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

AGENDA REQUESTED: 05/31/2023

DATE OF REQUEST: 05/12/2023

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

CAPTION: Docket No. 2023-0319-SIP. Consideration for publication of, and hearing on, the proposed Bexar County Moderate Area Attainment Demonstration State Implementation Plan (SIP) Revision for the 2015 Eight-Hour Ozone National Ambient Air Quality Standard.

To meet federal Clean Air Act requirements, the proposed SIP revision would include a photochemical modeling analysis, a weight of evidence analysis, a reasonably available control measures analysis, motor vehicle emissions budgets for 2023, and a contingency plan. The proposed SIP revision also includes a commitment from the Executive Director to propose a reasonably available control technology (RACT) analysis and regulations required to implement RACT, if any are needed, at a future Commission Agenda. (Brian Foster, Terry Salem; Project No. 2022-025-SIP-NR)

Richard C. Chism
Director

Donna F. Huff
Division Deputy Director

Jamie Zech
Agenda Coordinator

Copy to CCC Secretary? **NO** ☒ **YES** ☐

Texas Commission on Environmental Quality
Interoffice Memorandum

To: Commissioners **Date:** May 12, 2023

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

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

Docket No.: 2023-0319-SIP

Subject: Commission Approval for Proposal of the Bexar County Moderate 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 Moderate AD SIP Revision
Non-Rule Project No. 2022-025-SIP-NR

Background and reason(s) for the SIP revision:
Bexar County was originally designated nonattainment with a marginal classification for the 2015 eight-hour ozone NAAQS of 0.070 parts per million with a September 24, 2021 attainment date. Based on monitoring data from 2018, 2019, and 2020, Bexar County did not attain the standard by the September 24, 2021 attainment date for the area under the marginal classification and did not qualify for a one-year attainment date extension in accordance with federal Clean Air Act (FCAA), §181(a)(5).[1] On October 7, 2022, the United States Environmental Protection Agency (EPA) published a final notice reclassifying the area from marginal to moderate, effective November 7, 2022 (87 *Federal Register* (FR) 60897).

Bexar County is now subject to the moderate ozone nonattainment area requirements in FCAA, §182(b), and the Texas Commission on Environmental Quality (TCEQ) is required to submit moderate classification AD and reasonable further progress (RFP) SIP revisions to the EPA. The attainment date for the Bexar County 2015 ozone NAAQS moderate nonattainment area is September 24, 2024, with a 2023 attainment year (87 FR 60897).[2] EPA set a January 1, 2023 deadline for states to submit AD and RFP SIP revisions to address the 2015 eight-hour ozone moderate nonattainment area requirements.

Scope of the SIP revision:
As a result of reclassification, the TCEQ is required to submit to the EPA an AD SIP revision consistent with FCAA requirements for areas classified as moderate nonattainment for the 2008 eight-hour ozone NAAQS.

A.) Summary of what the SIP revision would do:
This proposed Bexar County AD SIP revision includes a photochemical modeling analysis and weight-of-evidence (WoE) analysis that meets the requirements of an AD for the 2015 ozone NAAQS. This proposed SIP revision includes an analysis of reasonably available control measures (RACM) and a contingency plan that would provide additional emissions reductions if the area fails to attain the standard by the moderate attainment date. To ensure that federal transportation

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[1] An area that fails to attain the 2015 eight-hour ozone NAAQS by its attainment date would be eligible for the first one-year extension if, for the attainment year, the area's 4th highest daily maximum eight-hour average is at or below the level of the standard (70 parts per billion (ppb)); Bexar County's fourth highest daily maximum eight-hour average for 2020 was 72 ppb. Bexar County's design value for 2021 was 73 ppb.
[2] The attainment year ozone season is the ozone season immediately preceding a nonattainment area's attainment date.

funding conforms to the SIP, this proposed Bexar County AD SIP revision contains nitrogen oxides and volatile organic compounds (VOC) motor vehicle emissions budgets (MVEB) for the 2023 attainment year. No control measures were identified as RACM for this SIP revision because any such measures would have had to be implemented by January 1, 2023, to be considered as even potentially advancing attainment.

B.) Scope required by federal regulations or state statutes:
The elements included in this proposed SIP revision meet FCAA SIP requirements for moderate ozone nonattainment areas. Consistent with the EPA's November 2018 modeling guidance, this proposed Bexar County AD SIP revision would also include a modeled attainment demonstration and a WoE analysis.[3] This SIP revision also includes certification statements to confirm that nonattainment new source review and Stage I gasoline vapor recovery program requirements have been met for the Bexar County 2015 ozone NAAQS nonattainment area under the moderate classification. This proposed SIP revision does not include a reasonably available control technology (RACT) analysis but proposes to include a commitment from the Executive Director to propose a RACT analysis and associated control measures required to implement RACT for Bexar County, if any are needed, at a future Commission Agenda. This proposed Bexar County AD SIP revision and commitment to submit a RACT analysis at a later time would be consistent with the requirements of FCAA, §182(b)(1) and the 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).

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

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

Effect on the:

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

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

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

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

Stakeholder meetings:
TCEQ hosted a virtual Bexar County Stakeholders Meeting on June 8, 2022 related to the 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. The meeting was open to the public, but the focus was on stationary sources. In addition, two virtual Technical Information Meetings were hosted by TCEQ. One was held on August 16, 2021, and the other was held on August 22, 2022. The purpose of these meetings was for TCEQ to have an open, consultative forum regarding the technical work associated with the SIP, to include the development of the photochemical modeling, data analysis, and EI. Both meetings were open to everyone; however, the focus was on the technical aspects on the development of the SIP.

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

Public Involvement Plan
Yes.

Alternative Language Requirements
Yes. Spanish.

Potential controversial concerns and legislative interest:
The current project timeline allows for submission to EPA by the end of 2023, after EPA's January 1, 2023 SIP submittal deadline. Missing the submittal deadline could lead to EPA issuing a finding of failure to submit prior to TCEQ's planned submittal, which would start sanctions and federal implementation plan (FIP) clocks. EPA would be required to promulgate a FIP anytime within two years after finding TCEQ failed to make the required submission unless TCEQ submits, and EPA approves, a plan revision correcting the deficiency prior to promulgating the FIP. Sanctions could include transportation funding restrictions, grant withholdings, and 2-to-1 emissions offset requirements for new construction and major modifications of stationary sources in the Bexar County 2015 ozone NAAQS nonattainment area. Based on the TCEQ's modeling and available data, Bexar County is not expected to attain the 2015 ozone NAAQS by the September 24, 2024 attainment date.

Contingency measures are required to be implemented upon failure to attain the NAAQS to achieve specific emissions reductions after the attainment year. A 2021 court ruling on the 2015 eight-hour ozone standard SIP requirements rule vacated provisions in the rule allowing for the use of previously implemented measures as contingency measures (*see Sierra Club v. EPA*, 21 F.4th 815, D.C. Cir. 2021). EPA's new draft guidance on contingency measures published on March 23, 2023 (88 FR 17571), indicates that contingency measures must be conditional and prospective (not previously implemented). This guidance is not final. The required contingency reductions included in the proposed SIP revision are from previously implemented federal measures.

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

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What are the consequences if this SIP revision does not go forward? Are there alternatives to revision?
The TCEQ could choose to not comply with requirements to develop and submit an AD SIP revision to EPA. However, if the SIP revision is not submitted to EPA, EPA could issue a finding of failure to submit, requiring that TCEQ submit the required SIP revision within a specified time period, and imposing sanctions on the state. EPA would be required to promulgate a FIP anytime within two years after finding TCEQ failed to make the required submission. Sanctions could include transportation funding restrictions, grant withholdings, and 2-to-1 emissions offsets requirements for new construction and major modifications of stationary sources in the Bexar County 2015 ozone NAAQS nonattainment area. EPA could impose such sanctions and implement a FIP until the state submitted, and EPA approved, an AD SIP revision for the area.

Key points in the proposal SIP revision schedule:
Anticipated proposal date: May 31, 2023
Anticipated public hearing date: July 13, 2023
Anticipated public comment period: June 2, 2023 through July 17, 2023
Anticipated adoption date: November 8, 2023

Agency contacts:
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cc: Chief Clerk, 2 copies
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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 MODERATE AREA ATTAINMENT DEMONSTRATION STATE IMPLEMENTATION PLAN REVISION FOR THE 2015 EIGHT-HOUR OZONE NATIONAL AMBIENT AIR QUALITY STANDARD

PROJECT NUMBER 2022-025-SIP-NR

Proposal
May 31, 2023

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EXECUTIVE SUMMARY

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 (ppm) with a September 24, 2021 attainment date.[1] Based on monitoring data from 2018, 2019, and 2020, Bexar County did not attain the standard by the September 24, 2021 attainment date for the area under the marginal classification and did not qualify for a one-year attainment date extension in accordance with federal Clean Air Act (FCAA), §181(a)(5).[2] On October 7, 2022, the United States Environmental Protection Agency (EPA) published a final notice reclassifying Bexar County from marginal to moderate, effective November 7, 2022 (87 *Federal Register* (FR) 60897).

Bexar County is now subject to the moderate ozone nonattainment area requirements in FCAA, §182(b), and the Texas Commission on Environmental Quality (TCEQ) is required to submit moderate ozone classification attainment demonstration (AD) and reasonable further progress (RFP) state implementation plan (SIP) revisions to the EPA. The attainment date for the Bexar County 2015 ozone NAAQS nonattainment area is September 24, 2024, with a 2023 attainment year (87 FR 60897).[3] The EPA set a January 1, 2023 deadline for states to submit AD and RFP SIP revisions to address the 2015 eight-hour ozone moderate nonattainment area requirements.

This Bexar County AD SIP revision includes the following required SIP elements for ozone nonattainment areas classified as moderate: photochemical modeling, a reasonably available control measures (RACM) analysis, a weight-of-evidence (WoE) analysis, a contingency plan, attainment year motor vehicle emissions budgets (MVEB) for transportation conformity purposes, and certification statements to confirm that nonattainment new source review and Stage I gasoline vapor recovery program requirements have been met for the Bexar County 2015 ozone NAAQS nonattainment area. This proposed SIP revision also describes existing ozone control measures for Bexar County; however, it does not include a reasonably available control technology (RACT) analysis. This proposed SIP revision includes a commitment from the Executive Director to propose a RACT analysis and associated control measures required to implement RACT for Bexar County, if any are needed, at a future Commission Agenda. The Bexar County RACT analysis and any associated rules would be proposed later in 2023. The RACT analysis and any regulations, if adopted by the commission, would be submitted to the EPA by May 7, 2024.

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. A 2021 court ruling on the 2015 eight-hour ozone standard SIP requirements rule

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[1] Bexar County was designated nonattainment for the 2015 ozone NAAQS effective September 24, 2018, after most of the rest of the country (83 FR 35136, July 25, 2018).

[2] 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.

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

vacated provisions in the rule allowing for the use of previously implemented measures as contingency measures (*Sierra Club v. EPA*, 21 F.4th 815, D.C. Cir. 2021). The EPA published draft guidance on contingency measures in the *Federal Register* for public comment on March 23, 2023 (88 FR 17571). Since the EPA had not issued guidance to states regarding contingency measures at the time it was developed, this SIP revision relies on the historically approved approach of using surplus mobile source emissions reductions to fulfill the contingency measure requirements.

This Bexar County AD SIP revision is scheduled to be proposed in conjunction with the Bexar County 2015 Ozone NAAQS RFP SIP Revision (Project No. 2022-024-SIP-NR), the 30 Texas Administrative Code (TAC) Chapter 114 rulemaking concerning Expansion of Vehicle I/M to Bexar County and Removal of Six Dallas-Fort Worth Counties from the Regional Low Reid Vapor Pressure Gasoline Program (Project No. 2022-026-114-AI), and the Bexar County I/M SIP Revision (Project No. 2022-027-SIP-NR).

This proposed Bexar County AD SIP revision includes a photochemical modeling analysis of reductions in nitrogen oxides (NO_X) and volatile organic compounds (VOC) emissions from existing control strategies and by a WoE analysis. The peak ozone design value for the Bexar County nonattainment area is estimated to be 71 ppb in 2023. The quantitative and qualitative analyses in Chapter 5: *Weight of Evidence* supplement the photochemical modeling analysis presented in Chapter 3: *Photochemical Modeling* to characterize future ozone conditions.

For the photochemical modeling analysis, this 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 modeling a 2019 base case and 2023 future case modeling results to estimate 2023 eight-hour ozone design values.

Table ES-1: *Summary of 2019 Base and 2023 Future Case Anthropogenic Modeling Emissions in 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 and 2023 future case ozone modeling. The differences in modeling emissions between the 2019 base and the 2023 future case reflect the net of economic growth and reductions from existing controls. The existing controls include both state and federal measures that have already been adopted.

