Area Contingency Measure Requirements for Ozone and Particulate Matter*, indicates that contingency measures must be conditional and prospective (not previously implemented) based on the recent court rulings.[21] The guidance also

[21] https://www.epa.gov/air-quality-implementation-plans/final-contingency-measures-guidance

establishes an entirely new scheme for determining the amount of emissions reductions necessary to address the contingency requirement.

This SIP revision relies on the historically approved approach of using surplus emissions reductions from previously implemented measures to fulfill the contingency measure requirements outlined in FCAA, §172(c)(9), consistent with past practices. Under the historical approach, 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 calculates the required 3% contingency reductions from the 2017 RFP base year inventory from the concurrent Bexar County Serious Area RFP SIP Revision for the 2015 Eight-Hour Ozone NAAQS (Non-Rule Project No. 2024-040-SIP-NR). The 3% contingency analysis for 2027 is based on a 0.40% reduction in NO_X and a 2.60% reduction in VOC, to be achieved during the one-year period from January 1, 2027, through December 31, 2027. Analyses were performed to assess emissions reductions for the 2027 contingency year from the federal emissions certification programs and for fuel control programs for both on-road and non-road vehicles. Additional analysis was performed to calculate on-road mobile source emissions reductions from the vehicle inspection and maintenance program being implemented in Bexar County in November 2026.

A summary of the 2027 contingency analysis is provided in Table 4-3: *2027 Bexar County 2015 Ozone NAAQS Nonattainment Area Attainment Contingency Plan (tons per day)*. The analysis demonstrates that the 2027 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 concurrent Bexar County Serious Area RFP SIP Revision for the 2015 Eight-Hour Ozone NAAQS (Non-Rule Project No. 2024-040-SIP-NR).

Table 4-3: 2027 Bexar County 2015 Ozone NAAQS Nonattainment Area Attainment Contingency Plan (tons per day)

Contingency Plan Description	NO_x	VOC
Bexar County 2017 RFP base year (BY) EI	88.08	115.82
Percent for contingency calculation (total of 3%)	0.40	2.60
2026 to 2027 AD required contingency reductions (RFP BY EI x [contingency percent])	0.35	3.01
Control reductions to meet contingency requirements		
2026 to 2027 emissions reductions due to federal Motor Vehicle Control Program (FMVCP), East Texas Regional Low RVP, 2017 Low Sulfur Gasoline Standard, ultra-low sulfur diesel, I/M and on-road Texas Low Emission Diesel (TxLED)	3.98	3.60
2026 to 2027 emissions reductions due to federal non-road mobile new vehicle certification standards and non-road TxLED	0.35	1.08
Total AD contingency reductions	4.33	4.68

Contingency Plan Description	NO_x	VOC
Contingency Excess (+) or Shortfall (-)	3.98	1.67

4.10 ADDITIONAL FCAA REQUIREMENTS

FCAA, §182 establishes a graduated control program for ozone nonattainment areas. According to EPA's final 2015 eight-hour ozone standard SIP requirements rule, states must submit a SIP element to meet each FCAA, §182 nonattainment area planning requirement for the 2015 eight-hour ozone NAAQS (83 FR 62998). Where an air agency determines that an existing regulation is adequate to meet the applicable nonattainment area planning requirements of FCAA, §182 for a revised ozone NAAQS, that air agency's SIP revision may provide a written statement certifying that determination in lieu of submitting new revised regulations. This section certifies that Texas meets all additional FCAA nonattainment area requirements applicable to the Bexar County 2015 ozone NAAQS nonattainment area for the serious classification, including enhanced vehicle I/M program requirements, enhanced monitoring network requirements, vehicle miles traveled (VMT) demonstration requirements, nonattainment new source review (NSR) program requirements, and the clean fuel fleet program requirement.

4.10.1 Enhanced I/M

The FCAA and 40 CFR Part 51, as amended, require a basic vehicle emissions I/M program in ozone nonattainment areas classified as moderate and an enhanced vehicle emissions I/M program in ozone nonattainment areas classified as serious and higher. Rulemaking was required to implement I/M and set the testing fee applicable in Bexar County, and a SIP revision was required to incorporate a Bexar County I/M program into the SIP. On November 29, 2023, the commission adopted a 30 TAC Chapter 114 rulemaking and associated SIP revision (Project Nos. 2022-026-114-AI and 2022-027-SIP-NR) implementing a new low-enhanced I/M program in Bexar County to begin on November 1, 2026. These projects satisfy the basic I/M requirements for Bexar County under the moderate classification as well as the enhanced I/M requirements for Bexar County under the current serious classification. The SIP and rule revisions were submitted to EPA on December 18, 2023. On March 13, 2025, EPA approved the SIP and rule revisions implementing I/M in Bexar County (90 FR 15119).

Rulemaking and a SIP revision are required to revise the Texas I/M program, including the I/M program for Bexar County, to implement House Bill (HB) 3297, which eliminates the mandatory annual vehicle safety inspection program for noncommercial vehicles, and Senate Bill (SB) 2102, which extends the initial registration and inspection period for rental vehicles from two years to three years. The proposed HB 3297 and SB 2102 Implementation I/M SIP Revision (Non-Rule Project No. 2025-013-SIP-NR), contains the performance standard modeling and analysis demonstrating how the Bexar County I/M program would meet the Enhanced Performance Standard that reflects the I/M program design elements specified in 40 CFR §51.351(i).

4.10.2 Enhanced Monitoring Network

Section 182(c)(1) of the FCAA requires that states with nonattainment areas classified serious or higher adopt and implement a program to improve air monitoring for

ambient concentrations of ozone, NO_x, and VOC. Details on the ozone monitoring network in the Bexar County ozone nonattainment area are provided in Section 4.8: *Monitoring Network*. Further details of ozone, NO_x, and VOC monitoring in the Bexar County area are provided in the *Texas 2025 Air Monitoring Network Plan* which will be published on the TCEQ's Air Monitoring Network Plans webpage (https://www.tceq.texas.gov/airquality/monops/past_network_reviews) on July 1, 2025.

TCEQ commits to maintaining an air monitoring network to meet EPA regulatory requirements for the Bexar County nonattainment area. TCEQ continues to work with EPA through the air monitoring network review process, as required by 40 CFR Part 58, to determine: the adequacy of the ozone monitoring network; additional monitoring needs; and recommended monitor decommissions. Per 40 CFR Part 58, TCEQ will develop and implement an Enhanced Monitoring Plan for the Bexar County ozone nonattainment area. The Enhanced Monitoring Plan will detail enhanced ozone and ozone precursor monitoring activities and will be included as part of the *Texas 2026 Annual Monitoring Network Plan*.

4.10.3 Vehicle Miles Traveled (VMT) Demonstration

FCAA, §182(c)(5) requires a VMT demonstration for areas designated as serious ozone nonattainment. The required VMT demonstration for the Bexar County 2015 serious ozone NAAQS nonattainment area is provided in the concurrently proposed Bexar County Serious Area RFP SIP Revision for the 2015 Eight-Hour Ozone NAAQS (Project No. 2024-040-SIP-NR).

4.10.4 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 serious ozone nonattainment areas are those sources emitting at least 50 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 serious ozone nonattainment areas is 1.2:1.

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

Ozone Nonattainment Areas), the nonattainment NSR SIP requirements are met for Texas for the Bexar County 2015 eight-hour ozone NAAQS nonattainment area under the serious classification.

4.10.5 Clean Fuel Fleet Program

The clean fuel fleet program is required by FCAA, §182(c)(4) for serious areas and above. FCAA, §182(c)(4)(B) allows states to opt out with an adequate substitute program. Texas has a currently approved substitute program in 30 TAC Chapter 114, Subchapter K, Division 5. On January 31, 2014, EPA published direct final approval of revisions to the Texas motor vehicle rules in 30 TAC Chapter 114 that established the substitute program and affirmed that Texas' substitute program continues to meet clean fuel fleet program requirements (79 FR 5287).

4.11 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 proposed AD SIP revision revises the SIP emissions year used for emission credit generation. If adopted and submitted to EPA, the new SIP emissions year for Bexar County will be 2019 for point source electric generating units with emissions recorded in EPA's Air Markets Program Database, 2019 for all other point sources with emissions recorded in TCEQ's State of Texas Air Reporting System (STARS) emissions database, 2019 for oil and gas area sources, 2020 for all other area sources, and 2019 for all mobile sources.

On April 9, 2021, TCEQ sent notice to point sources through agency e-mail 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 SIP revision development; as discussed in Chapter 2: *Anthropogenic Emissions Inventory Description*, those revisions were incorporated into this SIP revision.

4.12 I/M PROGRAM PERFORMANCE STANDARD MODELING

Rulemaking and a SIP revision are required to revise the Texas I/M program, including the I/M program for Bexar County, to implement House Bill (HB) 3297, which eliminates the mandatory annual vehicle safety inspection program for noncommercial vehicles, and Senate Bill (SB) 2102, which extends the initial registration and inspection period for rental vehicles from two years to three years. The proposed HB 3297 and SB 2102 Implementation I/M SIP Revision (Non-Rule Project No. 2025-013-SIP-NR), contains the performance standard modeling and analysis demonstrating how the Bexar County I/M program would meet the Enhanced Performance Standard that reflects the I/M program design elements specified in 40 CFR §51.351(i).

CHAPTER 5: WEIGHT OF EVIDENCE

5.1 INTRODUCTION

The corroborative analyses presented in this chapter demonstrate the progress that the Bexar County 2015 ozone National Ambient Air Quality Standard (NAAQS) (Bexar County 2015 ozone NAAQS) nonattainment area is making towards attainment of the 70 parts per billion (ppb) standard. This chapter describes analyses that, in conjunction with the modeling results presented in Chapter 3: *Photochemical Modeling*, indicate that the Bexar County 2015 ozone NAAQS nonattainment area is expected to reach attainment by September 24, 2027. The U.S. Environmental Protection Agency's (EPA) *Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze* (EPA 2018; referred to as the EPA modeling guidance) states that all modeled attainment demonstrations (AD) should include supplemental evidence that the conclusions derived from the basic attainment modeling are supported by other independent sources of information. This chapter details the supplemental evidence, i.e., the corroborative analyses, for this proposed Bexar County AD state implementation plan (SIP) revision.

This chapter describes analyses that corroborate the conclusions in Chapter 3: *Photochemical Modeling*. Topics covered in this analysis include ambient and emissions trends, background ozone trends, ozone chemistry, and meteorological influences on ozone. Analyses of ambient measurements corroborate the modeling analyses and independently support the AD. More detail on ozone and emissions in the Bexar County 2015 ozone NAAQS nonattainment area is provided in Appendix B: *Conceptual Model for the Bexar County Nonattainment Area for the 2015 Eight-Hour Ozone National Ambient Air Quality Standard*. Finally, this chapter describes air quality control measures that are not quantified but are nonetheless expected to yield tangible air quality benefits even though they were not included in the AD SIP modeling discussed in Chapter 3.

5.2 ANALYSIS OF AMBIENT TRENDS AND EMISSIONS TRENDS

EPA 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 and its precursors emissions (past and projected) are consistent with progress toward attainment.

The Bexar County 2015 ozone NAAQS nonattainment area's monitoring network currently has three regulatory and five non-regulatory ozone monitors, four nitrogen oxides (NO_X) monitors, one automated gas chromatograph (auto-GC) for volatile organic compounds (VOC), and one canister sampler for VOC. There are additional monitors inside the San Antonio area (San Antonio Area includes Bexar, Comal, Guadalupe, Karnes, Kendall, Wilson and Atascosa Counties) but outside of the Bexar County ozone nonattainment area that contribute to a more extensive network.

Details about the monitors in the Bexar County 2015 ozone NAAQS nonattainment area that measure regulatory ozone, NO_X, or VOC are listed below in Table 5-1: *Monitor Information for the Bexar County 2015 Ozone NAAQS Nonattainment Area*. Monitors that measure ozone are marked with an asterisk. 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.[22] Ozone data used in this chapter are only from regulatory monitors that report to EPA's Air Quality System (AQS). All other pollutant data are from Texas Air Monitoring Information System (TAMIS), unless otherwise noted.

Table 5-1: Monitor Information for the Bexar County 2015 Ozone NAAQS Nonattainment Area

Site Name	AQS Number	CAMS Number	Compounds or Parameters Measured
San Antonio Northwest*	480290032	0023	Ozone, NO_x
Camp Bullis*	480290052	0058	Ozone, VOC, NO_x
Calaveras Lake*	480290059	0059	Ozone, NO_x
Old Hwy 90	480290677	0677	VOC
San Antonio Interstate 35	480291069	1069	NO_x

This section examines emissions and ambient trends from the regulatory ozone and ozone-precursor monitoring network in the Bexar County 2015 ozone NAAQS nonattainment area. Appendix B provides additional graphics and analyses that detail ozone formation in the region, primarily from 2014 through 2023. Results from these analyses show that ozone has declined over the past decade, despite a continuous increase in the population of the 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 discusses trends in design values, the fourth-highest eight-hour concentrations, and background ozone. Ozone data used in this section are only from regulatory monitors that report to the EPA's AQS unless otherwise noted.