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

Emissions Source Category	2019 NO_X (tpd)	2023 NO_X (tpd)	2019 VOC (tpd)	2023 VOC (tpd)
On-Road	28.26	20.61	14.95	12.37
Non-Road	7.82	6.99	11.36	11.92

Emissions Source Category	2019 NO_x (tpd)	2023 NO_x (tpd)	2019 VOC (tpd)	2023 VOC (tpd)
Off-Road – Airports	1.89	1.72	0.62	0.59
Off-Road - Locomotives	1.98	1.48	0.09	0.07
Area Sources	5.34	5.53	77.41	81.14
Oil and Gas - Drilling	0.00	0.00	0.00	0.00
Oil and Gas - Production	1.71	1.71	6.38	6.38
Point - EGU	8.34	10.08	0.33	0.33
Point - Non-EGU	8.73	9.33	4.33	4.91
Bexar County Total	**64.07**	**57.45**	**115.47**	**117.71**

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

The 2019 base case design value (DVB) and 2023 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 2019 DVB and Modeled 2023 DVF for Bexar County 2015 Ozone NAAQS Nonattainment Area Regulatory Monitors*. In accordance with the 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,*[4] the 2023 DVFs presented have been rounded to one decimal place and then truncated. Based on the TCEQ's modeling and available data, the Bexar County area is not expected to attain the 2015 ozone NAAQS by the September 24, 2024 attainment date.

Table ES-2: Summary of 2019 DVB and Modeled 2023 DVF for Bexar County 2015 Ozone NAAQS Nonattainment Area Regulatory Monitors

Monitor Name	CAMS Number	2019 DVB (ppb)	Relative Response Factor	2023 DVF (ppb)
Camp Bullis	0058	72.00	0.995	71
Calaveras Lake	0059	65.67	0.998	65
San Antonio Northwest	0023	72.00	0.996	71

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

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

SECTION V-A: LEGAL AUTHORITY

General

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

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

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

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

Local government authority is found in Subchapter E of the TCAA. Local governments have the same power as the TCEQ to enter property and make inspections. They also may make recommendations to the commission concerning any action of the TCEQ that affects their territorial jurisdiction, may bring enforcement actions, and may execute cooperative agreements with the TCEQ or other local governments. In addition, a city or town may enact and enforce ordinances for the control and abatement of air pollution not inconsistent with the provisions of the TCAA and the rules or orders of the commission.

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

Applicable Law

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

Statutes

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

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

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

Chapter 7: Enforcement
- Subchapter A: General Provisions (§§7.001, 7.002, 7.0025, 7.004, and 7.005 only)
- Subchapter B: Corrective Action and Injunctive Relief (§7.032 only)
- Subchapter C: Administrative Penalties
- Subchapter D: Civil Penalties (except §7.109)
- Subchapter E: Criminal Offenses and Penalties: (§§7.177, 7.178-7.183 only)

Rules

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

Chapter 7: Memoranda of Understanding, §§7.110 and 7.119

December 13, 1996 and May 2, 2002, respectively

Chapter 19: Electronic Reporting March 15, 2007

Subchapter A: General Provisions

Subchapter B: Electronic Reporting Requirements

Chapter 39: Public Notice

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

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

Chapter 101: General Air Quality Rules May 14, 2020

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

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

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

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

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

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

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

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

SECTION VI: CONTROL STRATEGY

A. Introduction (No change)

B. Ozone (Revised)

1. Dallas-Fort Worth (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)

TABLE OF CONTENTS

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	United States 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

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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 United States 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, the EPA published final designations for areas under the 2015 eight-hour ozone NAAQS (83 FR 25766), effective August 3, 2018; however, the EPA did not designate Bexar County as part that action. The 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 a 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.[5] 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 the 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 the EPA on July 13, 2020. On December 21, 2020, the 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 the EPA on June 24, 2020. The revision satisfied FCAA EI reporting requirements for areas designated nonattainment for the 2015 eight-hour ozone NAAQS and also included certification statements to confirm that emissions statement and nonattainment new source review (NSR) SIP requirements had been met for the 2015 eight-hour ozone nonattainment areas. On June 29, 2021, the EPA published final approval of the EI for the Bexar County 2015 ozone NAAQS nonattainment area (86 FR 34139). On September 9, 2021,

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

the 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 under the marginal classification and did not qualify for a one-year attainment date extension in accordance with FCAA, §181(a)(5).[6] On October 7, 2022, the EPA published 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 is September 24, 2024 with a 2023 attainment year. In this same action, the EPA also disapproved the Bexar County §179B Demonstration SIP Revision.

1.2.2 Ozone Design Value Trends

The eight-hour ozone design values for the San Antonio area from 2000 through 2022 are illustrated in Figure 1-1: *Eight-Hour Ozone Design Values and Population in the San Antonio Area*. The design value has decreased over the past 22 years. The 2022 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 45% increase in area population from 2000 through 2021.

[6] 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.

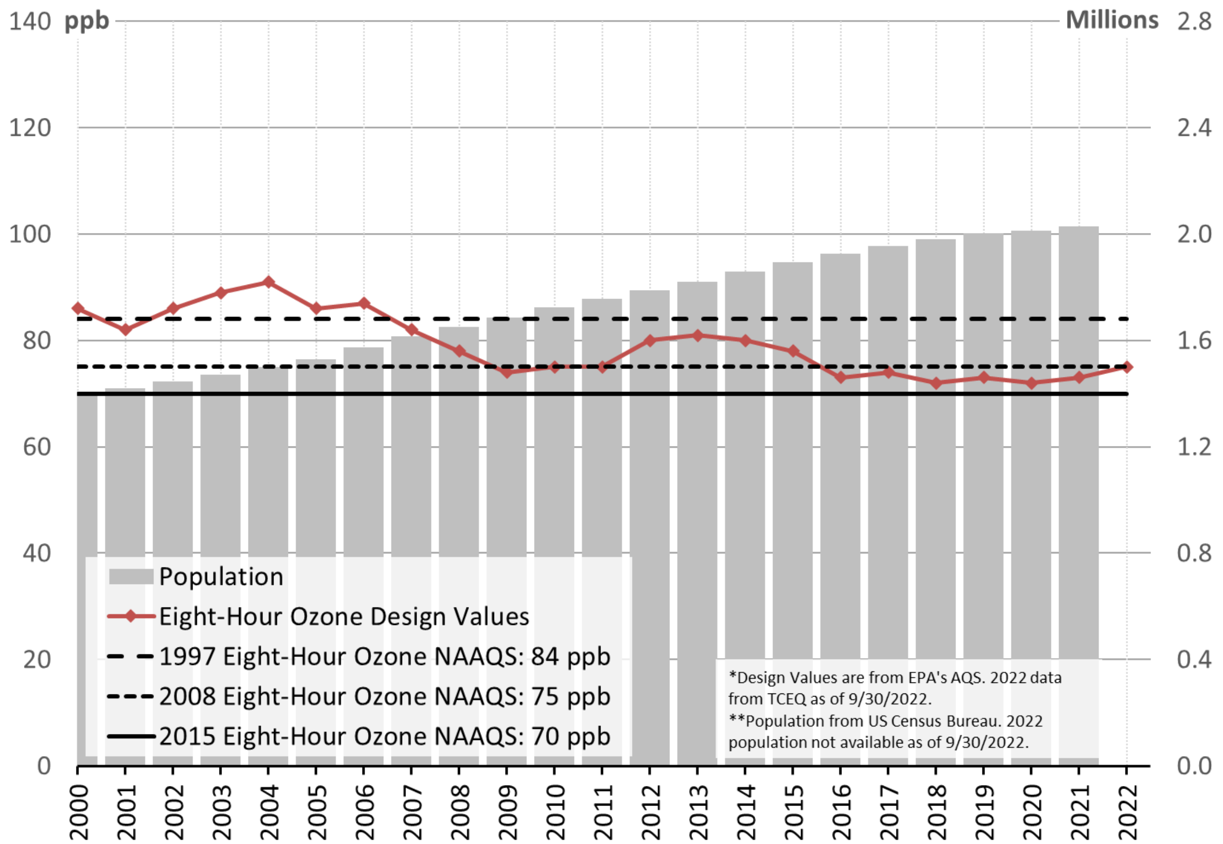

Figure 1-1: Eight-Hour Ozone Design Values and Population in the San Antonio Area

1.3 HEALTH EFFECTS

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

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

1.4 STAKEHOLDER PARTICIPATION AND PUBLIC MEETINGS

1.4.1 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. The TCEQ hosted two virtual TIMs, one on August 16, 2021 and the other was held on August 22, 2022. These TIMs included presentations on ozone planning, ozone design values, modeling platform updates, emissions inventory development, and updates from the EPA. 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 Meeting

The TCEQ hosted a virtual Bexar County Stakeholders Meeting on June 8, 2022 related to the 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. The meeting was opened to public, but the focus was on companies and industry in Bexar County with stationary sources of pollution.

In addition, two virtual Technical Information Meetings were hosted by the TCEQ. One was held on August 16, 2021 and the other was held on August 22, 2022. The purpose of these meetings was for the TCEQ to have an open, consultative forum regarding the technical work associated with the SIP, to include the development of the Photochemical Modeling, Data Analysis, and Emissions Inventory. Both meetings were open to everyone, however, the focus was on the technical aspects on the development of the SIP.

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	July 13, 2023	7:00 pm	Alamo Area Council of Governments 2700 NE Loop 410, Suite 101 San Antonio, TX 78217

The public comment period will open on June 2, 2023 and close on July 17, 2023. Written comments will be accepted via mail, fax, or through the TCEQ Public Comment system (https://tceq.commentinput.com/). File size restrictions may apply to comments being submitted via the TCEQ Public Comment system. All comments should reference the “Bexar County 2015 Ozone NAAQS Moderate AD SIP Revision” and should reference Project Number 2022-025-SIP-NR. Comments submitted via hard copy may be mailed to Alison Stokes, 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 July 17, 2023.

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

1.6 SOCIAL AND ECONOMIC CONSIDERATIONS

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

1.7 FISCAL AND MANPOWER RESOURCES

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

CHAPTER 2: ANTHROPOGENIC EMISSIONS INVENTORY DESCRIPTION

2.1 INTRODUCTION

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

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

The EI also provides data for a variety of air quality planning tasks, including establishing baseline emissions levels, calculating 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 SOURCES

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

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

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

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

For this proposed AD revision, the TCEQ has designated the projection-base year for point sources as 2019 for electric generating units (EGU) with emissions recorded in the United States Environmental Protection Agency's (EPA) Air Markets Program Data and 2019 for all other stationary point sources (non-EGUs) with emissions recorded in the TCEQ STARS database. For more detail on the projection-base year for point sources, 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, the TCEQ requested regulated entities submit any revisions to the 2019 point source EI by July 9, 2021. The point source emissions in this proposed Bexar County AD SIP revision reflect all updates submitted by the due date. The TCEQ provided notification to regulatory entities and the public through its email distribution system and by posting the notice on the TCEQ website.[7]

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.

[7] 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 periodic emissions inventory (PEI) is reported every third year (triennially) to the EPA for inclusion in the National Emissions Inventory. The TCEQ submitted the most recent PEI for calendar year 2020.

2.4 NON-ROAD MOBILE SOURCES

Non-road vehicles (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: NONROAD model categories (as described further below), airports, locomotives, and drilling rigs used in upstream oil and gas exploration activities. Since no commercial marine 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 discussed below.

2.4.1 NONROAD Model Categories Emissions Estimation Methodology

The Motor Vehicle Emission Simulator version 3 (MOVES3) is the EPA's latest mobile source emissions model for estimating non-road source category emissions. The TCEQ has invested significant time and resources to develop a Texas-specific version of the non-road sources called Texas NONROAD utility version 2 (TexN2) that replaces EPA defaults used to determine emissions with county-specific activity data.[8] The TCEQ uses 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 MOVES3 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 MOVES3 model and TexN2 utility, alternate emissions estimates were developed for that source category in order to develop more accurate county-level inventories. The equipment populations for drilling rigs were set to zero in the TexN2 utility to avoid double counting emissions from these sources.

2.4.2 Drilling Rig Diesel Engines Emissions Estimation Methodology

Drilling rig diesel engines used in upstream oil and gas exploration activities are included in the MOVES3 model category "Other Oilfield Equipment," which includes various types of equipment; however, due to significant growth in the oil and gas

[8] https://www.tceq.texas.gov/downloads/air-quality/research/reports/emissions-inventory/5822111300fy2021-20210423-erg-texn2-update.pdf

exploration and production industry, a 2015 survey of oil and gas exploration and production companies was used to develop updated drilling rig emissions characterization profiles.[9] The drilling rig emissions characterization profiles from this study were combined with 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.[10] 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.[11] 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 SIP revision includes preliminary on-road EIs developed using MOVES3. Updated on-road EIs and emissions factors were developed using the EPA's mobile emissions factor model, MOVES3. The MOVES3 model may be run using national default information or the default information may be modified to simulate data specific to the Bexar County 2015 ozone NAAQS nonattainment area, such as the control programs, driving behavior, meteorological conditions, and vehicle characteristics.

The TCEQ parameters reflect local conditions to the extent that local values are available; these local values are reflected in the emission factors calculated by the MOVES3 model. The localized inputs used for the on-road mobile EI development

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[9] 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

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

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

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 estimate by the MOVES3 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 (TDMs) run by the Texas Department of Transportation and/or by the local metropolitan planning organizations. The TDMs are validated against a large number of ground counts, i.e., traffic passing over counters placed in various locations throughout a county or area. For SIP 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 MOVES3 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 the TCEQ's Air Quality Research and Contract Projects webpage (https://www.tceq.texas.gov/airquality/airmod/project/pj.html).

CHAPTER 3: PHOTOCHEMICAL MODELING

3.1 INTRODUCTION

This chapter describes attainment demonstration (AD) modeling conducted in support of this proposed state implementation plan (SIP) revision. The Texas Commission on Environmental Quality (TCEQ) followed procedures recommended for AD modeling for the eight-hour ozone National Ambient Air Quality Standard (NAAQS) in the United States Environmental Protection Agency's (EPA) November 2018 *Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze* EPA, 2018; (referred to as the EPA modeling guidance).

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

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

3.2 MODELING EPISODE

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

One of the recommended criteria for selecting a modeling episode is that the episode be in the recent past and that it contains a sufficient number of exceedance days. Exceedance days are defined as days when at least one regulatory monitor in the area had a Maximum Daily Eight-Hour Average (MDA8) ozone concentration that exceeded the 2015 ozone NAAQS of 70 parts per billion (ppb). Figure 3-1: *Exceedance Days in the Bexar County 2015 Ozone NAAQS Nonattainment Area by Year from 2012 through 2021* shows the number of exceedance days across Bexar County by year over a 10-year period. While there were a higher number of ozone exceedance days earlier in the decade shown, 2019 had 4 exceedance days which is similar to the number of exceedance days as 2014, 2016, and 2017 but lower than the years 2018, 2020, and 2021.

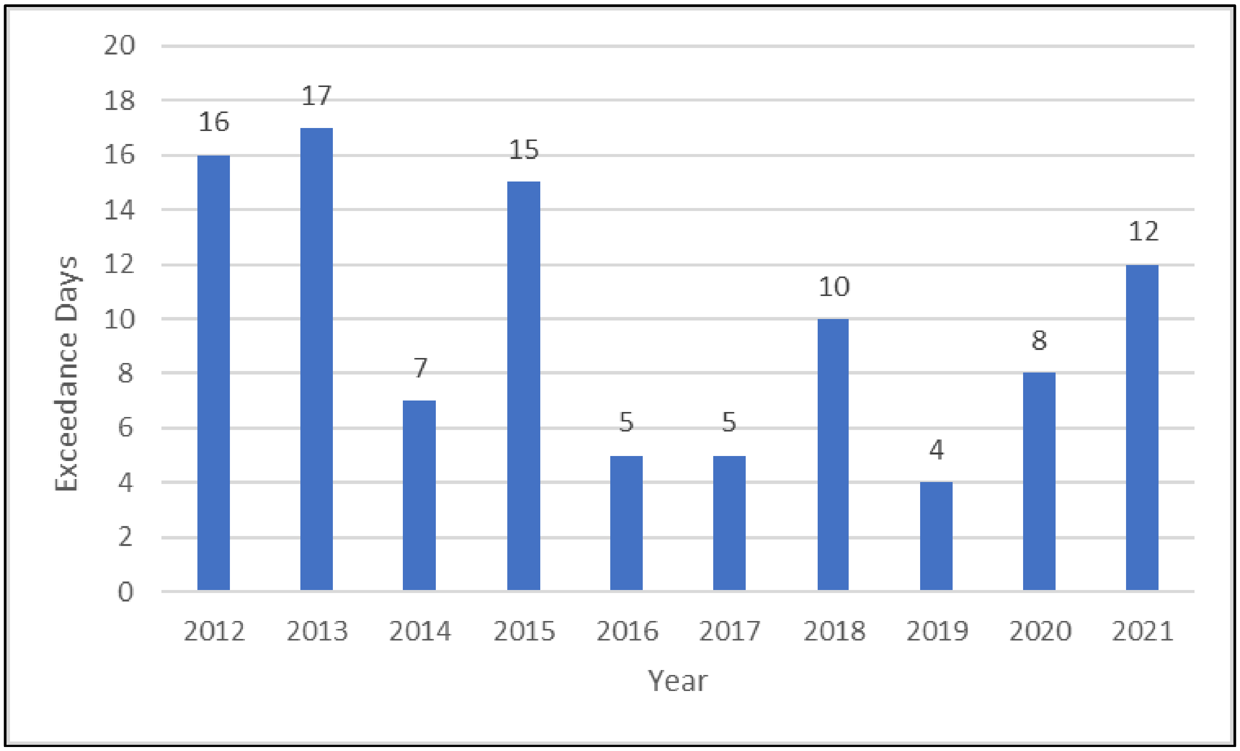

Figure 3-1: Exceedance Days in the Bexar County 2015 Ozone NAAQS Nonattainment Area by Year from 2012 through 2021

In selecting a modeling episode, the EPA recommends that the exceedance days follow historically observed temporal trends. Figure 3-2: *Exceedance Days by Month from 2012 through 2021 in the Bexar County 2015 Ozone NAAQS Nonattainment Area* shows the frequency of exceedance days for the 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 area 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.

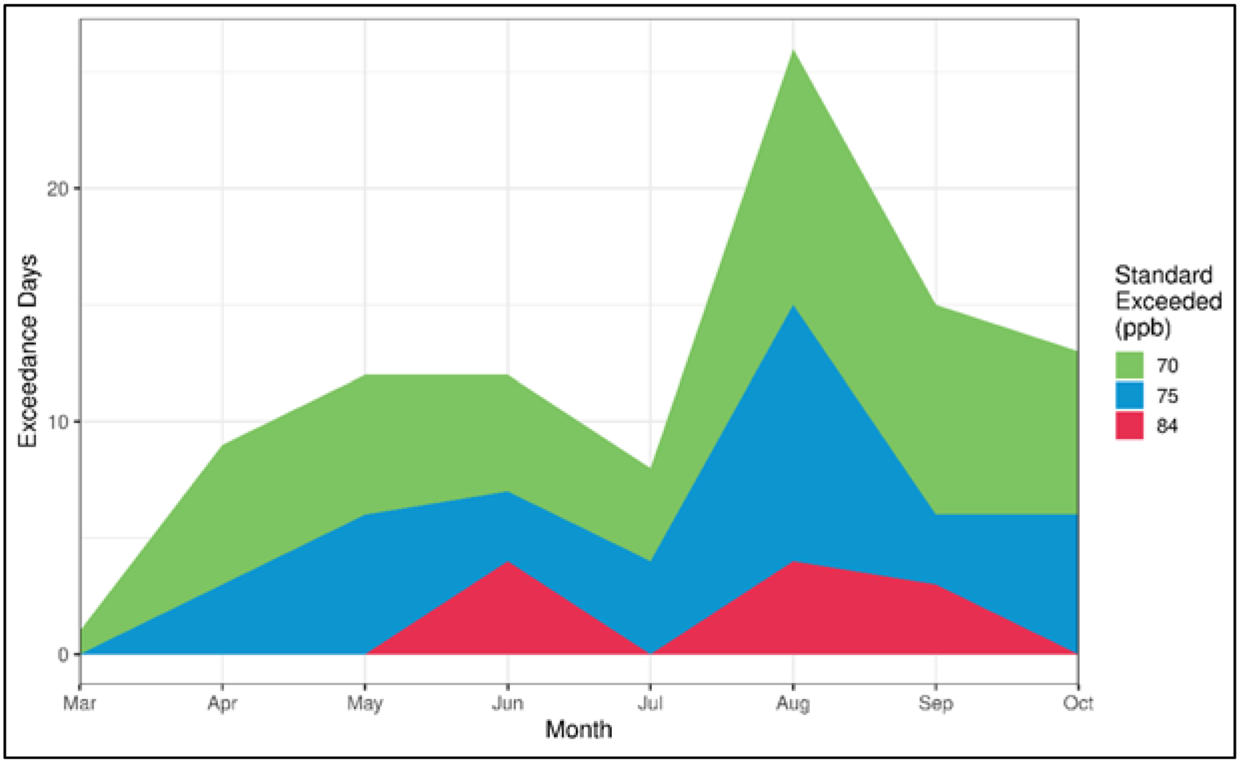

Figure 3-2: Exceedance Days by Month from 2012 through 2021 in the Bexar County 2015 Ozone NAAQS Nonattainment Area

Figure 3-3: *Map of Regulatory Ozone Monitors in Bexar County 2015 Ozone NAAQS Nonattainment Area* shows the locations of the three regulatory ozone monitors in Bexar.[12]

[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.

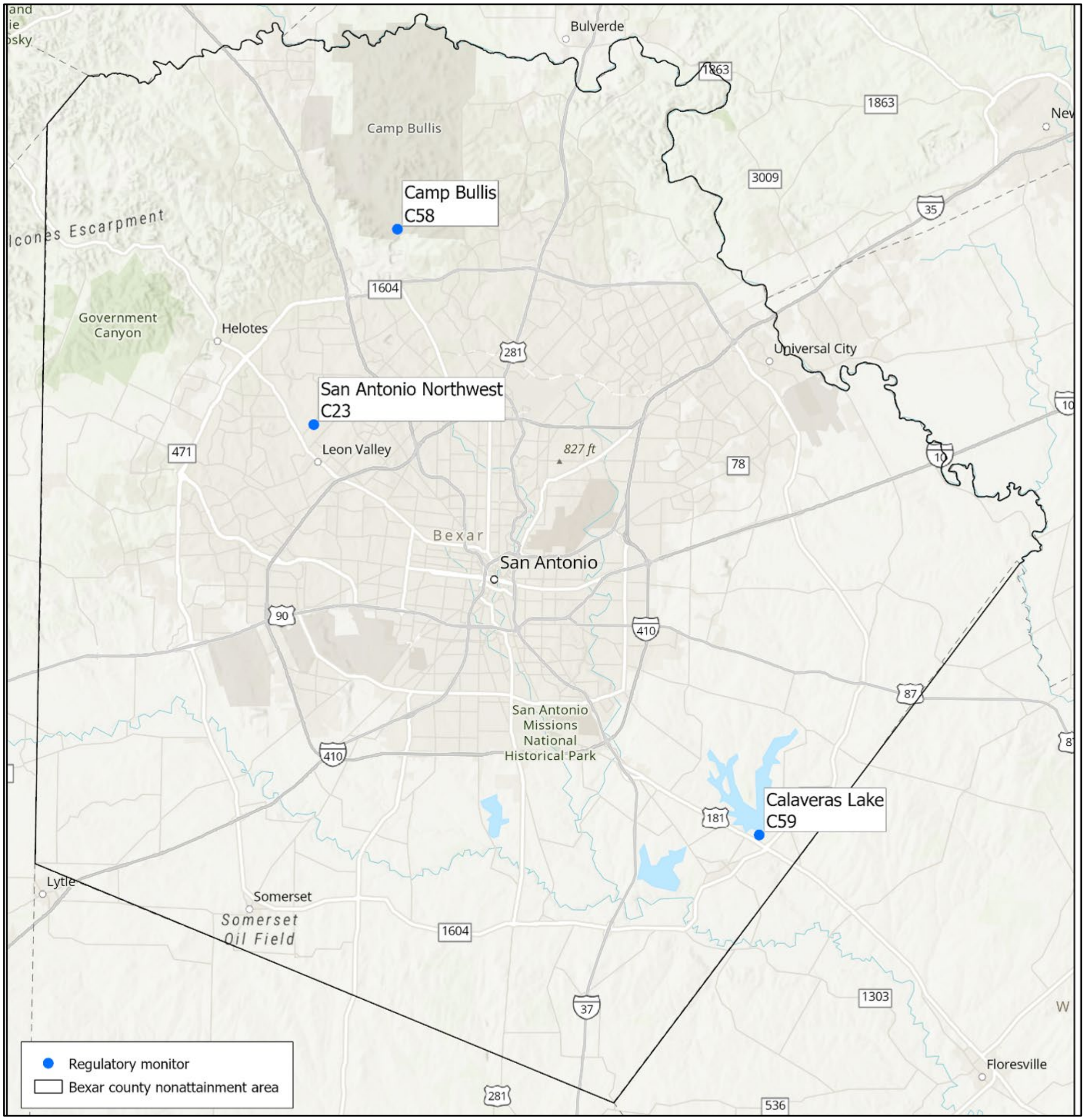

Figure 3-3: Map of Regulatory Monitors in Bexar County 2015 Ozone NAAQS Nonattainment Area

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: *Exceedance Days and Ozone Conditions from April through October 2019 Modeling Episode at Regulatory Monitors* indicate 10 days above 60 ppb for two regulatory monitors, and only six days above 60 ppb for the remaining regulatory monitor. All three regulatory monitors in Bexar County have at least the five days over 60 ppb recommended in the EPA modeling guidance, one of the criteria used by the TCEQ for selecting the April 1 through October 31, 2019, modeling episode.

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

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 this assessment and of the episode selection used by the TCEQ are provided in Section 1.2: *Modeling Episode* of Appendix A.

3.3 PHOTOCHEMICAL MODELING

The TCEQ used the Comprehensive Air Quality Model with Extension (CAMx), version 7.20, for this AD modeling. The model software and the CAMx user's guide are publicly available (Ramboll, 2018). The TCEQ's choice of CAMx is in line with the criteria specified in the EPA modeling guidance for model selection.