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 fourth-highest maximum daily average eight-hour (MDA8) ozone values at each regulatory monitor over three years. The eight-hour ozone design value for a nonattainment area

[22] https://www.tceq.texas.gov/airquality/monops/sites/air-mon-sites

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.

Design values have decreased in the Bexar County 2015 ozone NAAQS nonattainment area since 2014, as shown in Figure 5-1: *Eight-Hour Ozone Design Values in Bexar County 2015 Ozone NAAQS Nonattainment Area*. The 2024 eight-hour ozone design value for the nonattainment area was 75 ppb, which represents a 6% decrease from the 2014 design value of 80 ppb.

The largest decrease in design value occurred from 2014 through 2016, when it dropped by 7 ppb. After 2016, the design value has remained consistently between 72 ppb and 76 ppb. These fluctuations may be due to changes in meteorology and/or background ozone; both will be examined in later sections.

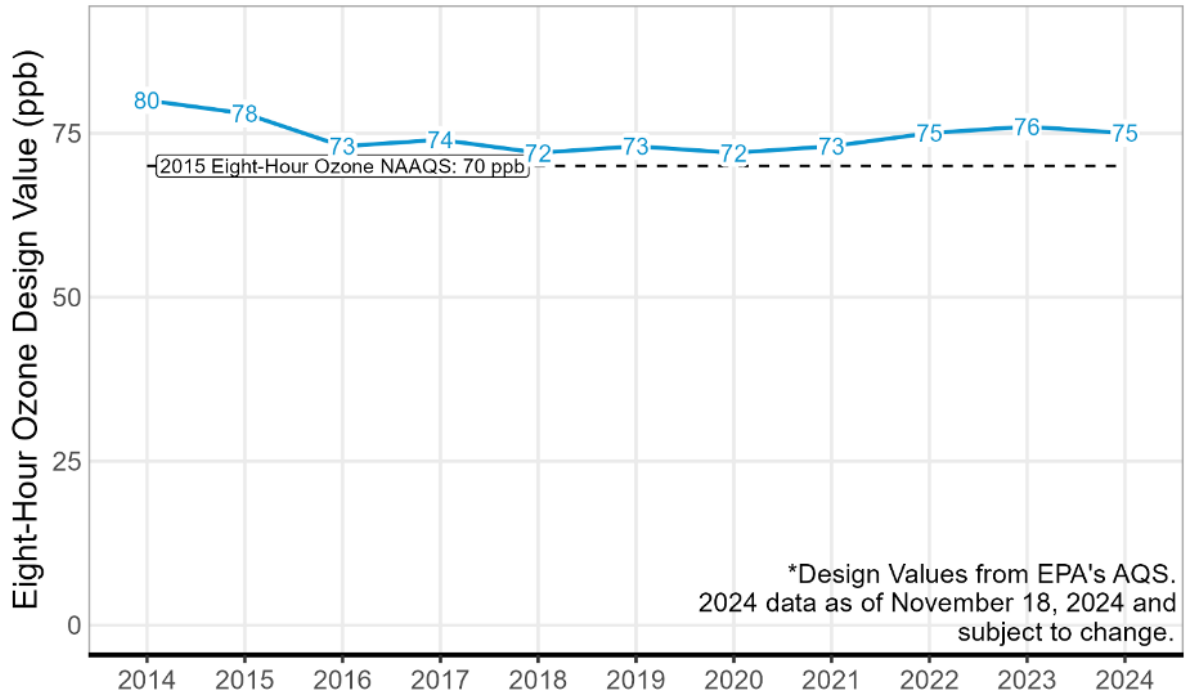

Figure 5-1: Eight-Hour Ozone Design Values in Bexar County 2015 Ozone NAAQS Nonattainment Area

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 Bexar County 2015 Ozone NAAQS Nonattainment Area* displays the 2014 through 2024 design values at the three regulatory ozone monitors and demonstrates that the design values have slightly decreased for Camp Bullis and San Antonio Northwest, while slightly increasing at Calaveras Lake.

Figure 5-2 also shows how the monitor with the highest eight-hour ozone design value in the Bexar County 2015 ozone NAAQS nonattainment area has changed over time. In 2014 and 2015, Camp Bullis measured a design value multiple ppb higher than San Antonio Northwest. However, after 2016, there has been much less variation between

the two monitors' design values, including years such as 2024 when San Antonio Northwest was the design value setting monitor.

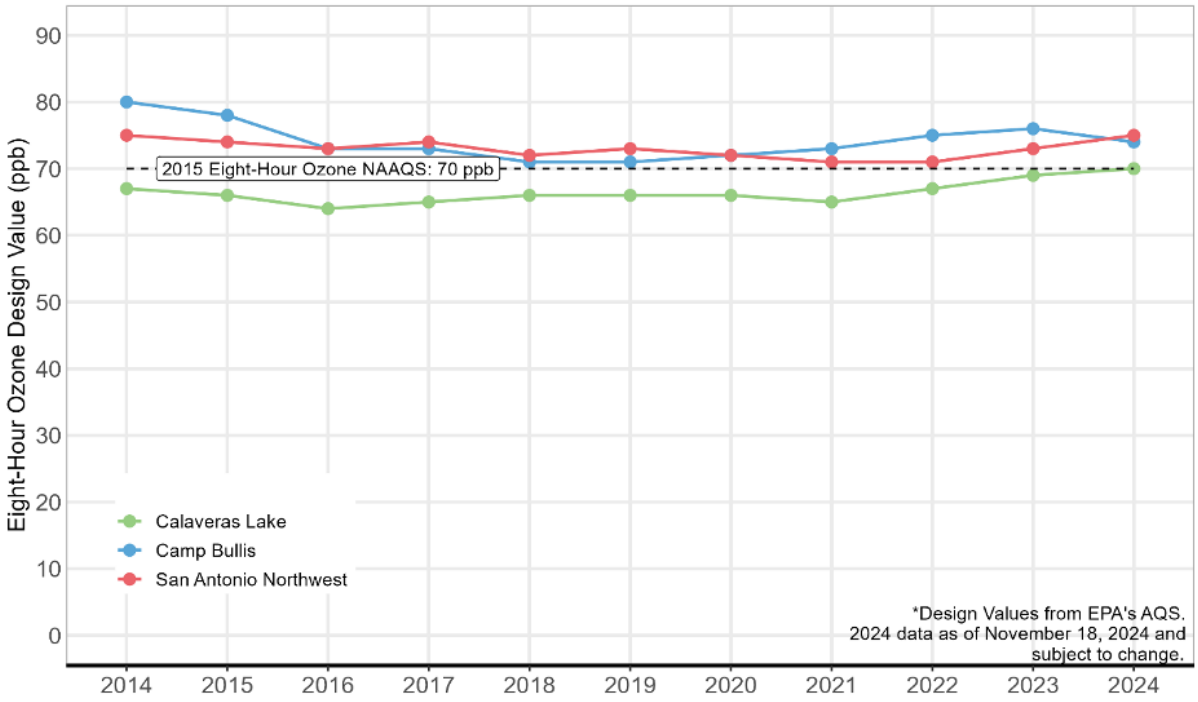

Figure 5-2: Eight-Hour Ozone Design Values by Monitor in Bexar County 2015 Ozone NAAQS Nonattainment Area

5.2.1.2 Fourth-Highest Eight-Hour Ozone Trends

Because eight-hour ozone design values are three-year averages, trends tend to be smoother, making year-to-year variations in ozone concentrations due to factors such as meteorology less apparent. Trends in yearly fourth-highest MDA8 ozone concentrations provide more insight into each individual year. Fourth-highest MDA8 ozone trends can also help determine what levels of ozone are required in order for the area to monitor attainment. Area-wide 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 in the Bexar County 2015 ozone NAAQS nonattainment area in Figure 5-3: *Fourth-Highest MDA8 Ozone Concentration by Monitor in Bexar County 2015 Ozone NAAQS Nonattainment Area*. The fourth-highest MDA8 ozone trends span from 2012 through 2024 in order to examine all years used in the design value trends.

Trends show that there is more variability in fourth-highest MDA8 ozone values compared to design values. Fourth-highest MDA8 ozone values trended downward from 2012 through 2016, then stagnated from 2016 through 2019, and have slightly increased from 2019 through 2024. Calaveras Lake is consistently lower than the other two monitors. From 2014 through 2018 and 2022 through 2024, Camp Bullis and San Antonio Northwest had fourth-highest values within a few ppb of each other. However, from 2019 through 2021, their fourth-highest values diverge.

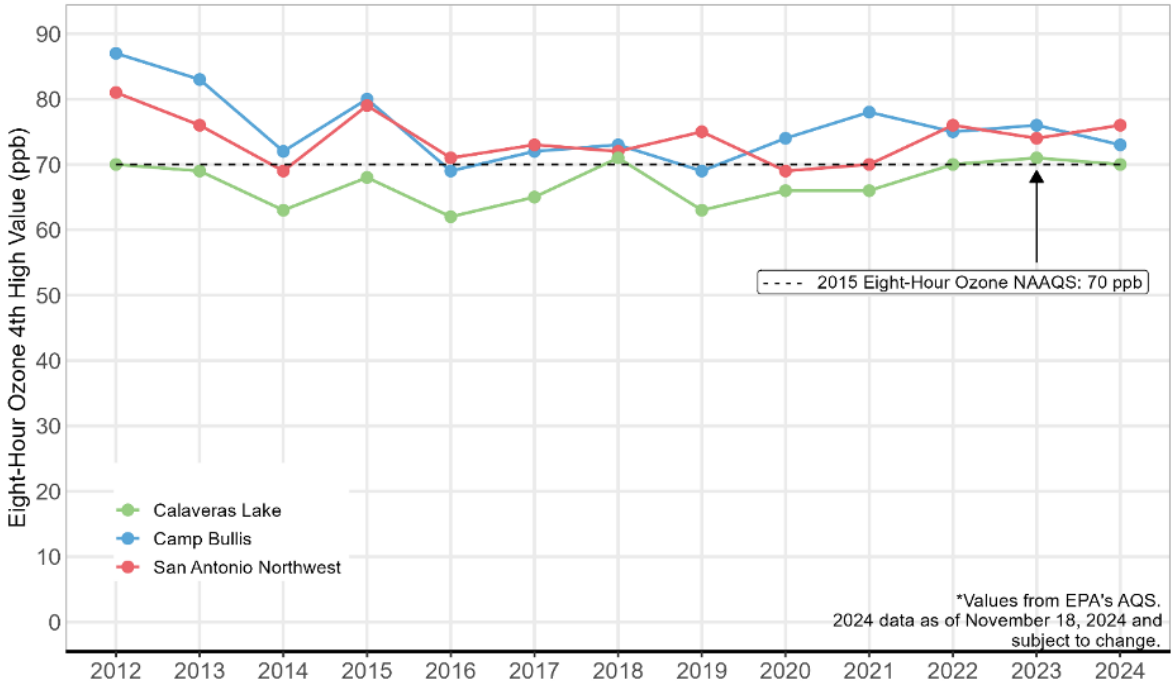

Figure 5-3: Fourth-Highest MDA8 Ozone Concentration by Monitor in Bexar County 2015 Ozone NAAQS Nonattainment Area

5.2.1.3 Background Ozone Trends

Regional background ozone (background ozone) reflects ozone produced from all sources outside of the Bexar County 2015 ozone NAAQS nonattainment area. Determining background ozone concentrations for the Bexar County 2015 ozone NAAQS nonattainment area provides insight into how much ozone the area produces from local emissions and how much ozone is transported from outside the local area. The local component of ozone formation is the amount that the area could potentially control to meet the 2015 eight-hour ozone NAAQS. 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. The technique uses the lowest MDA8 ozone value from selected sites located at the outskirts of the nonattainment area to determine background ozone concentrations. Selected sites, in San Antonio area, for background ozone calculation were Calaveras Lake, Elm Creek Elementary, Fair Oaks Ranch, Heritage Middle School, Government Canyon, Bulverde Elementary, City of Garden Ridge, New Braunfels Airport, and Seguin Outdoor Learning Center.

Daily locally produced ozone was calculated by subtracting the daily background ozone concentration from the highest MDA8 ozone value among all monitors in 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 are any days with a MDA8 ozone value greater than 70 ppb. Low ozone days are any days with a MDA8 ozone value less than or equal to 70 ppb.

San Antonio's ozone season runs from March through November; however, several of the non-regulatory monitors used for this analysis do not monitor in March and none of the high ozone days were observed in November. To avoid artificial skewing of the data due to in-operational monitors in March, this analysis focuses on the months of April through October. This does not affect the results significantly because there have not been any exceedance days in March or November from 2014 through 2023.