3.3.1 Modeling Domains

CAMx was configured with three nested domains: a 36-kilometer (km) grid resolution domain (named na_36km) covering most of North America, a 12 km grid resolution domain (named us_12km) covering the continental United States, and a 4 km grid resolution domain (named txs_4km) covering central and east Texas. Dimensions of the CAMx domains are shown in Table 3-2: *CAMx Horizontal Domain Parameters*. A map showing the geographic extent of each domain is shown in Figure 3-4: *CAMx Domains*. The Bexar County 2015 ozone NAAQS nonattainment area is contained within txs_4km, the finest resolution 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

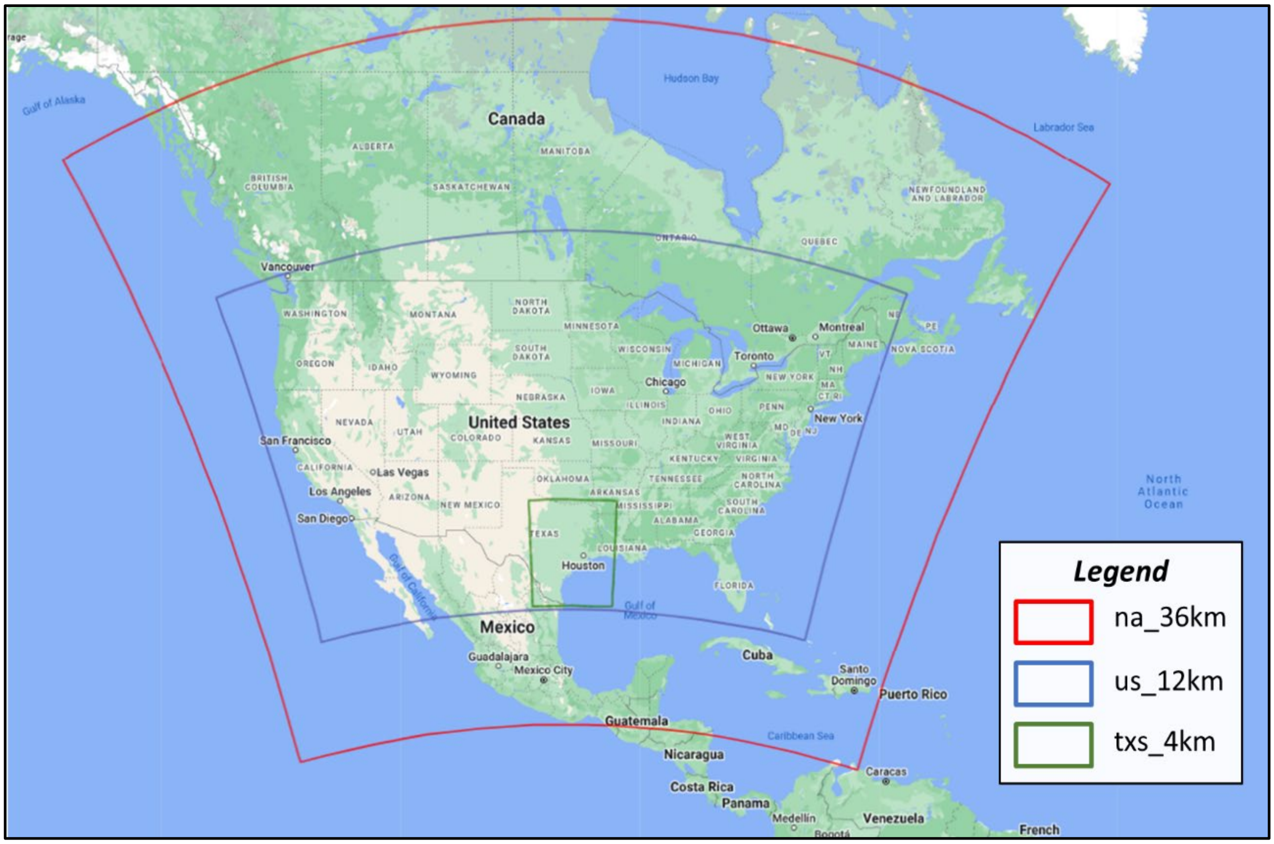

Figure 3-4: CAMx Domains

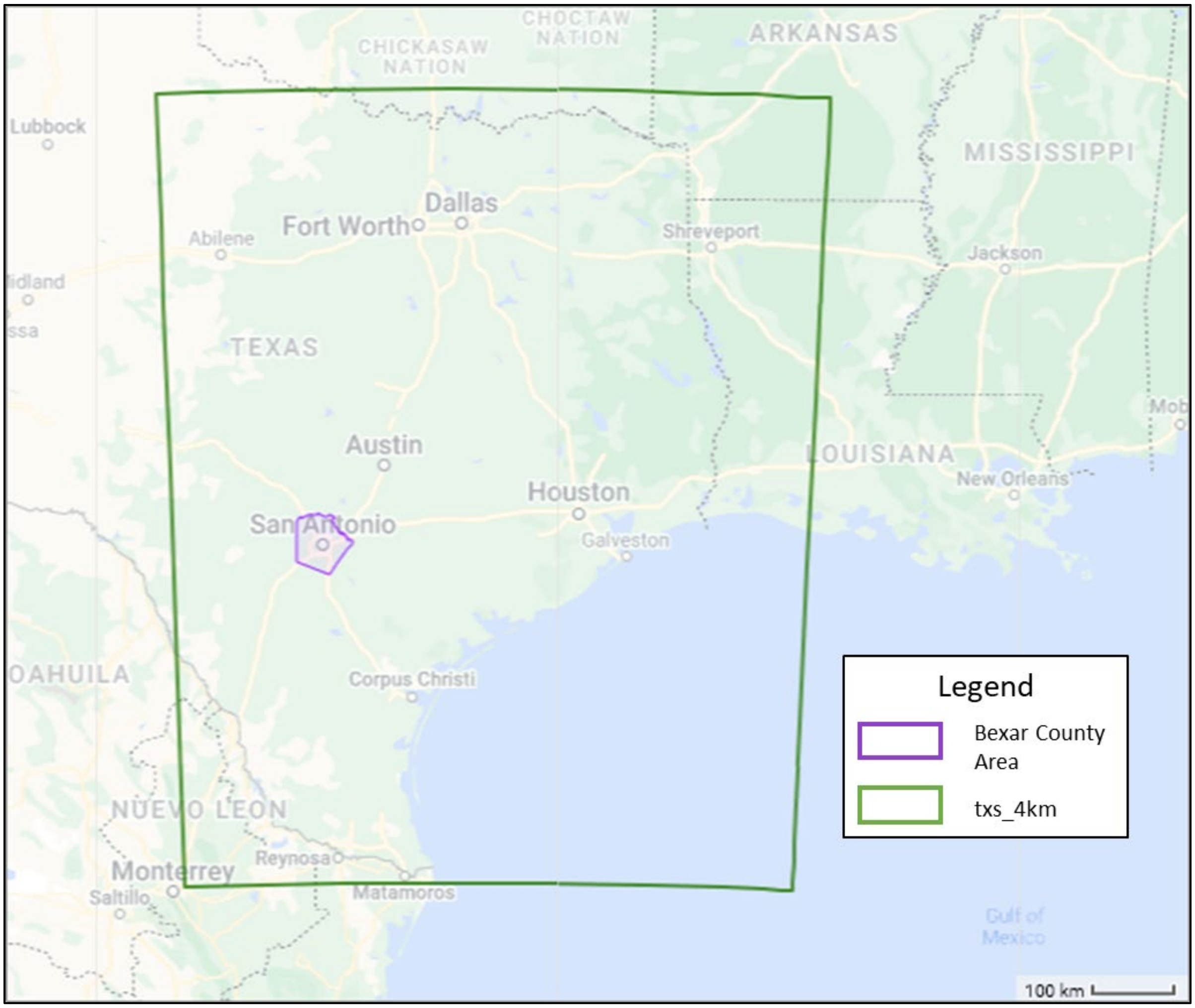

Figure 3-5: The Bexar County 2015 Ozone NAAQS Nonattainment Area and the txs_4km CAMx Domain

3.3.2 CAMx Options

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

Table 3-3: CAMx Configuration Options

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

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

3.4 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

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

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

Figure 3-6: WRF and CAMx Domains

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

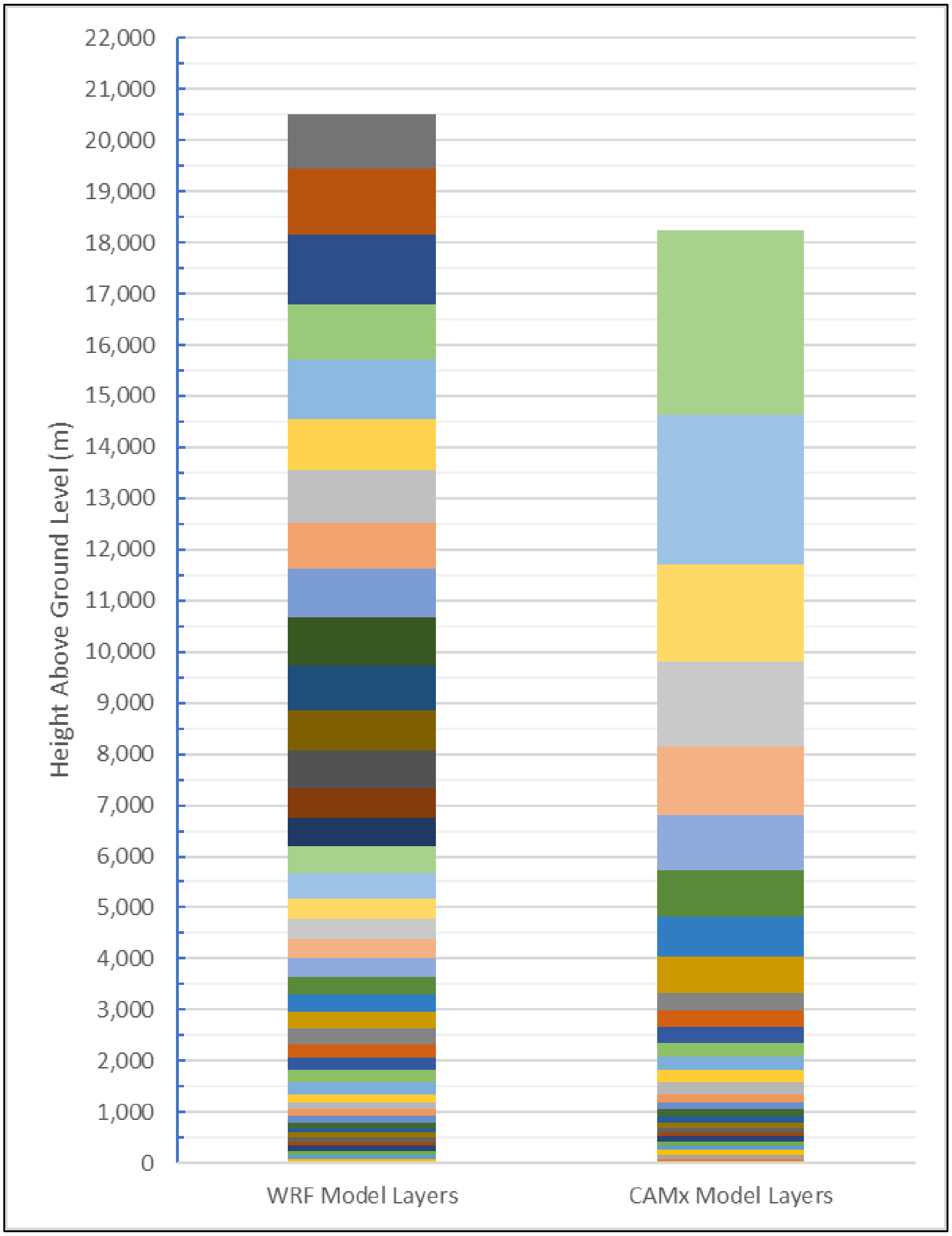

Figure 3-7: WRF and CAMx Vertical Layers for txs_4km Domain

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

3.4.2 Emissions Inputs

Model-ready hourly emissions were developed for the April through October episode for the 2019 base case and the 2023 future case. The sections below provide an overview of the emission inputs used in this AD SIP modeling; more details about emissions inventory development are provided in Section 3: *Emissions Modeling* of Appendix A.

Emission inputs, or modeling emission inventories (EI), include emission 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 emission sources (e.g., fires). 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 are listed in Table 3-4: *EI Data Sources for the TCEQ 2019 Base Case*. A variety of datasets and interpolation techniques were used to develop the EI for the 2023 future case, which are described in Appendix A.

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

EI Source Category	Sector/Geographic area	Datasets 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 nonattainment areas	MOVES3[18] - link-based
Mobile	On-Road, other	MOVES3 - county based
Mobile	Non-Road, TX	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 nonattainment areas	Texas Trasportation Institute (TTI) 2020 data
Mobile	Off-Road Airports, other	EPA 2016v1 modeling platform
Mobile	Off-Road Locomotives, TX nonattainment areas	TTI 2019 data; Other: EPA 2016v1 modeling platform
Mobile	Off-Road Locomotives, other	EPA 2016v1 modeling platform

[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/latest-version-motor-vehicle-emission-simulator-moves

EI Source Category	Sector/Geographic area	Datasets and/or Models used for 2019 EI
Area	Area TX	2020 Air Emissions Reporting Requirements (AERR)
Area	Area Non-TX	EPA 2017 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 model episode day of June 12 in the 2019 base case and 2023 future case from within the Bexar County 2015 ozone NAAQS nonattainment area 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 2023 Future Case Anthropogenic EI in the Bexar County 2015 Ozone NAAQS Nonattainment Area.* The June 12 was sample episode day chosen because it had high monitored ozone in the nonattainment area. Mobile sources contributed the greatest amount of NO_X and CO emissions in the area. Area sources contributed the greatest amount of 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	28.26	14.95	281.22
Non-Road	7.82	11.36	222.92
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	8.13
Point - Non-EGU	8.73	4.33	3.41
Bexar County Total	**64.07**	**115.47**	**531.75**

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

Source Category	NO_X (tpd)	VOC (tpd)	CO (tpd)
On-Road	20.61	12.37	257.76
Non-Road	6.99	11.92	241.36
Off-Road - Airports	1.72	0.59	5.38
Off-Road - Locomotives	1.48	0.07	0.45

[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)
Area Sources	5.53	81.14	10.10
Oil and Gas - Drilling	0.00	0.00	0.00
Oil and Gas - Production	1.71	6.38	2.59
Point - EGU	10.08	0.33	3.41
Point - Non-EGU	9.33	4.91	6.05
Bexar County Total	57.45	117.71	527.10
Difference between 2023 and 2019	**-6.62**	**2.24**	**-4.65**

While emissions for categories described in Table 3-4 are projected to 2023, the anthropogenic emissions from other categories are held constant with the 2019 values used for 2023 future case. The emissions from non-US, non-Canada, and non-Mexico countries within the modeling domain and from natural source categories, including fire and biogenic categories, are held constant. While individual sectors in Table 3-6 increase in emissions between 2019 and 2023, there is an overall decrease in NO_X and CO emissions but an increase in VOC emissions.