In ozone data analysis, the median is the best summary statistic to investigate the central tendency of the background ozone data. The median MDA8 ozone, background ozone, and locally produced ozone was calculated each year and results are displayed in Figure 5-4: *Trends in MDA8 Ozone, Background Ozone, and Locally Produced Ozone for High versus Low Ozone Days in April through October in San Antonio Area*. Because the median for each statistic was chosen, there may be years when the background ozone and locally produced ozone do not exactly add to the areawide MDA8 ozone. Overall, median background ozone is 27 to 33 ppb on low ozone days and increases to 49 to 60 ppb on high ozone days. Although background ozone is higher on high ozone days, local ozone production also increases at a proportional rate on these days. For high ozone days, background ozone contributes 69% to MDA8, meaning that locally produced ozone contributed roughly 31%. These contributions are nearly identical for high ozone days, 71% for background and 29% for locally produced ozone.

Background ozone declined on both low and high ozone days from 2014 to 2023, decreasing by 3% for low ozone days and 7% for high ozone days. Locally produced ozone increased on both low and high ozone days from 2014 through 2023, increasing 15% for low ozone days and 19% for high ozone days.

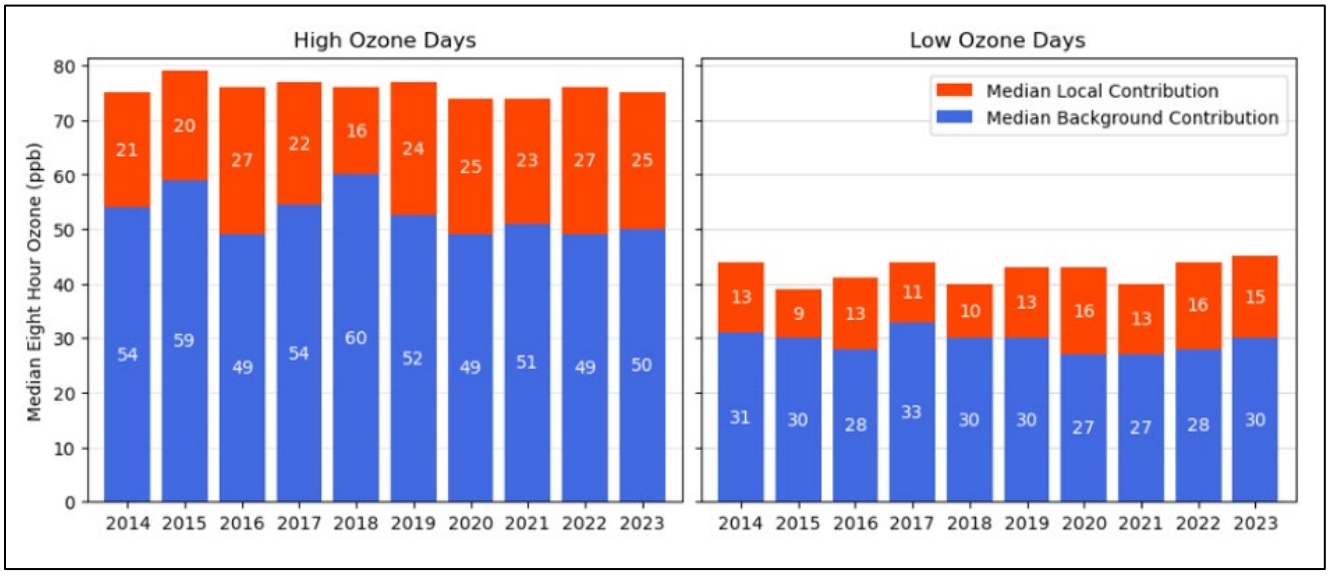

Figure 5-4: Trends in MDA8 Ozone, Background Ozone, and Locally Produced Ozone for High versus Low Ozone Days in April through October in San Antonio Area

5.2.2 NO_X Trends

NO_x, a precursor to ozone formation, is a mixture of nitric 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 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 the NO_x values that lead to ozone formation, this analysis uses only NO_x concentrations that occur during March through October.

The Bexar County 2015 ozone NAAQS nonattainment area currently has four NO_x monitors, including one near-road monitor. Two additional NO_x monitors (CPS Pecan Valley (CAMS 0678) and Heritage Middle School (CAMS 0622)) ceased operations prior to 2023. All six NO_x monitors in operation at some point from 2014 through 2023 were used to calculate area-wide NO_x trends.

All valid hours and years of NO_x data were used to calculate yearly median and 95th percentile NO_x trends. The 95th percentile shows trends at the highest NO_x levels while the median shows the central tendency of NO_x concentrations. Figure 5-5: *NO_x Trends in Bexar County 2015 Ozone NAAQS Nonattainment Area for days in March through October* shows that 95th percentile NO_x decreased from 2014 through 2023 while median NO_x showed little or no change.

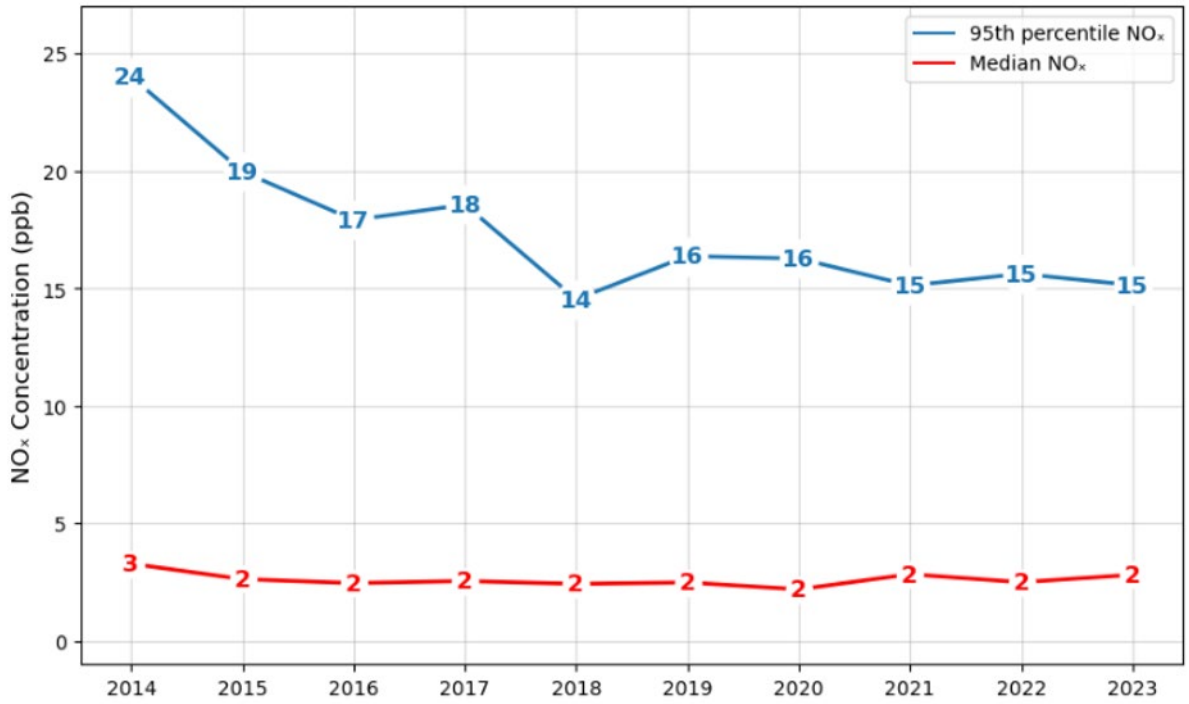

Figure 5-5: Ozone Season NO_x Trends in Bexar County 2015 Ozone NAAQS Nonattainment Area for days in March through October

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, NO_x trends were examined at the six NO_x monitors. Only NO_x data for days in the months of March through October and years with at least 75% completeness were used in this analysis.

Figure 5-6: *Median NO_x Concentrations by Monitor in Bexar County 2015 Ozone NAAQS Nonattainment Area for days in March through October* shows there is variability in median NO_x values by monitor. San Antonio Interstate 35 is a near-road NO_x monitor, which could account for the higher readings. Generally, the trend across the years is flat, though San Antonio Interstate 35 saw a decrease in 2018, followed by an increase from 2018 through 2020 that is back near the levels from before 2018. The Camp Bullis monitor, a design value setting monitor for 2022 and 2023, showed a decrease in median NO_x concentrations after 2019.

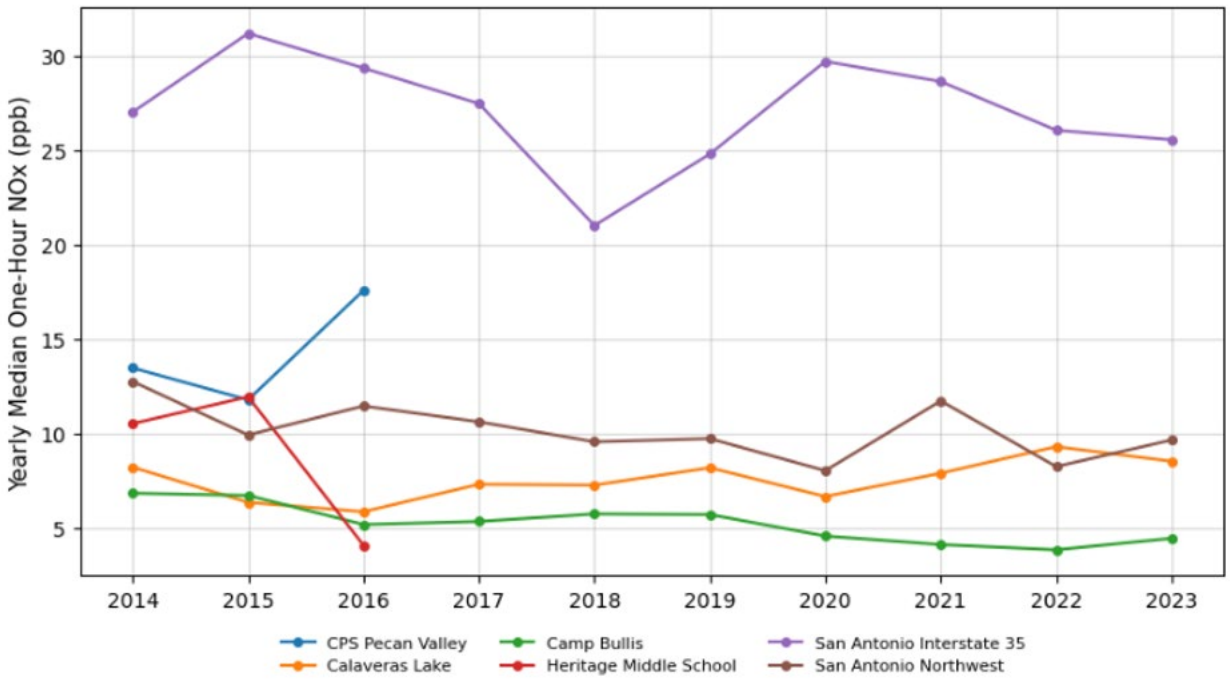

Figure 5-6: Median NO_x Concentrations by Monitor in Bexar County 2015 Ozone NAAQS Nonattainment Area for days in March through October

From the late 1990s to the present, federal, state, and local measures have resulted in significant NO_x reductions within the Bexar County 2015 ozone NAAQS nonattainment area. TCEQ funded a study by the Texas Transportation Institute (TTI) to estimate on-road emissions trends throughout Texas from 1999 through 2050 using the 2014a version of the Motor Vehicle Emission Simulator (MOVES2014a) model (TTI, 2015). On-road NO_x emissions in the San Antonio area decreased from the early 2000s through 2023 and beyond. These reductions are projected to continue as older, higher-emitting vehicles are removed from the fleet and are replaced with newer, lower-emitting ones. Details can be found in the previous Bexar County nonattainment area conceptual model (TCEQ, 2020)). The latest TTI study funded by TCEQ to estimate on-road emissions trends throughout Texas from 1999 through 2060 using the 2020 version of the Motor Vehicle Emission Simulator (MOVES3) model (TTI, 2023) also holds the same

trend as above for on-road NO_X and VOC emissions in the San Antonio area decreased from 1999 through 2023 and beyond.

A similar pattern is reflected in a TCEQ non-road emissions trends analysis using the Texas NONROAD (TexN) model. Non-road emissions decreased from 1999 through 2023 and beyond, even as the number of non-road engines (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. Details can be found in the previous Bexar County nonattainment area conceptual model (TCEQ, 2020).

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 reporting requirements under the TCEQ emissions inventory rule (30 Texas Administrative Code (TAC) §101.10). The emissions trends analysis uses data in tons per year from 2014 through 2022. Emissions from 2023 were not available in time to be included in this analysis.

Figure 5-7: *Bexar County 2015 Ozone NAAQS Nonattainment Area Point Source NO_X Emissions by* shows the top NO_X emitters in the area. All other point source emissions are displayed as the Sum of All Others. The top six reporting sites accounted for 97% of the total point source NO_X emissions in 2022. Each of these sites reported total NO_X emissions exceeding 100 tons in 2022, with the largest emitter, City Public Services Board (CPS) Calaveras Plant, reporting about 4,500 tons of NO_X in 2022. Overall, NO_X emissions decreased 18% from 2014 to 2022.

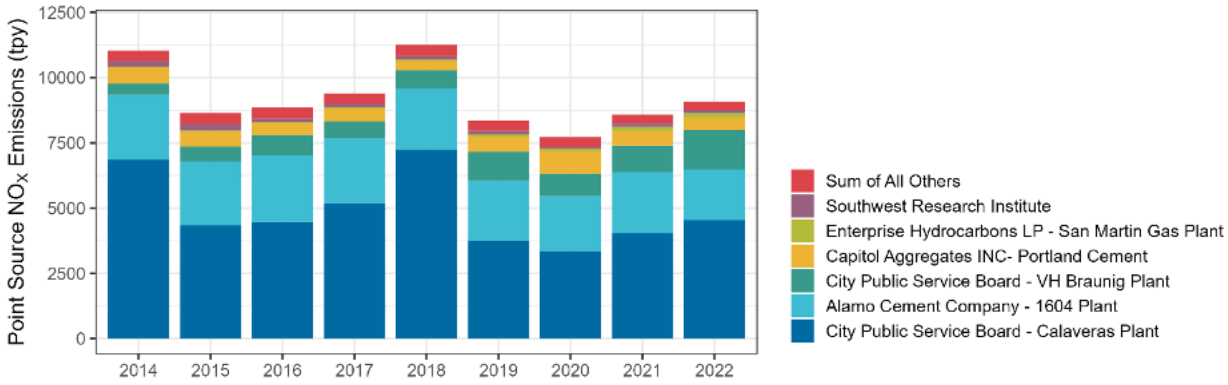

Figure 5-7: Bexar County 2015 Ozone NAAQS Nonattainment Area Point Source NO_X Emissions by Site

5.2.3 VOC Trends

Total non-methane hydrocarbons (TNMHC) are used to represent total VOC concentrations. VOC are emitted from numerous sources including large industrial processes, automobiles, solvents, paints, dry-cleaning, fuels, and even natural sources such as trees.

Two types of monitors record VOC concentrations in the Bexar County 2015 ozone NAAQS nonattainment area: auto-GC, which record hourly data; and canisters, which

record 24-hour data every few days. Due to the reactive nature of VOCs, hourly auto-GC measurements are preferred for assessing trends. The nonattainment area currently has one auto-GC monitor (Camp Bullis) and one canister monitor (Old Highway 90). Camp Bullis did not have complete data until 2017, so this analysis will use data from 2017 through 2023 for the months of March through October.

Figure 5-8: *Median and 95th Percentile TNMHC in Bexar County 2015 Ozone NAAQS Nonattainment Area for days in March through October* shows results from Camp Bullis. These two metrics moved in opposite directions from 2017 through 2023, with the 95th percentile TNMHC decreasing by 3% and median TNMHC increasing by 19%.

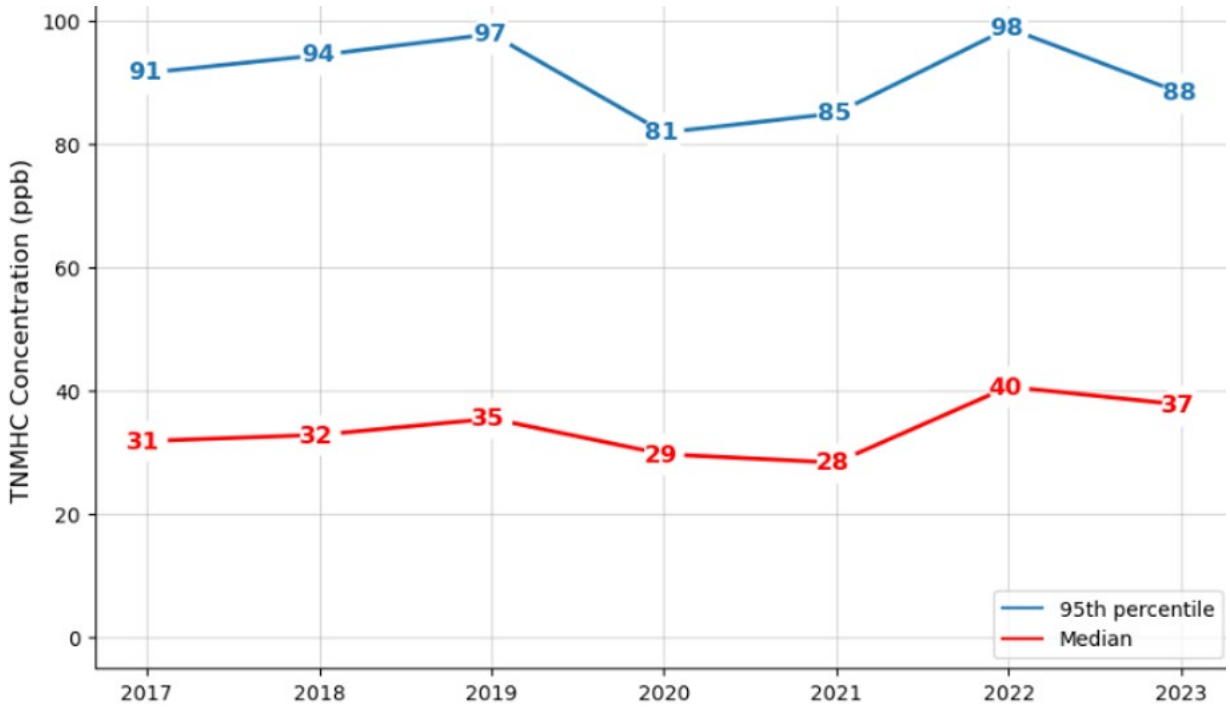

Figure 5-8: Median and 95th Percentile TNMHC in Bexar County 2015 Ozone NAAQS Nonattainment Area for days in March through October

Like ozone and NO_x, VOC concentrations can vary widely based on location. VOC concentrations tend to be higher nearer to VOC emission sources. TNMHC trends at Camp Bullis may or may not be representative of other regions of the Bexar County 2015 ozone NAAQS nonattainment area.

Using Old Highway 90 canister VOC data, 16 distinct groups of VOC were analyzed to investigate long term VOC trends in the Bexar County 2015 eight-hour ozone nonattainment area. Figure 5-9: *Total Concentrations of VOC Groups at Old Highway 90 Canister Site in Bexar County 2015 Ozone NAAQS Nonattainment Area* shows a decreasing trend from 2014 through 2023. Aside from the increase in 2019, the decrease seems to be steady and consistent through all the larger concentration VOC groups, like 2 or 3 carbon compounds, butanes, ethylene, pentanes, and toluene.

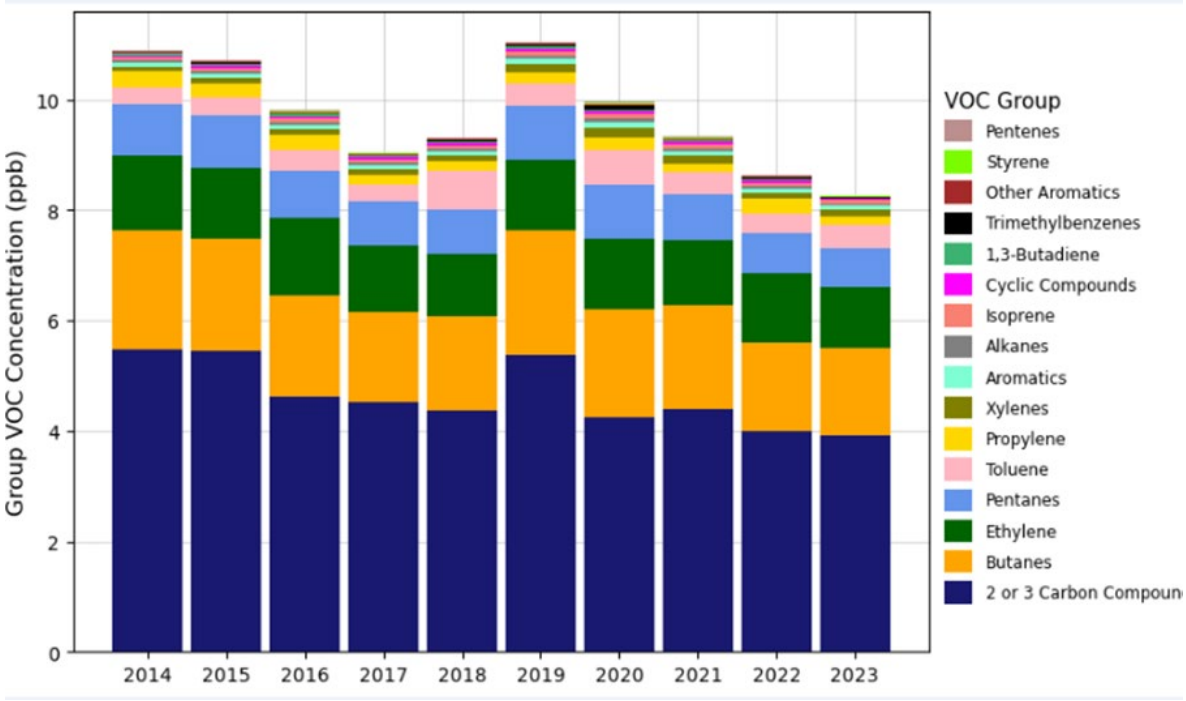

Figure 5-9: Total Concentrations of VOC Groups at Old Highway 90 Canister Site in Bexar County 2015 Ozone NAAQS Nonattainment Area

Point source VOC emission trends from STARS were also investigated. Figure 5-10: *Bexar County 2015 Ozone NAAQS Nonattainment Area Point Source VOC Emissions by Site* shows the top VOC emitters in the area. All other point source emissions are displayed as the Sum of All Others.

Figure 5-10 shows the top six reporting sites accounted for 53% of total point source VOC emissions in the nonattainment area in 2022. Each of these sites reported total VOC emissions exceeding 50 tons in 2022, with the largest emitter, Toyota Vehicle Assembly Plant, reporting almost 250 tons of VOC in 2022. Overall VOC emissions increased 1% from 2014 to 2022.

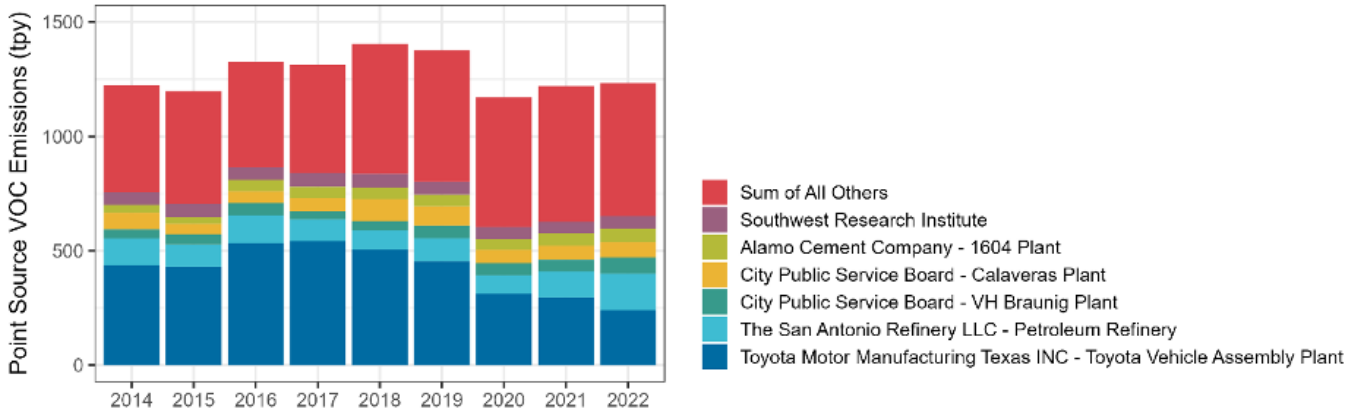

Figure 5-10: Bexar County 2015 Ozone NAAQS Nonattainment Area Point Source VOC Emissions by Site

5.2.4 VOC and NO_X Limitations

The VOC or NO_X limitation of an air mass can help determine how reductions in VOC and NO_X concentrations might affect ozone concentrations. A NO_X limited regime occurs where the radicals from VOC oxidation are abundant, and therefore the ozone formation is more sensitive to the amount of NO_X present in the atmosphere. In these regimes, controlling NO_X would be more effective for reducing ozone. In VOC limited regimes, NO_X is abundant, and therefore ozone formation is more sensitive to the VOC oxidation. In VOC limited regimes, controlling VOC emissions would be more effective for reducing ozone. 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 could reduce ozone concentrations.