Figure 3-8: *Difference in Anthropogenic NO_X between 2023 Future and 2019 Base Case on June 12 Modeled Episode Day*, shows how the difference in total anthropogenic NO_X emissions between future and base case are distributed spatially within the Bexar County area. Figure 3-9: *Difference in Anthropogenic VOC between 2023 Future and 2019 Base Case on June 12 Modeled Episode Day* shows how the difference in total anthropogenic VOC emissions between future and base case are distributed spatially within the Bexar County area.

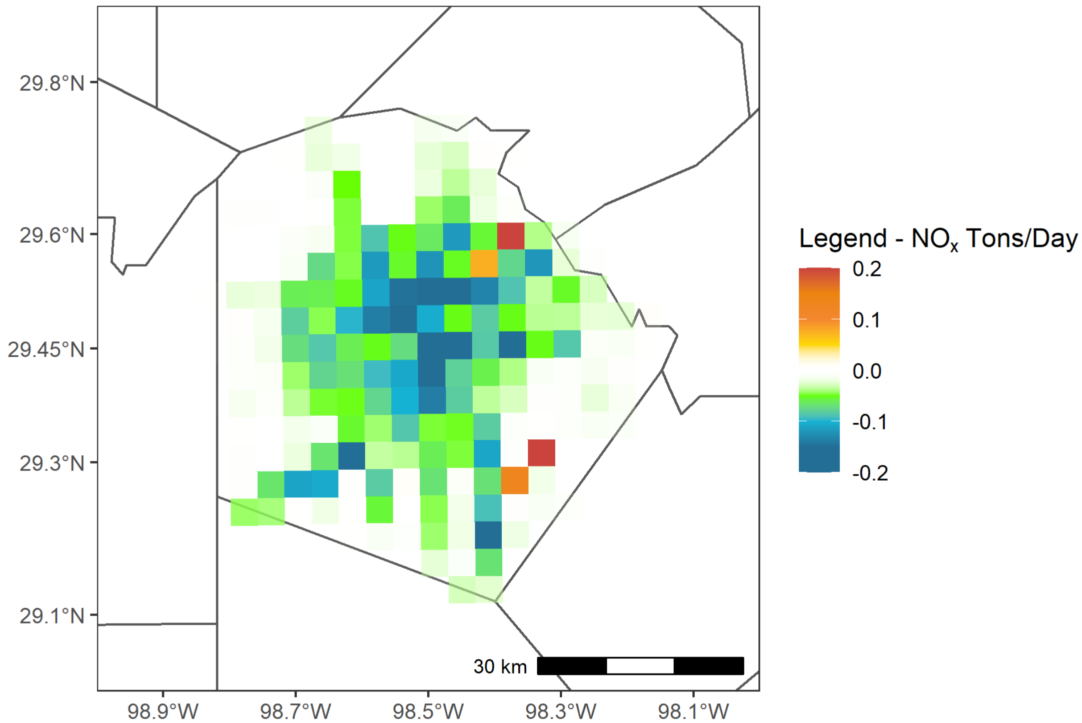

Figure 3-8: Difference in Anthropogenic NO_x between 2023 Future and 2019 Base Case on June 12 Modeled Episode Day

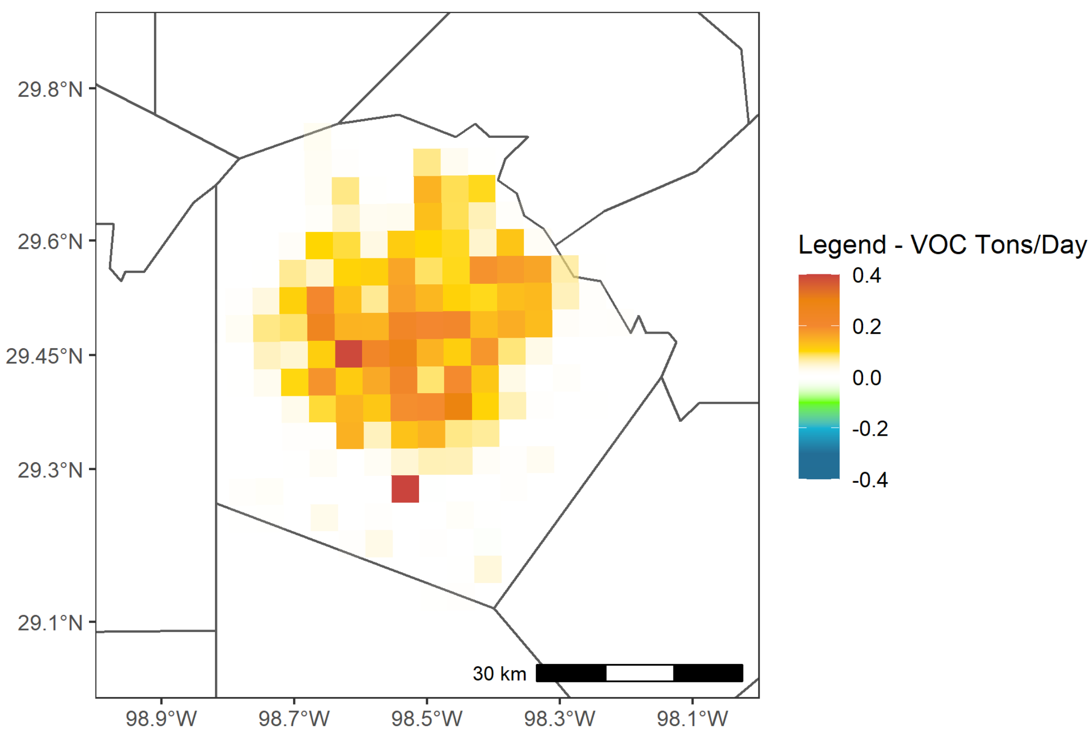

Figure 3-9: Difference in Anthropogenic VOC between 2023 Future and 2019 Base Case on June 12 Modeled Episode Day

While Figure 3-8 shows decreases in NO_X emissions between the 2023 future case and 2019 base case for almost all grid cells in the Bexar County area for the June 12 modeled episode day, there are a few grid cells in the northeast and southeast that show increases. The largest reductions are concentrated in the grid cells near the center of the county where major roadways in San Antonio are located, in line with the largest NO_X emissions decreases (7.65 tpd) coming from the on-road sector as shown in Table 3-5 and Table 3-6.

In line with the overall increase in VOC emissions between the 2023 future case and the 2019 base case, Figure 3-9 shows increases in most grid cells in the Bexar County area with the increases spread evenly over the urban geographic area and indicating the VOC emissions increases come mostly from the area source sector.

3.4.3 Initial and Boundary Condition Inputs

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

The TCEQ contracted with the University of Houston to complete the GEOS-Chem model runs necessary for IC/BC development. The GEOS-Chem model simulations incorporated an eight-month period from March through October with a two-month spin-up time (Jan and Feb). A spin-up period is the period of days that precede the actual time period of interest for modeling. The spin-up period is used to ensure that the atmospheric conditions in the model are balanced. For both modeled years, (2019 and 2023) GEOS-Chem version 12.7.1 was run at $2^{\circ} \times 2.5^{\circ}$ horizontal resolution with tropospheric chemistry with simplified secondary organic aerosols (Tropchem+simpleSOA) and 2019 meteorology from the Modern-Era Retrospective analysis for Research and Applications, Version 2 (MERRA-2). The 2023 future anthropogenic emissions were interpolated according to a moderate emission scenario from Representative Concentration Pathways (RCP4.5), with regional scaling factors for the United States, Canada, Mexico, and Asia. The 2023 and 2025 EIs from the EPA 2016v1 modeling platform were used to develop scaling factors at the county-level for the US 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

Model performance evaluation (MPE) of the base case modeling is necessary to demonstrate the ability of the model to replicate the formation and transport of ozone given the meteorological and emissions inputs. The model's ability to suitably replicate real-life conditions is necessary to have confidence in the model's simulation of the future case ozone and the response to various control measures. The MPE is performed by comparing 2019 base case CAMx modeling results to measured ozone concentrations at all regulatory and non-regulatory ozone monitoring sites in Bexar County and adjacent counties. 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 3-7: Non-Regulatory Monitors in Bexar and Adjacent Counties. Due to the small number of regulatory ozone monitors in Bexar, including the five non-regulatory ozone monitors in Bexar County and the four non-regulatory ozone monitors in adjacent counties produces more robust statistics, especially for statistics with minimum ozone cutoffs.

Table 3-7: 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
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

As recommended in the EPA modeling guidance, the TCEQ evaluations include eight-hour and one-hour performance measures calculated by comparing monitored and four-cell bi-linearly interpolated modeled ozone concentrations for all episode days and monitors. Statistical evaluations were compared to benchmarks set by Emery et al. (2017) which were based on a meta-analysis of the model performance statistics reported in peer-reviewed photochemical modeling studies. Normalized Mean Bias (NMB) values between -5 and 5% are within the 'goal' range indicate the best performance that a model can be expected to achieve. NMB values within -15 to 15% are within the 'criteria' range and indicate acceptable model performance. For Normalized Mean Error (NME), values less than 15% are within the goal range and values within 25% are within the criteria range.

The NMB and NME for high-ozone days with observed MDA8 ozone concentrations at or above 60 ppb for each ozone monitoring site in Bexar and adjacent counties for the whole modeling episode is presented in Figure 3-10: *NMB for MDA8 Ozone of at least 60 ppb in April through October 2019* and Figure 3-11: *NME for MDA8 Ozone of at least 60 ppb in April through October 2019*. Figure 3-10 shows that all ozone monitors in Bexar and adjacent counties have NMB within the criteria range and all but three show NMB values within the goal range. 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. This indicates acceptable model performance for all sites and good model performance for Camp Bullis and San Antonio Northwest.