VOC-to-NO_X ratios are one way to determine the chemical composition of an air mass and are calculated by dividing hourly TNMHC concentrations in parts per billion by carbon (ppbC) by hourly NO_X concentrations in parts per billion by volume (ppbV). The value of the ratio then determines the limitation of the air mass. While ratio definitions for VOC limited, NO_X limited, or transitional atmospheric conditions vary, this analysis uses the cut points described in the EPA's Photochemical Assessment Monitoring Stations (PAMS) training workshop (Hafner and Penfold, 2018). 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. Calculation of VOC-to-NO_X ratios are limited by the number of collocated auto-GC and NO_X monitors available in the area. In addition, auto-GC monitors are often source-oriented, and therefore they will only provide information on the air masses located near the source and not throughout the whole area.

Camp Bullis has data from collocated VOC and NO_X samplers from 2016 through 2023. Figure 5-11: *Median VOC-to-NO_X Ratios During the months of March through October in the Bexar County 2015 Ozone NAAQS Nonattainment Area* shows transitional to NO_X limited conditions in recent years. This monitor is not located near the San Antonio urban core and sees lower NO_X emissions.

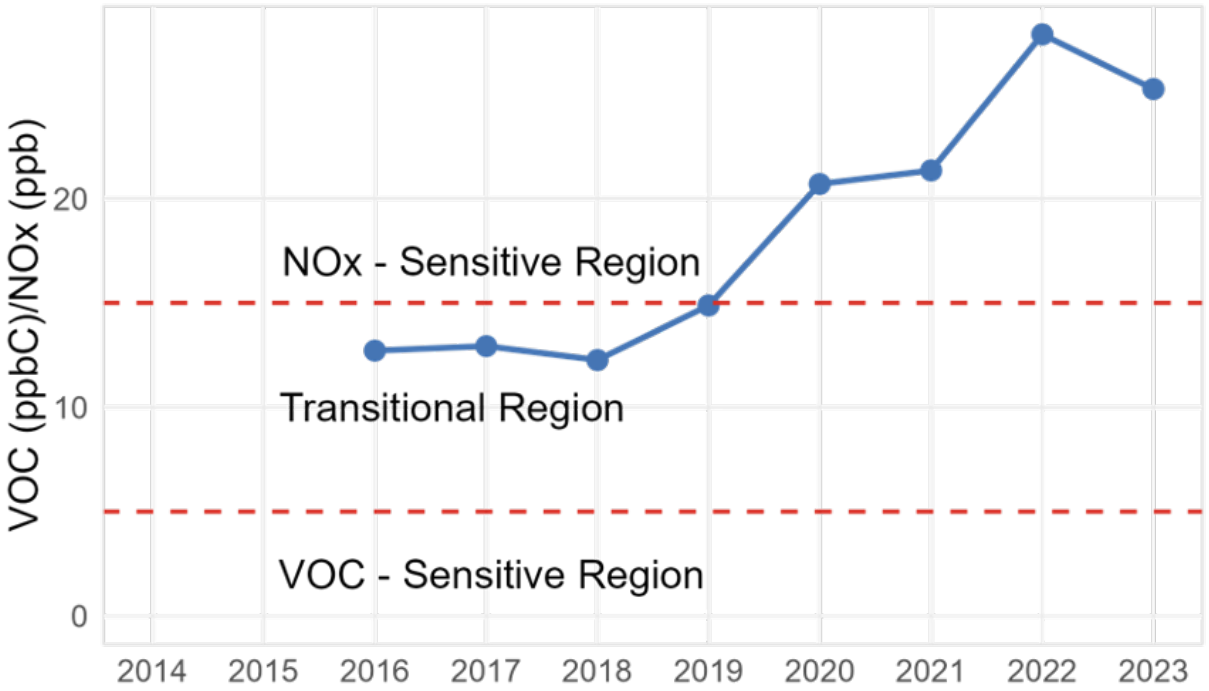

Figure 5-11: Median VOC-to-NO_X Ratios During the months of March through October in the Bexar County Ozone NAAQS Nonattainment Area

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 Bexar County, 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. Figure 5-12: *Modeling Domain and Monitors for Bexar County VOC and NO_X Sensitivity Analysis* shows a map with a purple outline surrounding Bexar County and parts of adjacent counties that comprise the modeling domain.[23] Circles show the monitors location used for this analysis. Anthropogenic emissions of VOC and NO_X across this modeling domain were reduced by 20% relative to emissions in each grid cell for the sensitivity analysis.

[23] Disclaimer: 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.

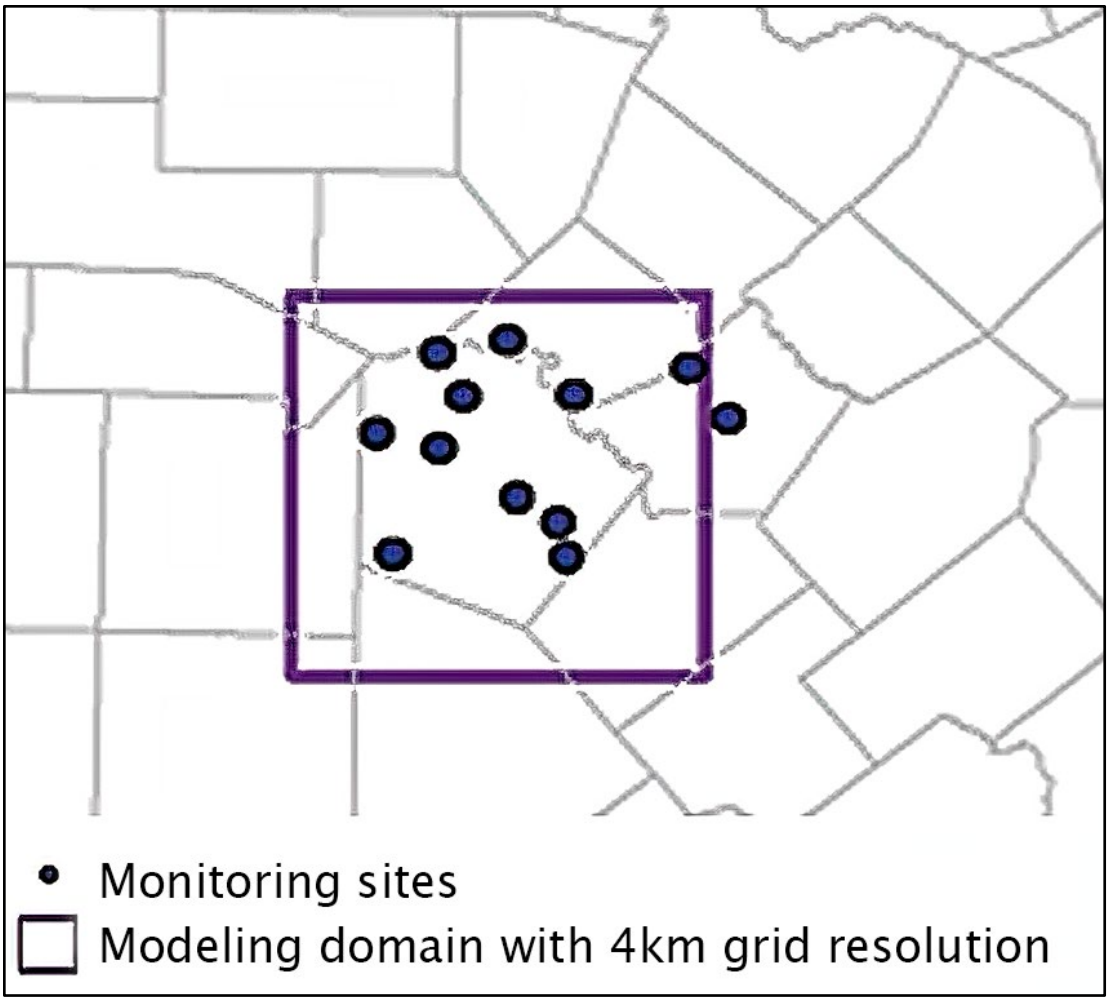

Figure 5-12: Modeling Domain and Monitors for Bexar County VOC and NO_x Sensitivity Analysis

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 of the MDA8 ozone from the top 10 days from the 20% anthropogenic emissions reduction emission scenario to the average of the MDA8 ozone from the top 10 days from the base case scenario for each monitor and adjusting the 2019 DVB with the ratio. The results showed that, though ozone decreased when VOC or NO_x was decreased, reductions in NO_x were more impactful. Figure 5-13: *Modeled Impact of NO_x and VOC 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 Bexar County. The maximum estimated decrease in the ozone base case design value from a 20% NO_x reduction is 1.2 ppb, a factor of six greater than the decrease of 0.2 ppb from a 20% VOC reductions scenario.

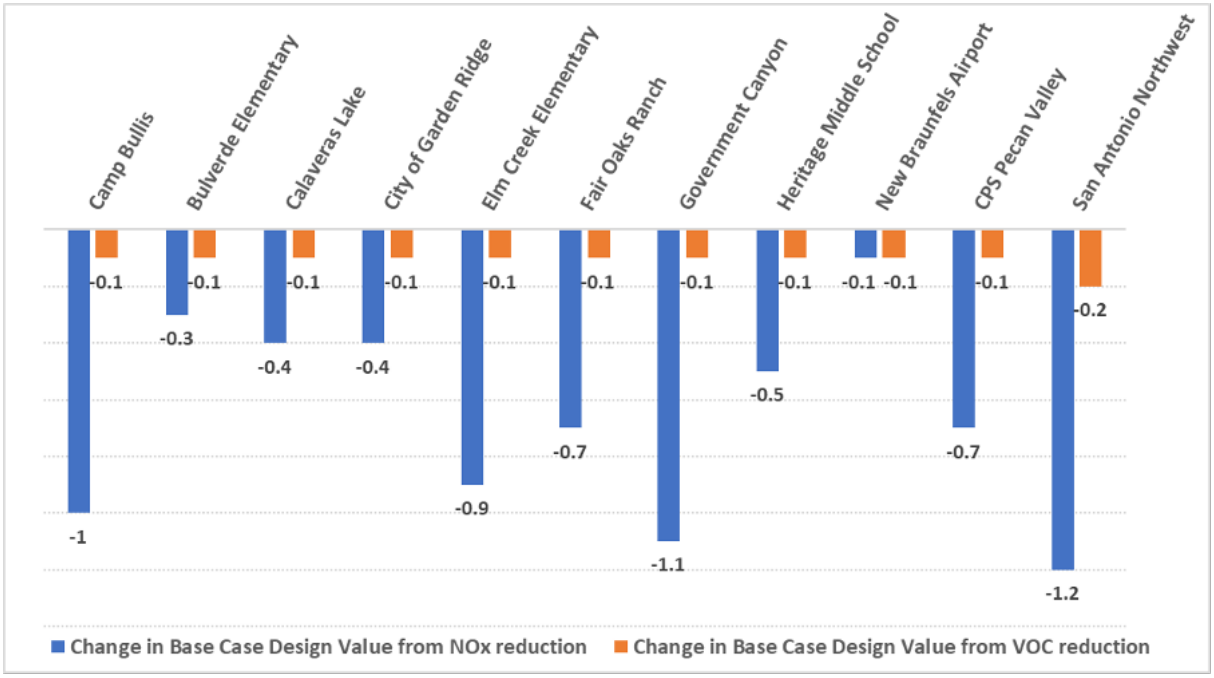

Figure 5-13: Modeled Impact of NO_x and VOC Reductions on 2019 Ozone DVB

The modeling results support the conclusion, from the analysis of measured data, that the ozone formation in Bexar County is primarily NO_x-limited.

5.2.4.2 Other Research

Wang (2023) conducted NO_x-VOC Sensitivity in Texas urban areas where they utilized observations of NO_2, a proxy for NO_x emissions, and formaldehyde (HCHO), a proxy for VOC emissions, from routine in situ sampling at ground-level stations, satellite instruments (TROPOMI), and photochemical model simulations to understand the spatial and temporal variability of ozone chemical regimes across the State of Texas, including the San Antonio area, under varying chemical and meteorological conditions. The study focused on identifying chemical regime based on the following indicators:

- HCHO to NO_2 ratio (FNR); and
- L_N/Q which is the ratio of radical loss (L_N) through the reaction with NO_x to the total primary radical production (Q).

Identifying regimes in the airshed helps to quantitatively assess if VOC or NO_x is driving ozone production.

The L_N/Q ratio was used for to analyze modeled concentrations obtained by using the Comprehensive Air Quality Model with Extensions (CAMx) photochemical model for the full April through October in 2022.

Wang (2023) defined transitional regime in L_N/Q as [0.4-0.6], NOx-limited as less than 0.4, and VOC-limited as greater than 0.6, if the standard deviation of L_N/Q is larger than 0.1. Following this regime definition, San Antonio was NO_x-limited during April through October 2022 with ratio of 0.33 as shown in Figure 5-14*: LN/Q Values for the April through October 2022 in the San Antonio Area.*

Based on Jin et al. (2020), FNR greater than 3.6 is categorized as NO_x-limited, less than 2.7 as VOC-limited and [2.7 - 3.6] as transitional. TROPOMI derived FNR values shows urban core San Antonio VOC-limited but transitional and NO_x-limited in the surrounding and suburb areas during April through October 2022 as shown in Figure 5-15: *TROPOMI Derived FNR Values for the April through October 2022 in the San Antonio Area.* Using CAMx and TROPOMI results, overall, the dominant regime was transitional and NO_x-limited in suburban and surrounding areas but VOC-limited in the urban San Antonio area.

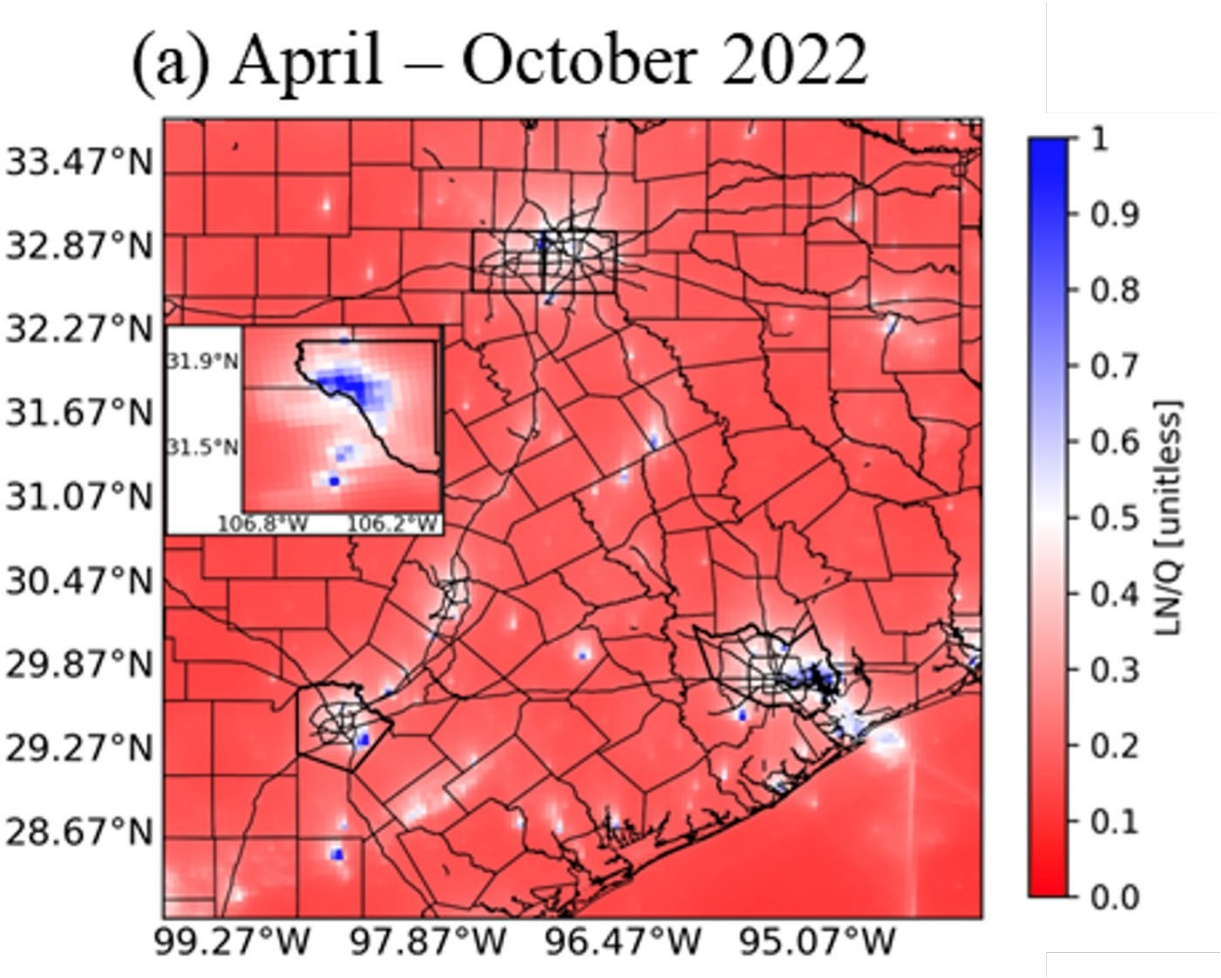

Figure 5-14: LN/Q Values for the April through October 2022 in San Antonio Area

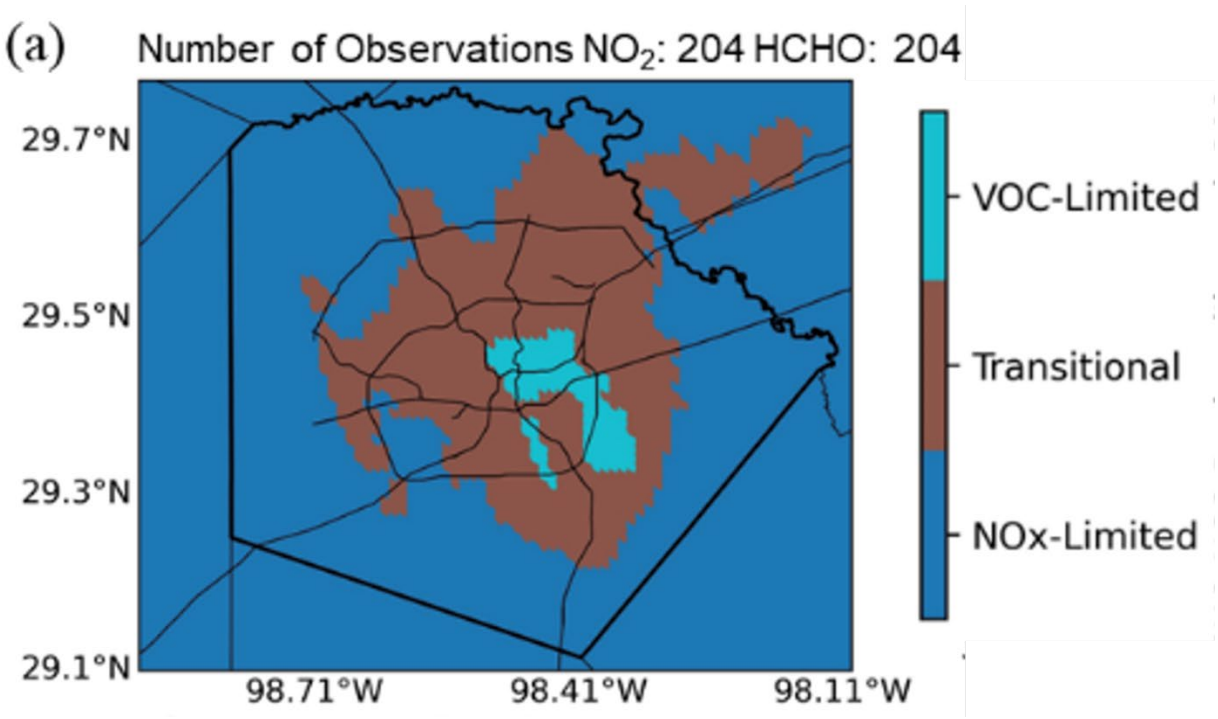

Figure 5-15: TROPOMI Derived FNR Values for the April through October 2022 in the San Antonio Area

5.2.5 Meteorological Influences on Ozone Trends

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

Meteorologically adjusted MDA8 ozone values represent what the ozone would be if meteorological effects on ozone concentrations are removed. Without the influence of meteorology, changes in ozone concentrations are more likely due to emission changes. 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 the observed average, 90th percentile, and 98th percentile MDA8 ozone to the meteorologically adjusted average, 90th percentile, and 98th percentile MDA8 ozone from May through September. EPA calculated these trends for each of the regulatory ozone monitors in the Bexar County 2015 ozone NAAQS nonattainment area from 2014 through 2023 (EPA, 2024). Although results for all statistics were examined, only 98th percentile trends will be discussed since it most closely relates to the ozone values used in design value calculations. To aggregate the data further, the maximum, median, and minimum 98th percentile MDA8 ozone value was calculated from regulatory monitors within the nonattainment area for each year.

Figure 5-16: *Observed and Meteorologically Adjusted 98th Percentile Ozone Trends for May through September in the Bexar County 2015 Ozone NAAQS Nonattainment Area* shows that low ozone in 2014 and 2016 and high ozone in 2022 were largely influenced by meteorology. In 2018 and 2022, meteorology pushed observed ozone slightly higher. The effect of meteorology was most notable at Camp Bullis. Comparing 2014 with 2023, both measured and meteorologically adjusted 98th percentile ozone increased, by 9% and 3%, respectively.

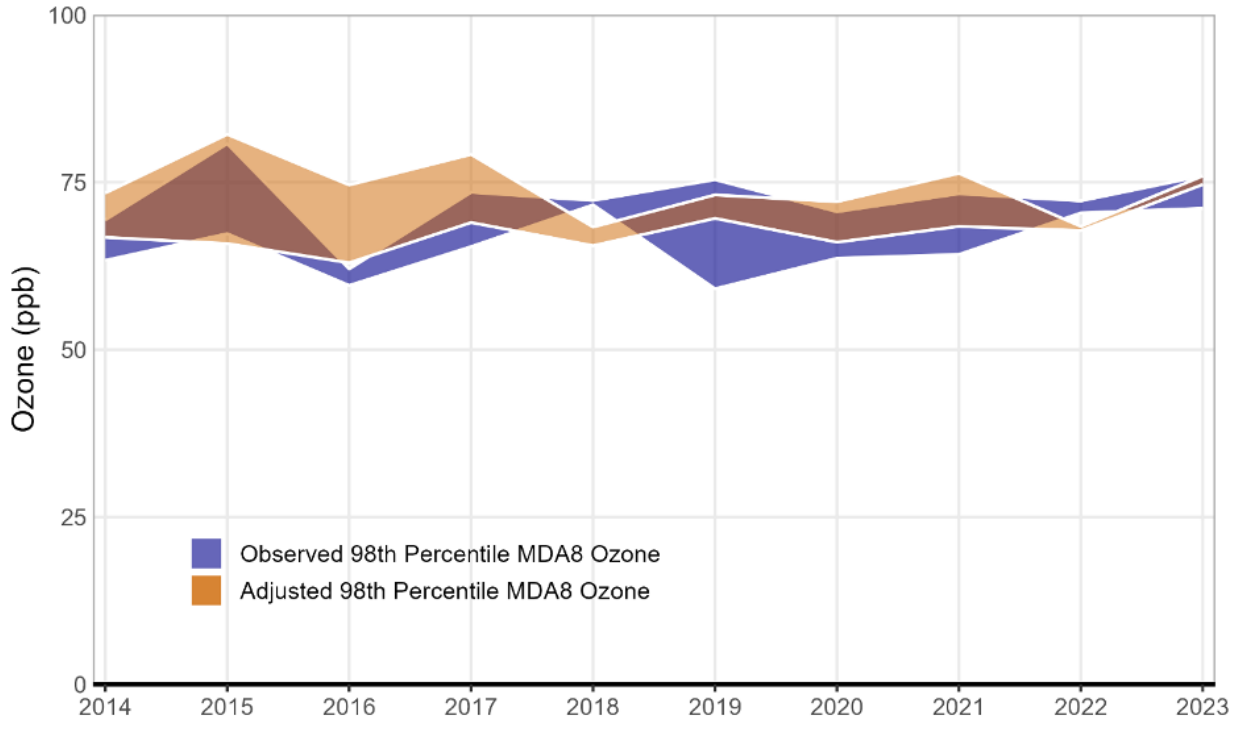

Figure 5-16: Observed and Meteorologically Adjusted 98th Percentile Ozone Trends for May through September in the Bexar County 2015 Ozone NAAQS Nonattainment Area

5.2.6 Fire Influence

The base case month of May was shown in Chapter 3, Section 3.5, Table 3-7 to have the poorest model performance, followed by April. At each of the three Bexar County regulatory monitors, four or five of the top-10 modeled base case days showed high influence from fire emissions. Five days (April 23 and May 9, 19, 21, and 22) have high influence from fire emissions across the three regulatory monitors. On these days, emissions from fires reached Bexar County, mostly from one- or two-days prior in the Yucatan region of Mexico. Figure 5-17: *Back Trajectories Ending on May 22 at Camp Bullis (top left) and San Antonio Northwest (top right), and May 21 Fire Emissions of NO_X (bottom left) and VOC (bottom right)* shows data for one example. The other days exhibit similar characteristics. The wind back trajectories shown end at the Camp Bullis and San Antonio Northwest monitors at 10, 50, 100, 500, and 1,000 meters above ground level (AGL). The wind trajectories indicate that air parcels arriving at these monitors on May 22 passed over the Yucatan Peninsula on May 21. The bottom panels of Figure 5-1 show estimated NO_X and VOC emissions from fires on May 21, including multiple 36-kilometer (km) grid cells with over 1,000 tons per day (tpd) of

VOC emissions. The back trajectory with the highest altitude traversed over areas with higher VOC emissions while lower altitude trajectories traversed over areas with lower emissions.