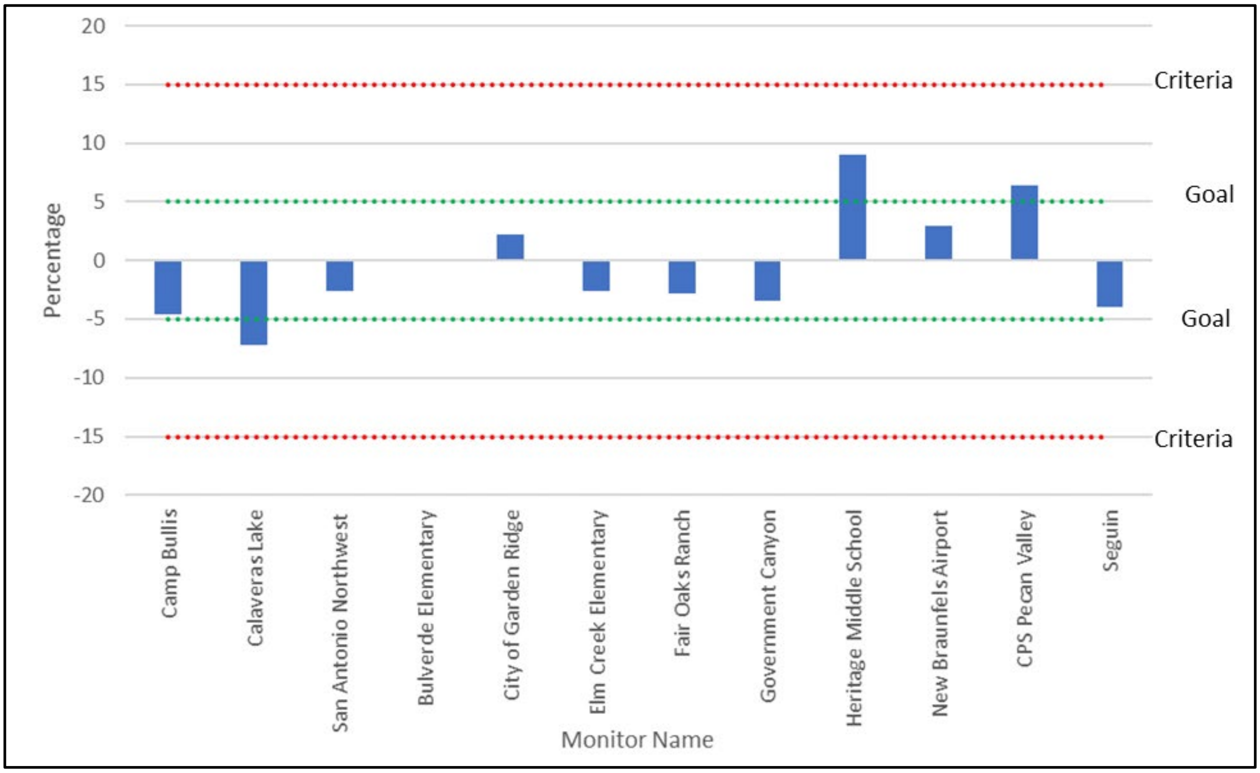

Figure 3-10: NMB for MDA8 Ozone of at least 60 ppb in April through October 2019

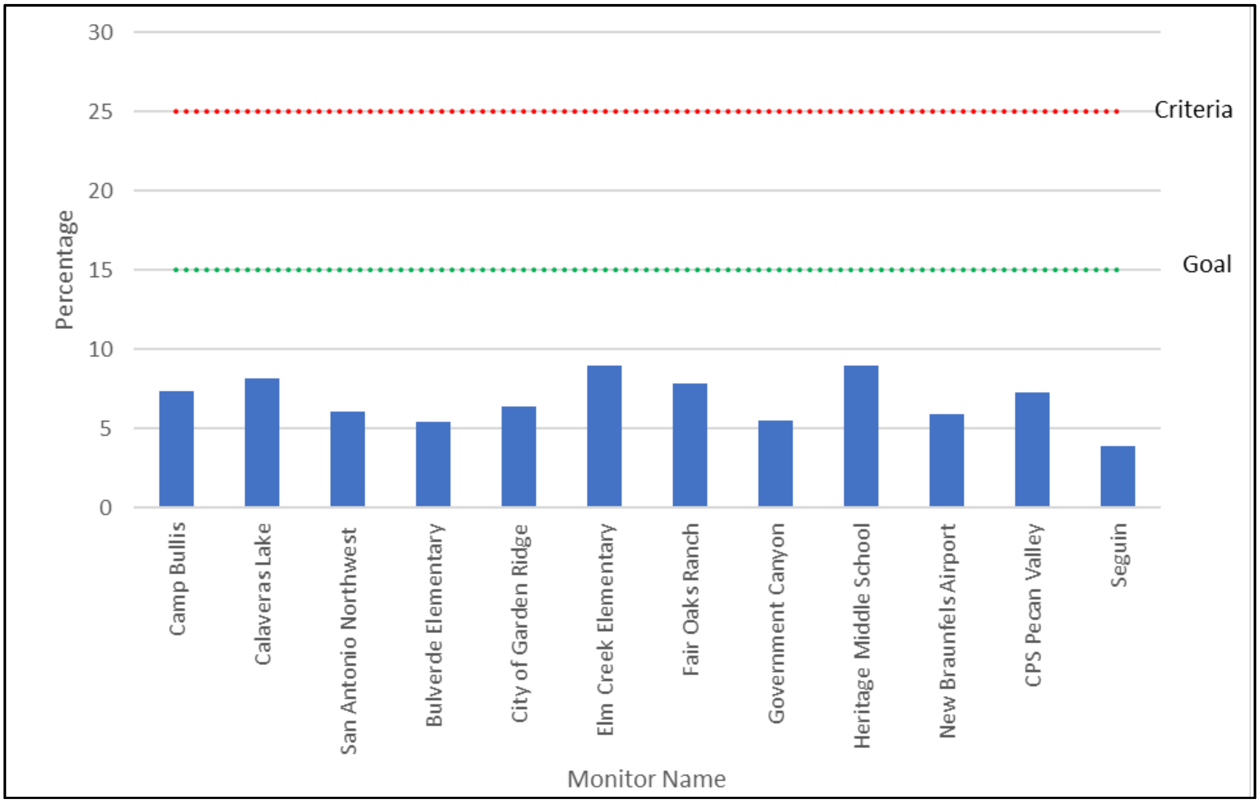

Figure 3-11: NME for MDA8 Ozone of at least 60 ppb in April through October 2019

Figure 3-11 shows that all monitors in Bexar and adjacent counties have NME within the goal range and all less than 10 percent NME. This indicates good model performance for regulatory and non-regulatory monitors in the Bexar County and adjacent counties. In addition to the episode-wide evaluation of model performance shown in Figure 3-10 and Figure 3-11, an evaluation of modeled eight-hour ozone concentrations for Bexar County and nearby counties for each month is presented in Table 3-8: *NMB and NME of Eight-hour Ozone in Bexar and Adjacent Counties.* The values represent monthly and seven-month averages from the 12 monitors in Bexar and adjacent counties shown in Figure 3-3. When evaluated for eight-hour observations (obs) over 40 ppb typical of daytime values, the NMB is positive in all months and within the criteria range in all months except May. The NMB values for MDA8 are within the criteria range except for April through June and always positive, with May and April showing the most positive bias. NMB values when the MDA8 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 are within the criteria value of 25% for each month except May, all months when observed ozone is over 40 ppb, and all months when the observed MDA8 is over 60 ppb. The NME values for the highest observed ozone days are within the 15% goal range and like for individual monitors, all under 10 percent. Model performance is acceptable for each month and the entire episode, with May and April showing the poorest performance.

Table 3-8: NMB and NME of Eight-hour Ozone in Bexar and Adjacent Counties

Month	NMB All Obs ≥ 40 ppb (%)	NME All Obs ≥ 40 ppb (%)	NMB Daily Max (%)	NME Daily Max (%)	NMB Daily Max Obs ≥ 60 ppb (%)	NME Daily Max Obs ≥ 60 ppb (%)
Apr	1.04	10.18	16.58	21.60	-5.51	6.04
May	18.5	20.19	39.52	40.22	(no obs ≥ 60 ppb)	(no obs ≥ 60 ppb)
Jun	3.55	11.59	15.24	21.76	-4.83	8.61
Jul	9.49	11.76	13.70	16.08	3.95	7.25
Aug	1.36	9.03	7.13	11.58	-6.24	9.77
Sep	9.27	12.35	10.16	14.19	-2.90	6.50
Oct	2.18	9.19	7.76	12.66	0.29	5.09
Apr through Oct	5.59	11.60	15.53	19.55	-2.13	7.11

Additional detailed evaluations are included in Section 5: *Photochemical Model Performance Evaluation* of Appendix A.

3.6 ATTAINMENT TEST

In accordance with EPA modeling guidance, the top 10 base case episode days with modeled MDA8 above 60 ppb, per monitor, were used for the modeled attainment test. The relative response factor (RRF) that is used in the attainment test was calculated based on the EPA modeling guidance as follow:

- from the 2019 base case modeling, the maximum concentrations of the three-by-three grid cell array surrounding each monitor were averaged over top-10 modeled days to produce the top-10 day average base case MDA8 values;
- from the 2023 future case modeling, the concentrations from the corresponding base case top-10 modeled days and maximum grid cells were averaged to calculate the future case top-10 day average future MDA8 values; and
- the RRF was calculated for each monitor as a ratio of the top-10 day average future MDA8 values to the top-10 day average base case MDA8 values.

All regulatory ozone monitors in the Bexar County area had 10 modeled base case days above 60 ppb as well as over five days of observed MDA8 over 60 ppb in 2019. Since these monitors all meet EPA modeling guidance recommendations, they were included in the attainment test. The RRF for each monitor is shown in Table 3-8: *Monitor-Specific Relative Response Factors for Attainment Test.*

Table 3-9: Monitor-Specific Relative Response Factors for Attainment Test

Monitor Name	CAMS Number	2019 Top 10-Days Modeled MDA8 Mean (ppb)	2023 Top 10-Days Modeled MDA8 Mean (ppb)	Relative Response Factor
Camp Bullis	0058	70.45	70.09	0.995
Calaveras Lake	0059	67.74	67.74	0.998
San Antonio Northwest	0023	73.06	72.76	0.996

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

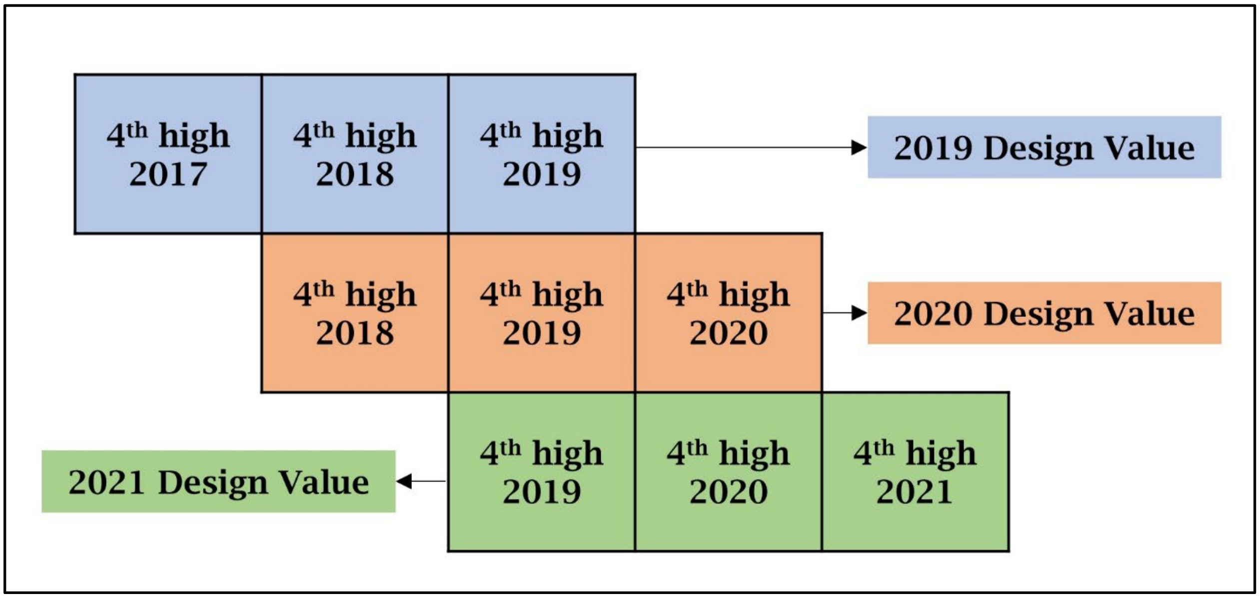

Figure 3-12: Example Calculation of 2019 DVB

In accordance with the EPA modeling guidance, the final DVF is obtained by rounding to the tenths digit and truncating to zero decimal places. The 2023 DVFs are presented in Table 3-10: *Summary of the 2023 DVF for the Attainment Test* and Figure 3-14: *2023 DVF in the Bexar County 2015 Ozone NAAQS Nonattainment Area*. Application of the attainment test results in two monitors above the 2015 eight-hour ozone standard of 70 ppb in 2023, with both Camp Bullis and San Antonio Northwest at 71 ppb.

Table 3-10: Summary of the 2023 DVF for the Attainment Test

Monitor Name	CAMS Number	2019 Base Case DVB (ppb)	2023 Pre-rounded DVF (ppb)	2023 Truncated DVF (ppb)
Camp Bullis	0058	72.00	71.63	71
Calaveras Lake	0059	65.67	65.51	65
San Antonio Northwest	0023	72.00	71.70	71