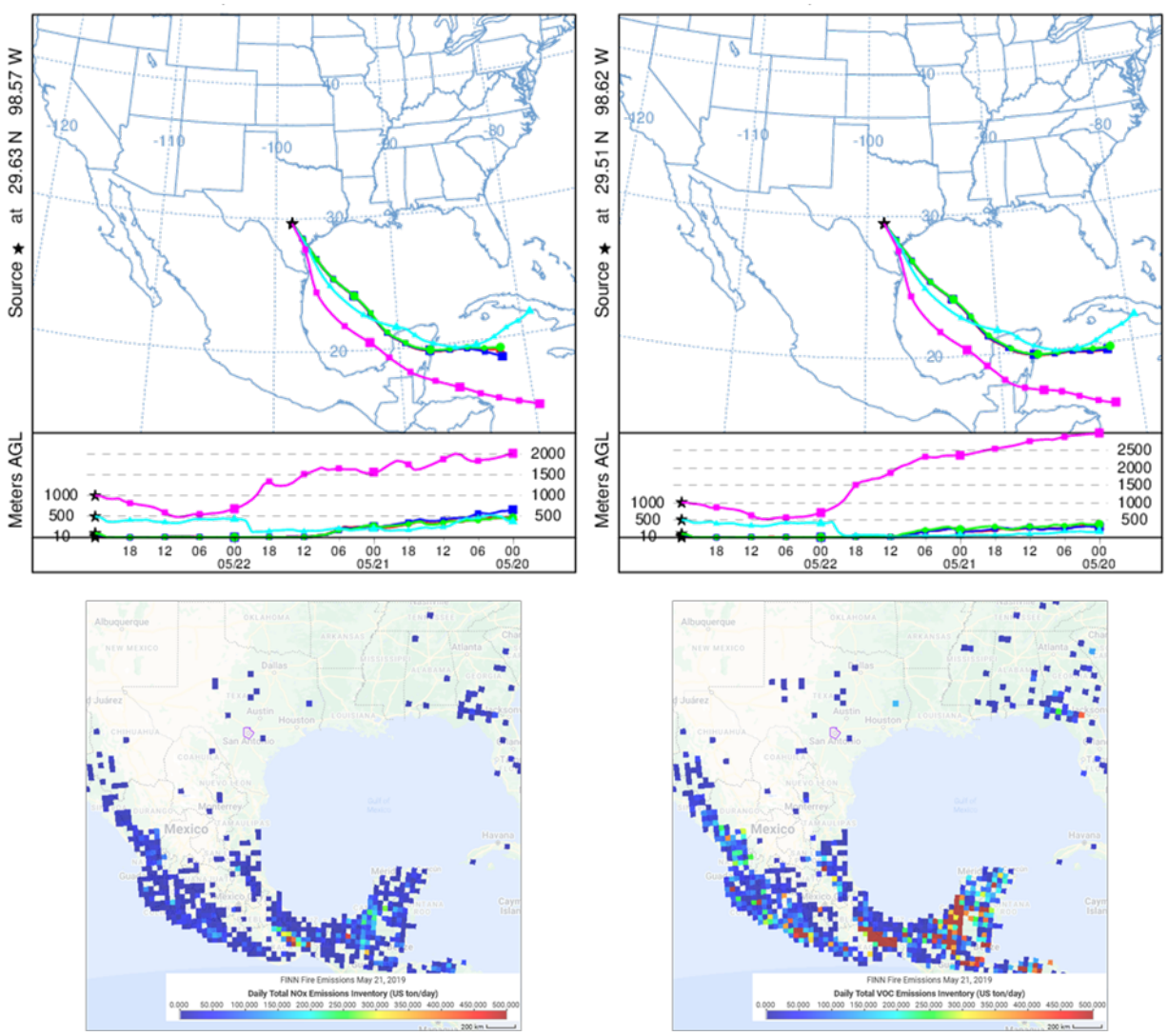

Figure 5-17: Back Trajectories Ending on May 22 at Camp Bullis (top left) and San Antonio Northwest (top right), and May 21 Fire Emissions of NO_x (bottom left) and VOC (bottom right)

Emissions plumes from large fires are assumed to extend above the 1000 meters AGL back trajectory pictured in Figure 5-17. The Fire Inventory of National Center for Atmospheric Research (FINN) fire emission estimation used in this modeling carries the fire plume up over 3,000 meters AGL for class 3 and larger fires, which burn over 100 acres as seen in Figure 5-18: FINN *Fire Plume Height for Different Size Fires.*[24]

[24] FINN fire emission plume height from *Development and Evaluation of the FINNv.2.2 Global Model Application and Fire Emissions Estimates for the Expanded Texas Air Quality Modeling Domain*, AQRP Project 18-022., https://aqrp.ceer.utexas.edu/edocman/projectinfoFY18_19/18-022/18-022%20Final%20Report.pdf

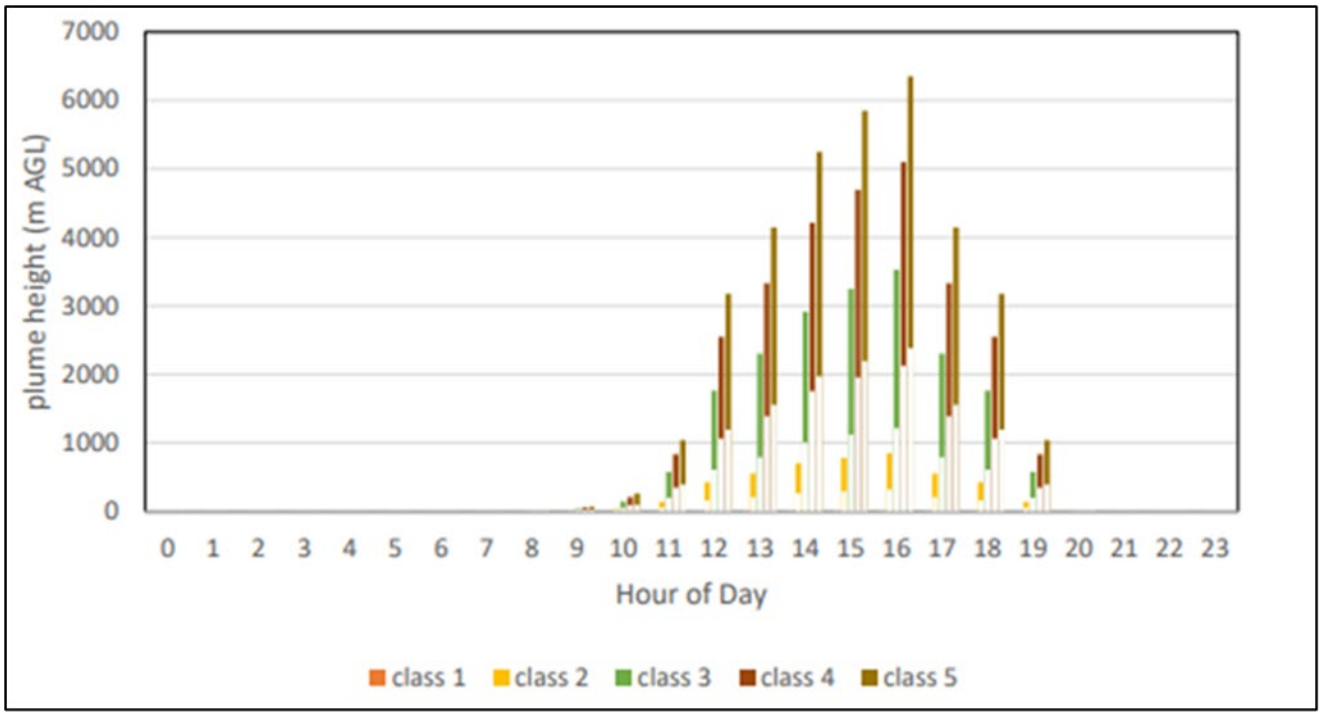

Figure 5-18: FINN Fire Plume Height for Different Size Fires

To analyze the influence of fire emissions, CAMx was run with and without fire emissions for the entire episode. For each day and regulatory monitor in Bexar County, the difference in hourly average modeled ozone concentration between the with-fire and without-fire runs was calculated and the maximum value and observation time recorded. The back trajectories in Figure 5-17 end at the time of the maximum difference on May 22. Maps of the maximum difference in hourly ozone concentration for May 21, when the trajectories are over the Yucatan Peninsula, and May 22, when the ozone plume reaches Texas, are shown in Figure 5-19: *Maximum Difference in Hourly Ozone Concentration Modeled with and Without Fire Emissions, May 21 (left) and May 22 (right).* In this figure, the ozone produced by fire emissions can be seen following a path similar to the trajectories in Figure 5-17, with the maximum fire influence decreasing as it traverses Texas.

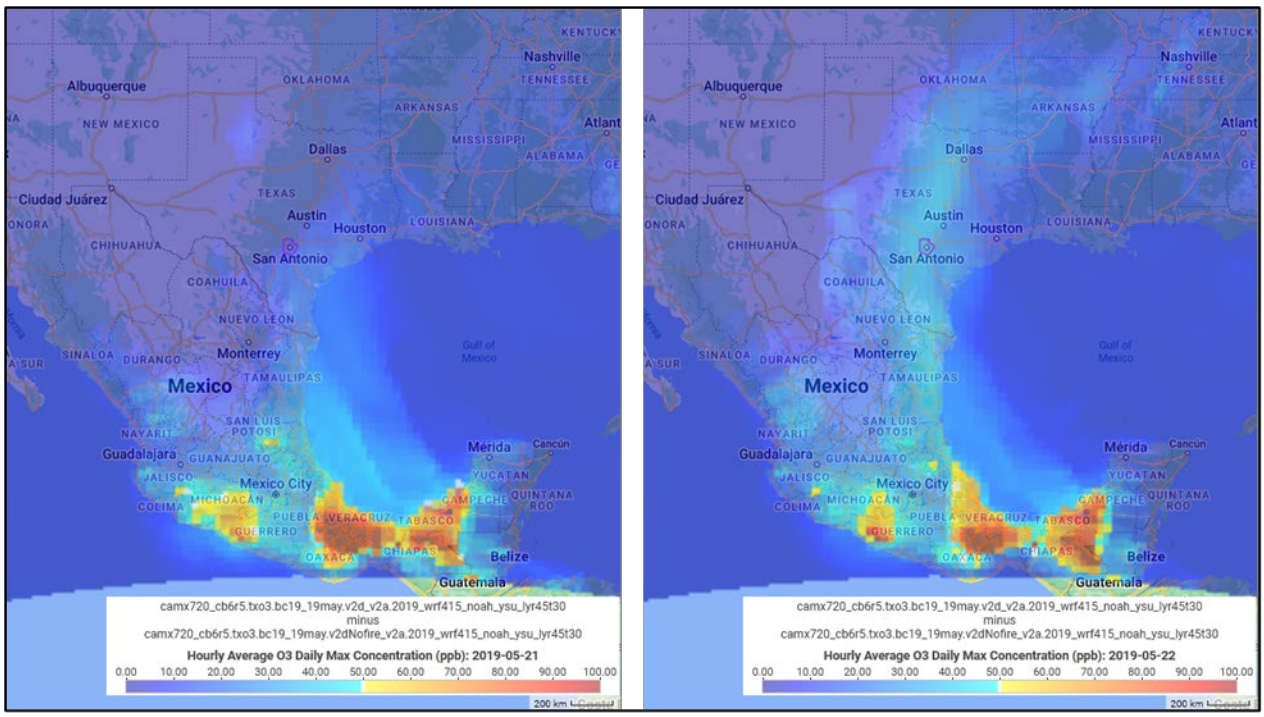

Figure 5-19: Maximum Difference in Hourly Ozone Concentration Modeled with and Without Fire Emissions, May 21 (left) and May 22 (right)

For each regulatory monitor in Bexar County, the 95th percentile of the distribution of the maximum daily hourly ozone differences for the episode was calculated. Modeled ozone differences above the 95th percentile value for that monitor were considered to be potentially highly influenced by fire emissions. The 95th percentile of with-fire minus without-fire modeled hourly ozone concentration is 10.47 ppb at Camp Bullis, 11.42 ppb at Calaveras Lake, and 11.04 ppb at San Antonio Northwest. The highest hourly with-fire minus without-fire modeled hourly ozone concentration is 34.00 ppb at Camp Bullis, 31.36 ppb at Calaveras Lake, and 34.10 ppb at San Antonio Northwest. Figure 5-20: *Box and Whisker Plot of the Maximum Difference in Hourly Ozone with and Without Fire Emissions at Camp Bullis* shows the distribution of the maximum hourly ozone differences, with only difference values outside the shaded interquartile range box plotted for readability.

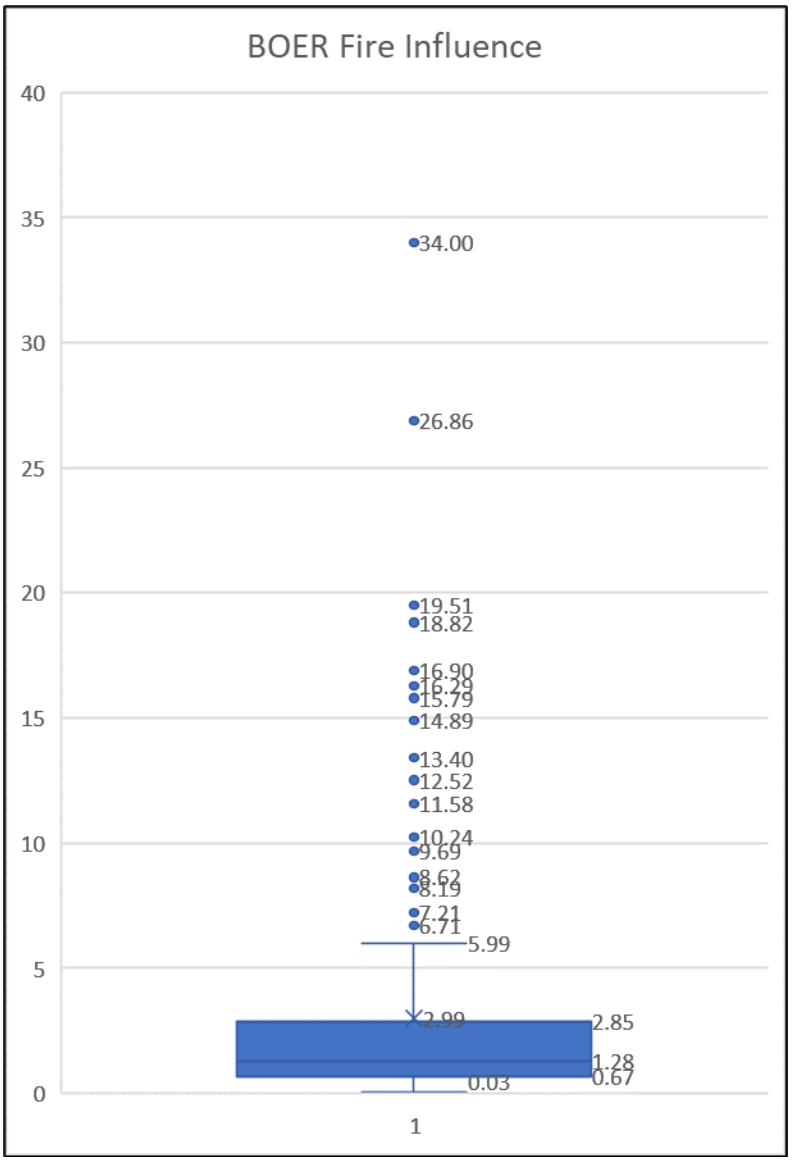

Figure 5-20: Box and Whisker Plot of the Maximum Difference in Hourly Ozone with and Without Fire Emissions at Camp Bullis

The fire emission inventory used in this modeling relies on satellite detection of fire activity and a chemical speciation profile grouping fires within five km of each other into a single event. The Yucatan region experiences burning for agricultural purposes during the months of April and May. Numerous detected small fires may get aggregated in such a way that the combined effect in the na_36km grid may not be representative of actual conditions. In Figure 5-17, many of the estimated 36-km grid cell VOC emissions in the Yucatan Peninsula area are over 1,000 tpd. This estimate may be excessive but actual measurements of VOC emissions from these fires are not available for comparison. It is also possible that CAMx produces excessive amounts of ozone in this situation. TCEQ continues to investigate alternative CAMx options to better handle fire emissions.

Because the future case emission inventory replicates the base case fire emissions, the same effect is expected on these days in the future case. If the days potentially highly influenced by fire are removed from the top-10 modeled days for the regulatory monitors, the future design value calculation is not likely to be affected since these potentially excessive emissions are removed from both the base and future case modeling but estimated future year design value could be more reflective of changes in anthropogenic emissions.

5.3 QUALITATIVE CORROBORATIVE ANALYSIS

5.3.1 Additional Measures

5.3.1.1 SmartWay Transport Partnership and Blue Skyway Collaborative

Among its various efforts to improve air quality in Texas, 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 397 million barrels.[25] Since 2004, SmartWay partners have prevented the release of 2,800,000 tons of NO_X and 115,000 tons of particulate matter into the atmosphere.[26] Approximately 308 Texas companies are SmartWay partners, 18 of which are in Bexar County.[27] The SmartWay Transport Partnership will continue to benefit Bexar County 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.

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 2023, Texas has 41,577 megawatts (MW) of installed wind generation capacity, 27.6% of the 150,427 MW

[25] https://www.epa.gov/smartway/smartway-program-successes
[26] *Id*
[27] https://www.epa.gov/smartway/smartway-partner-list

installed wind capacity in the United States.[28] Texas' total net electrical generation from renewable wind generators in 2023 was 107.99 million megawatt-hours (MWh), approximately 25.4% of the 425.235 million MWh total wind net electrical generation for the U.S.[29,30]

Texas non-residential solar electricity generation in 2023 totaled 32.4 million MWh, a 34% increase from 2022. The 2023 total installed solar electricity generation capacity in Texas was 16,000 MW, an 8% increase from 2022.[31,32]

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, estimates of energy savings and emission reductions from EE/RE measures are available on 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)

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.

On September 7, 2016, EPA signed the final CSAPR Update Rule for the 2008 eight-hour ozone standard. 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-

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[28] WINDExchange, Department of Energy, Office of Energy Efficiency & Renewable Energy, https://windexchange.energy.gov/maps-data/321.
[29] Fuel Mix Report 2023, Electric Reliability Council of Texas, https://www.ercot.com/gridinfo/generation.
[30] Electricity Explained, U.S. Energy Information Administration, https://www.eia.gov/energyexplained/electricity/electricity-in-the-us-generation-capacity-and-sales.php.
[31] Today in Energy, U.S. Energy Information Administration, https://www.eia.gov/todayinenergy/detail.php?id=61783.
[32] Texas Comptroller Energy Tour: Statewide Overview, Texas Comptroller, https://comptroller.texas.gov/economy/economic-data/energy/2023/texas.php.

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

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

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

EPA signed a final FIP on March 15, 2023, to address obligations for 23 states, including Texas, to eliminate significant contribution to nonattainment, or interference with maintenance, of the 2015 ozone NAAQS in other states. As part of the final FIP to address interstate transport obligations for the 2015 ozone NAAQS, EPA is including 22 states, including Texas, in a revised and strengthened CSAPR NO_x Ozone Season Group 3 Trading Program for EGUs beginning in the 2023 ozone season. 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. EPA published the final FIP on June 5, 2023 (88 FR 36654).

On July 31, 2023, EPA published an interim final rulemaking to suspend the effectiveness of the transport FIP for six states including Texas, effective August 4, 2023 (88 FR 49295). The interim final rule also restores the emission budgets, unit-level allowance allocation provisions, and banked allowance holdings that would have been in effect for applicable EGUs prior to the transport FIP. These provisions will remain in place while the proceedings on which the U.S. Court of Appeals for the Fifth Circuit's stay was based remain pending. On October 29, 2024, the EPA Administrator signed an interim final rule staying EPA's FIP in all 23 covered states, for all industries involved, including the power sector.

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 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 2024, $1,374,364,837 in DERI grants were awarded for projects projected to help reduce an estimated 191,068 tons of NO_X in the period over which emissions reductions are reported for each project under the program. This includes $137,235,406 going to activities in the San Antonio Area, which includes Bexar County, with an estimated 12,321 tons of NO_X reduced in the San Antonio Area in the period over which emissions reductions are reported for each project under the program.

Additional incentive programs under the TERP program will result in the reduction in NO_X emissions in the San Antonio 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 2024, the program awarded $37,554,483, with an estimated 1,633 tons of NO_X reduced in the period over which emissions reductions are reported for each project under the program. In the San Antonio Area $776,771 was awarded to projects with an estimated 32 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 2024, $81,617,123 in

TCFP grants were awarded for projects to help reduce an estimated 750 tons of NO_X in the period over which emissions reductions are reported for each project under the program. In the San Antonio Area, $13,902,497 in TCFP grants were awarded with an estimated 92 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 2024, $59,295,085 in TNGVGP grants were awarded for projects to help reduce an estimated 1,718 tons of NO_X in the period over which emissions reductions are reported for each project under the program. In the San Antonio Area, $3,900,080 in TNGVGP grants were awarded to projects with an estimated 131 tons of NO_X reduced in the period over which emissions reductions are reported for each project under the program.

Through fiscal 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

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. Through August 2024, the TCEQ Clean School Bus Program has awarded a total of $34,558,623 in grants for 7,560 retrofit activities across the state. This amount includes $4,694,101 in federal funds. As a result of legislative changes in 2017, this program also includes replacement of older school buses with newer, lower-emitting models. Through August 2024, the TCEQ Clean School Bus Program has awarded a total of $52,373,505 in grants for 711 replacement activities across the state to help reduce an estimated 360 tons of NO_X in the period over which emissions reductions are reported for each project under the program. Approximately $3,980,322 has been awarded for 752 school bus retrofit and replacement activities in the San Antonio Area, resulting in a projected 17 tons of NO_X reduced in the period over which emissions reductions are reported for each project under the program.

5.3.1.6 88th Texas Legislature

The bills passed during the 88th Texas Legislature, 2023, Regular and Special Sessions, that have the potential to impact air quality in the San Antonio area include HB 4885 and Rider 7 in the General Appropriations Act for TCEQ. For legislative updates regarding EE/RE measures and programs, see Section 5.3.1.2: Energy Efficiency and Renewable Energy Measures.

HB 4885, Relating to programs established and funded under the Texas emissions reduction plan

HB 4885 changes the TERP programs to establish the Texas hydrogen infrastructure, vehicle, and equipment grant program and add downstream "refining" oil and gas activities to projects eligible for the New Technology Implementation Grant Program. These programs are expected to accelerate the replacement of older, more polluting equipment with newer and cleaner equipment. New grant application periods for these programs started in Fiscal Year 2024, with public webinars to explain program requirements.

5.3.1.7 Local Initiatives

Local entities submitted an assortment of locally implemented strategies in the Bexar County 2015 ozone NAAQS nonattainment area, including projects, programs, partnerships, and policies. 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 D: *Local Initiatives*.

5.4 CONCLUSION

TCEQ used several sophisticated technical tools to evaluate causes of high ozone in the Bexar County 2015 ozone NAAQS nonattainment area to predict future air quality, as discussed in this chapter. The assessment of historical trends in ozone and ozone precursor concentrations and their causes supports the following conclusions.

Eight-hour ozone design values decreased from 2014 through 2024 but have remained mostly flat since 2016. On average, background ozone contributed about 71% to maximum daily ozone concentrations on low ozone days, and locally produced ozone contributed roughly 29%. The contribution averages are nearly identical for high ozone days, 69% and 31%, respectively. Overall, background ozone is decreasing, and local production is increasing slightly on both high and low ozone days.

Point source NO_X emissions decreased 18%, and VOC emissions increased 1%, respectively, in the Bexar County 2015 ozone NAAQS nonattainment area according to emissions data from 2014 through 2022. Camp Bullis shows NO_X-limited chemistry in recent years, which may be due to decreases in NO_X emissions. Further ozone reductions could be achieved with further reductions in NO_X emissions. While photochemical modeling shows benefits from both NO_X and VOC reductions, ozone decreases in larger amounts with the reductions in NO_X. This proposed AD SIP revision for the Bexar County 2015 ozone NAAQS nonattainment area documents a fully evaluated photochemical modeling analysis and a thorough weight-of-evidence assessment. Based on TCEQ's modeling and available data, the Bexar County 2015 ozone NAAQS nonattainment area is expected to attain the 2015 ozone NAAQS by the September 24, 2027, attainment date.

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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 Bexar County 2015 ozone National Ambient Air Quality Standard (NAAQS) nonattainment area and continues to work toward this goal. Texas continues to invest resources in air quality scientific research for better understanding of atmospheric chemical processes and the advancement of pollution control technology, refining quantification of emissions, and improving the science for ozone modeling and state implementation plan (SIP) analysis. Additionally, TCEQ is working with stakeholders 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 Bexar County 2015 ozone NAAQS 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 are located on 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 Projects

The TCEQ sponsors applied research projects to support the SIP and other agency requirements. The projects' 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. The final project reports are available at TCEQ's Air Quality Research and Contract Projects webpage.[33]

6.2.2.2 Texas Air Quality Research Programs

The goals of the State of Texas Air Quality Research Program (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.

[33]https://www.tceq.texas.gov/airquality/airmod/project/

The AQRP supported five projects during the 2024-2025 biennium. There is one statewide project, identified below, that could have findings relevant to the San Antonio area.

- Evaluating Updates to Comprehensive Air Quality Model with Extensions and nitrogen oxides EIs using TEMPO Measurements over Texas (project number 24-004)

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/).

Appendices Available Upon Request

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