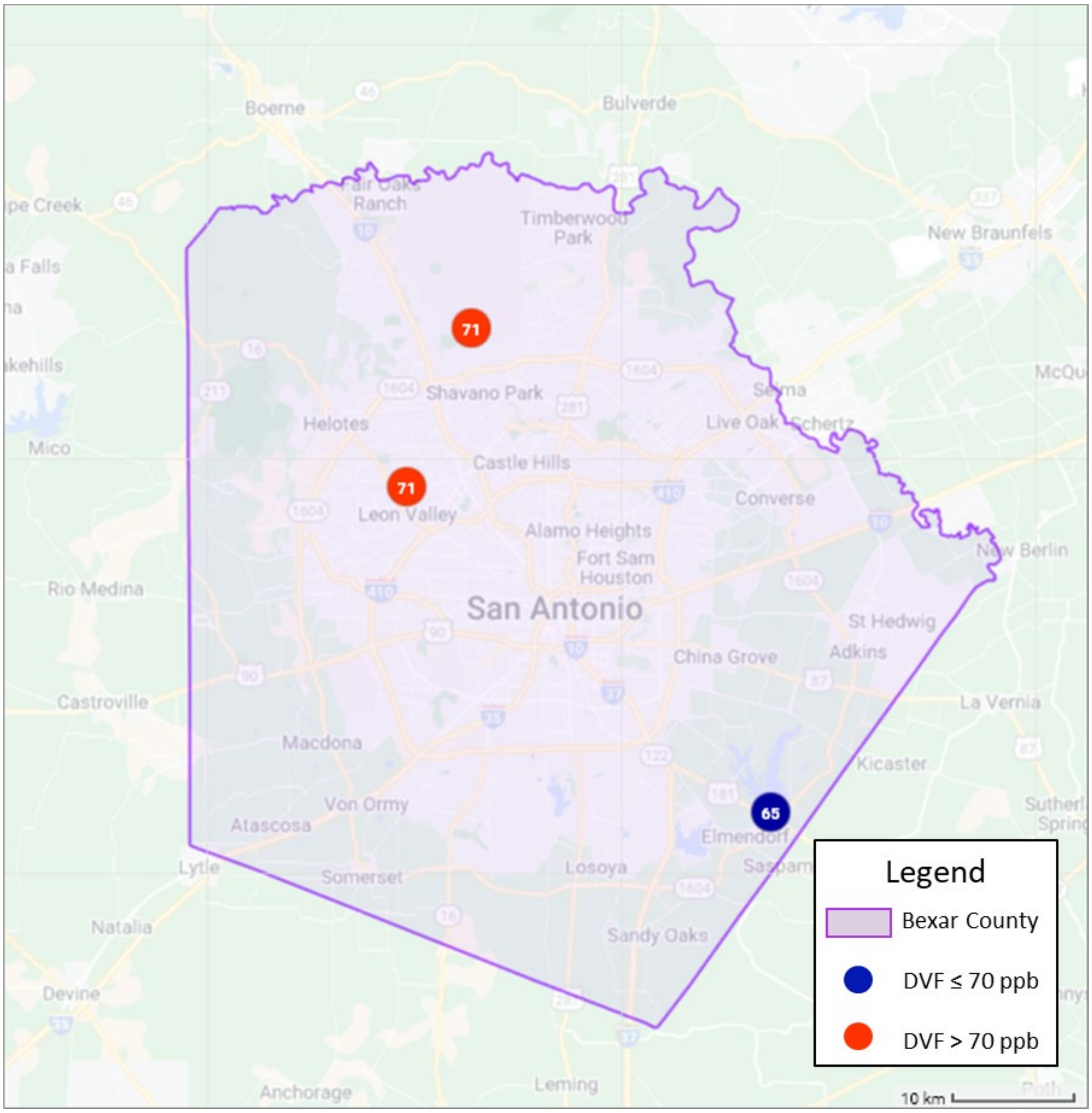

Figure 3-13: 2023 DVF in the Bexar County 2015 Ozone NAAQS Nonattainment Area

3.7 MODELING REFERENCES

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CHAPTER 4: CONTROL STRATEGIES AND REQUIRED ELEMENTS

4.1 INTRODUCTION

The Bexar County 2015 ozone National Ambient Air Quality Standard (NAAQS) nonattainment area, which consists of Bexar County, 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. This chapter describes existing ozone control measures for Bexar County and establishes a commitment from the TCEQ Executive Director to submit for the Commission's consideration, a proposed reasonably available control technology (RACT) analysis as well as proposed regulations to implement RACT requirements, if any are needed. The RACT analysis and any regulations will be submitted to the United States Environmental Protection Agency (EPA) by May 7, 2024.

4.2 EXISTING CONTROL MEASURES

Bexar County has existing VOC and NO_x regulations which were promulgated during the 1970's when the county was not attaining the photochemical oxidants air quality standard, the predecessor to the 1-Hour Ozone (1979) NAAQS. Additional VOC regulations were added in response to requests described in the Austin, San Antonio and Northeast Texas Early Action Compact SIP revisions for the 1997 eight-hour ozone standard, submitted to the EPA in 2004. Bexar County has also been included in NO_x regulations affecting East and Central Texas and various statewide and regional rules designed to address ozone affecting other Texas ozone nonattainment areas. Statewide requirements such as those for windshield washer fluid also apply to Bexar County. Table 4-1: *Existing Ozone Control and Voluntary Measures Applicable to Bexar County* lists the existing ozone control strategies that have been implemented for the 1979 one-hour ozone NAAQS and the 1997 and 2008 eight-hour ozone NAAQS and are applicable in Bexar County.

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

Measure	Description	Start Date(s)
VOC Storage Rules 30 Texas Administrative Code (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
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
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 (EPA-450/2-77-025)	December 31, 1973

Measure	Description	Start Date(s)
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 (EPA-450/2-77-035).	December 31, 1973
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
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-450/2-77-022)	May 7, 1979
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	Captures gasoline vapors that are released when gasoline is delivered to a storage tank Vapors returned to tank truck as storage tank is filled with fuel, rather than released into ambient air	1979 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
Natural Gas-Fired Small Boilers, Process Heaters, and Water Heaters 30 TAC Chapter 117, Subchapter E, Division 3	NO_X emission limits on small-scale residential and industrial boilers, process heaters, and water heaters equal to or less than 2.0 million British thermal units per hour (state-wide rule)	July 1, 2002
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

Measure	Description	Start Date(s)
Texas Emissions Reduction Plan (TERP) 30 TAC Chapter 114, Subchapter K	Provides grant funds for on-road and non-road heavy-duty diesel engine replacement/retrofit.	January 2002 See Section 5.3.2.4: *Texas Emissions Reduction Plan (TERP)*
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
California Gasoline Engines	California standards for non-road gasoline engines 25 horsepower and larger	May 1, 2004
Voluntary Energy Efficiency/Renewable Energy (EE/RE)	See Section 5.3.2.2: *Energy Efficiency and Renewable Energy Measures*	See Section 5.3.2.2
Federal On-Road Measures	Series of emissions limits implemented by the EPA for on-road vehicles Included in measures: Tier 1, Tier 2, and Tier 3 light-duty and medium- duty passenger vehicle standards, heavy-duty vehicle standards, low sulfur diesel standards, National Low Emission Vehicle standards, and reformulated gasoline	Phase in through 2010 Tier 3 phase in from 2017 through 2025
Federal Area/Non- Road Measures	Series of emissions limits implemented by the EPA for area and non-road sources Examples: diesel and gasoline engine standards for locomotives and leaf- blowers	Phase in through 2018

4.3 NEW CONTROL MEASURES

In addition to the required moderate attainment demonstration (AD) and reasonable further progress (RFP) SIP revisions, the state is also required to implement a vehicle emissions inspection and maintenance (I/M) program in Bexar County. The FCAA and 40 Code of Federal Regulations (CFR) Part 51, as amended, require a basic vehicle emissions I/M program in ozone nonattainment areas classified as moderate. Rulemaking is required to implement I/M and set the testing fee applicable in Bexar County, and a SIP revision is required to incorporate a Bexar County I/M program into the SIP. The concurrent proposed rulemaking (Project No. 2022-026-114-AI) and SIP revision (Project No. 2022-027-SIP-NR) would satisfy the I/M requirements for Bexar County.

4.4 RACT ANALYSIS

Ozone nonattainment areas classified as moderate and above are required to meet the mandates of the federal Clean Air Act (FCAA) under §172(c)(1) and §182(b)(2) and (f). According to the 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 control techniques guidelines (CTG) or alternative control techniques (ACT) as well as any non-ACT/CTG category sources that are classified as major stationary sources of nitrogen oxides or VOC (83 *Federal Register* (FR) 62998). On October 7, 2022, the EPA published a final notice reclassifying Bexar County from marginal to moderate nonattainment for the 2015 eight-hour ozone NAAQS, effective November 7, 2022 (87 FR 60897).

This proposed SIP revision does not include a RACT analysis. Additional time is required for the TCEQ to complete the RACT analysis for the Bexar County area and this proposed SIP revision establishes a commitment from the TCEQ Executive Director to submit for the Commission's consideration a proposed RACT analysis as well as proposed regulations to implement RACT requirements, if any are needed. The TCEQ intends to propose a Bexar County RACT SIP revision later in 2023. The final adopted RACT analysis and any regulations to implement RACT will be submitted to the EPA by May 7, 2024.

4.5 RACM ANALYSIS

4.5.1 General Discussion

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

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

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

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

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

4.5.2 Results of the RACM Analysis

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

4.6 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 3 of the Motor Vehicle Emission Simulator (MOVES3) model. The resulting MVEBs are shown in Table 4-2: *2023 Attainment Demonstration MVEBs for the Bexar County 2015Ozone NAAQS Nonattainment Area*.

Table 4-2: 2023 Attainment Demonstration MVEB for the Bexar County 2015 Ozone NAAQS Nonattainment Area (tons per day)

Description	NO_x (tpd)	VOC (tpd)
2023 On-Road MVEBs based on MOVES3	20.61	12.37

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

4.7 MONITORING NETWORK

The ambient air quality monitoring network provides data to verify the attainment status of the 2015 eight-hour ozone NAAQS. The TCEQ monitoring network in the San Antonio area consists of three regulatory ambient air ozone monitors in Bexar County. The 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. The TCEQ commits to maintaining an air monitoring network to meet EPA regulatory requirements in the San Antonio area. The TCEQ continues to work with the EPA through the air monitoring network review process, as required by 40 CFR Part 58, to determine: the adequacy of the ozone monitoring network; additional monitoring needs; and recommended monitor decommissions. Details regarding the annual review of the air monitoring network are located on the TCEQ's Air Monitoring Network Plans webpage (https://www.tceq.texas.gov/airquality/monops/past_network_reviews). Air monitoring data from these monitors continue to be quality assured, reported, and certified according to 40 CFR Part 58.

4.8 CONTINGENCY PLAN

AD SIP revisions for nonattainment areas are required by FCAA, §172(c)(9) to provide for specific contingency measures that would take effect and result in emissions reductions if an area fails to attain a NAAQS by the applicable attainment date or fails to demonstrate reasonable further progress. Recent court decisions have invalidated key aspects of EPA's historical approach to implementing the contingency measure requirement. At the time the proposed SIP revision was being developed, the EPA had historically accepted the use of surplus mobile source emissions reductions from previously implemented federal rules to fulfill the contingency measure requirements. However, the EPA's new draft guidance on contingency measures, published in the *Federal Register* for public comment on March 23, 2023 (88 FR 17571), indicates that contingency measures must be conditional and prospective (not previously implemented) based on the recent court rulings. The draft guidance also establishes an entirely new scheme for determining the amount of emissions reductions necessary to address the contingency requirement.

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

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

This proposed Bexar County AD SIP revision uses the 2017 RFP base year inventory from the concurrent Bexar County Moderate Area RFP SIP Revision for the 2015 Eight-Hour Ozone NAAQS (Project Number 2022-024-SIP-NR) as the inventory from which to calculate the required 3% contingency reductions. The 3% contingency analysis for 2024 is based on a 1.5% reduction in NO_x and a 1.5% reduction in VOC, to be achieved during the one-year period from January 1, 2024 through December 31, 2024. Analyses were performed to assess emissions reductions for the 2024 contingency year from the federal emissions certification programs and for fuel control programs for both on-road and non-road vehicles.

A summary of the 2024 contingency analysis is provided in Table 4-3: *2024* Bexar *County 2015 Ozone NAAQS Nonattainment Area Attainment Contingency Demonstration (tons per day).* The analysis demonstrates that the 2024 contingency reductions exceed the 3% reduction requirement; therefore, the AD contingency requirement is met based on the historical approach. Additional documentation for the attainment contingency demonstration calculations is available in the Bexar County

Moderate Area RFP SIP Revision for the 2015 Eight-Hour Ozone NAAQS, which is scheduled to be proposed concurrent with this proposed AD SIP revision.

Table 4-3: 2024 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	82.27	110.28
Percent for contingency calculation (total of 3%)	1.50	1.50
2023 to 2024 AD required contingency reductions (RFP BY EI x [contingency percent])	1.23	1.65
Control reductions to meet contingency requirements		
2023 to 2024 emission reductions due to Post-1990 Federal Motor Vehicle Control Program (FMVCP), East Texas Regional Low Reid vapor pressure (RVP), 2017 Low Sulfur Gasoline Standard, ultra-low sulfur diesel, and on-road Texas Low Emissions Diesel (TxLED)	10.41	6.96
2023 to 2024 emission reductions due to federal non-road mobile new vehicle certification standards and non-road TxLED	0.25	0.83
Total AD contingency reductions	10.66	7.79
Contingency Excess (+) or Shortfall (-)	**9.43**	**6.14**

4.9 ADDITIONAL FCAA REQUIREMENTS

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

Rulemaking is required to implement I/M and set the testing fee applicable in Bexar County, and a SIP revision is required to incorporate a Bexar County I/M program into the SIP. The concurrent proposed rulemaking (Project No. 2022-026-114-AI) and SIP revision (Project No. 2022-027-SIP-NR) would satisfy the I/M requirements for Bexar County. The proposed I/M SIP revision also contains the EPA-required performance standard modeling and analysis that demonstrates how the Bexar County I/M program would meet the applicable performance standard defined within the federal I/M regulations (40 CFR Part 51, subpart S) and the FCAA.

4.9.1 Nonattainment NSR Program

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

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

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

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

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

4.9.2 Stage I Vapor Recovery

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

4.10 EMISSION CREDIT GENERATION

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

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

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

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) 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 could reach attainment by September 24, 2024. The United States Environmental Protection Agency's (EPA) *Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze* (EPA 2018; referred to as the 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. First, information regarding trends in ozone and ozone precursors in the Bexar County 2015 ozone NAAQS nonattainment area are presented. This chapter also provides an overview of trends in background ozone levels transported into the nonattainment area, in ozone chemistry, and in meteorological influences on ozone. 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*.

5.2 ANALYSIS OF AMBIENT TRENDS AND EMISSIONS TRENDS

The EPA's modeling guidance states that examining recently observed air quality and emissions trends is an acceptable method to qualitatively assess progress toward attainment. Declining trends in observed concentrations of ozone and its precursors and in 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 oxides of nitrogen (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 but outside of the ozone nonattainment area that contribute to a more extensive network. Data from these monitors are discussed in Appendix B.

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](https://www.tceq.texas.gov/airquality/monops/sites/air-mon-sites) webpage (https://www.tceq.texas.gov/airquality/monops/sites/air-mon-sites). Ozone data used in this chapter are only from regulatory monitors that reports to the EPA's Air Quality System (AQS).

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 2012 through 2021. 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, growth in vehicle miles traveled, and steady to increasing trends in NO_X and VOC emissions. Some of the ozone declines may be due to meteorological effects.

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 daily-maximum eight-hour average (MDA8) ozone values at each regulatory monitor over three years. The eight-hour ozone design value for a metropolitan area is the maximum design value from all the area's regulatory monitors' individual design values. Design values of 71 ppb and greater exceed the 2015 eight-hour ozone NAAQS.

Design values have decreased in the Bexar County 2015 ozone NAAQS nonattainment area since 2012, as shown in Figure 5-1: *Eight-Hour Ozone Design Values in Bexar County 2015 Ozone NAAQS Nonattainment Area*. The 2022 eight-hour ozone design value for the nonattainment area was 75 ppb, which represents a 6% decrease from the 2012 design value of 80 ppb.

The largest decreases in design values occurred from 2013 through 2016, when it dropped by 8 ppb. After 2016, the design value has remained consistently between 72 ppb and 75 ppb. These fluctuations may be due to changes in meteorology and/or background ozone; both will be examined in later sections.

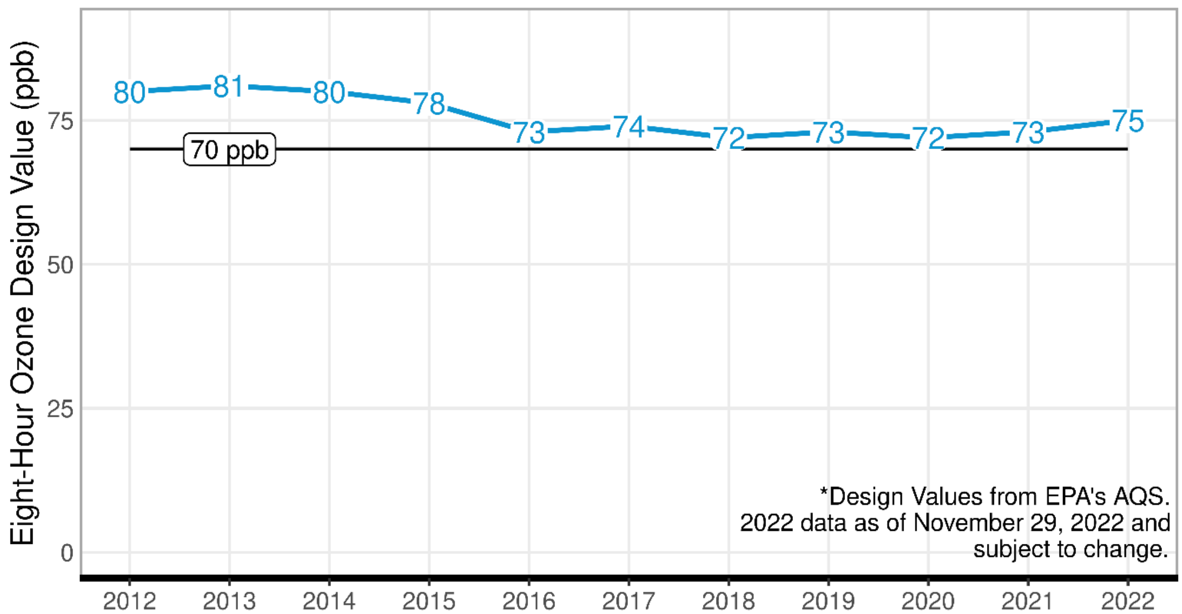

Figure 5-1: Eight-Hour Ozone Design Values in Bexar County 2015 Ozone NAAQS Nonattainment Area

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 2012 through 2022 design values at the three regulatory ozone monitors and demonstrates that the design values have decreased across the area.

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. From 2012 through 2016, Camp Bullis consistently measured a design value multiple ppb higher than San Antonio Northwest. However, from 2016 on, there has been much less variation between the two monitors' design values and there have even been years that San Antonio Northwest was the design value setting monitor.

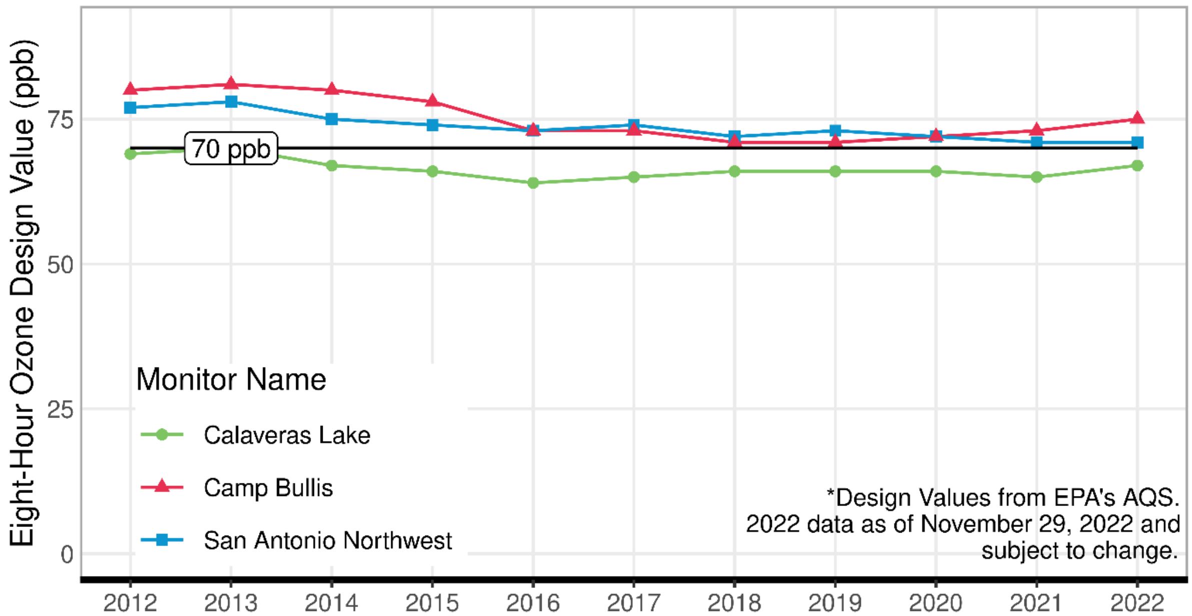

Figure 5-2: Eight-Hour Ozone Design Values by Monitor in Bexar County 2015 Ozone NAAQS Nonattainment Area

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 are less apparent. Trends in the 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 2010 though 2022 in order to examine all years used in the design value trends.

Trends show that there is more variability present in fourth-highest MDA8 ozone values when compared to design values. Fourth-highest MDA8 ozone values trended downwards from 2011 through 2016, and then stagnated from 2016 through 2022. Except for 2018, Calaveras Lake is consistently lower than the other two monitors. From 2014 through 2018, 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.,

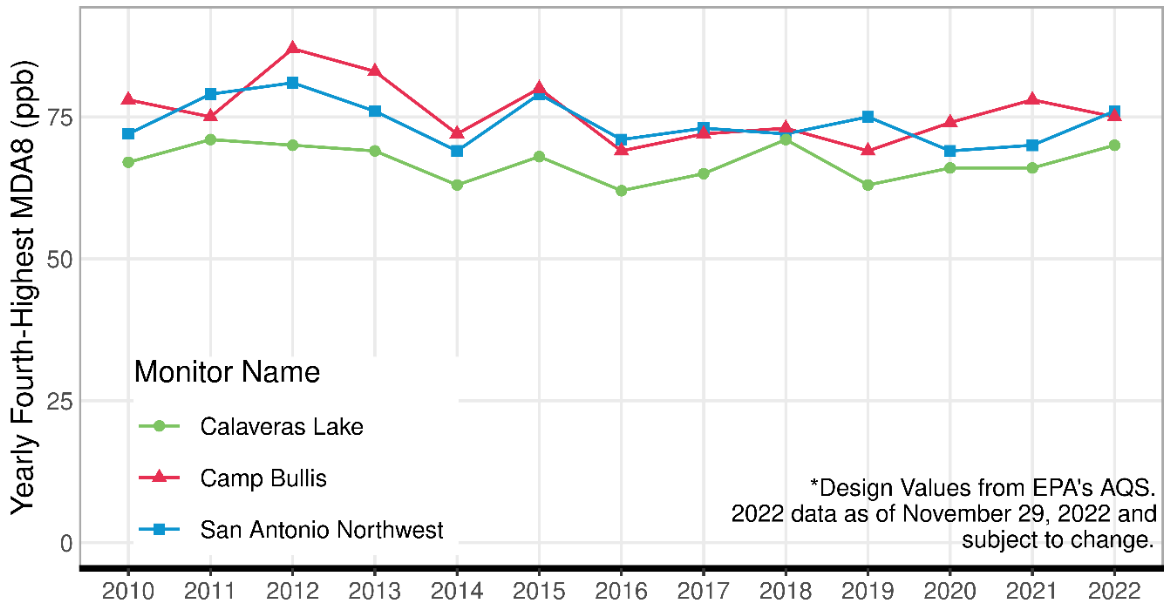

Figure 5-3: Fourth-Highest MDA8 Ozone Concentration by Monitor in Bexar County 2015 Ozone NAAQS Nonattainment Area

5.2.1.3 Background Ozone Trends

Background ozone reflects the 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 received 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 the background ozone concentrations, is detailed in Appendix B.

Locally produced ozone was calculated by subtracting the background ozone concentration from the highest MDA8 ozone value for the area. Results were then separated into low ozone days and high ozone days to investigate if high ozone is due to changes in background ozone or changes in local ozone. For this analysis, high ozone days are any day with a MDA8 ozone value greater than 70 ppb. Low ozone days are any day 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, which will be referred to as the modified ozone season. This will not affect the results significantly because there has only been one exceedance day in March over the period of 2012 through 2021.

In ozone data analysis, the median is a better 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: *Modified Ozone Season Trends in MDA8 Ozone, Background Ozone, and Locally Produced Ozone for High versus Low Ozone Days in San Antonio Area*. Because the median for each statistic was chosen, there may be years where the background ozone and locally produced ozone do not exactly add to the area wide MDA8, but this is not an error in calculations. Overall, the median background ozone is 27 to 36 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 both high and low ozone days, background ozone accounts for approximately 70% of the MDA8 ozone and locally produced ozone accounts for approximately 30% of the MDA8 ozone.

Background ozone declines on both low and high ozone days from 2012 through 2021, decreasing 6 ppb for low ozone days and 7 ppb for high ozone days. On high ozone days, locally produced ozone increased 2 ppb from 2012 to 2021. However, this trend is not seen on low ozone days. These trends offset one another to create the flat trend in design values.

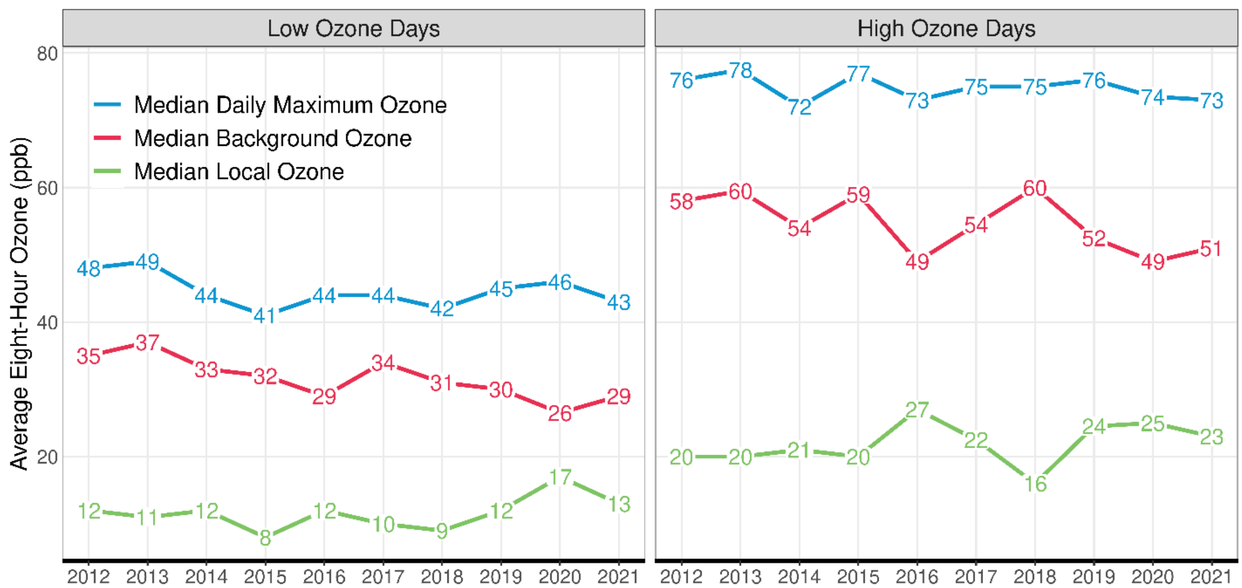

Figure 5-4: Modified Ozone Season Trends in MDA8 Ozone, Background Ozone, and Locally Produced Ozone for High versus Low Ozone Days in San Antonio Area

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, or the ozone season.

The Bexar County 2015 ozone NAAQS nonattainment area has four NO_x monitors, including one near-road monitor, as of 2021. Two additional NO_x monitors (CPS Pecan Valley (CAMS 0678) and Heritage Middle School (CAMS 0622)) ceased operations prior to 2021. All six NO_x monitors in operation at some point from 2012 through 2021 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: *Ozone Season NO_x Trends in Bexar County 2015 Ozone NAAQS Nonattainment Area* shows that 95th percentile NO_x increased from 2012 through 2021 while median NO_x showed little change.

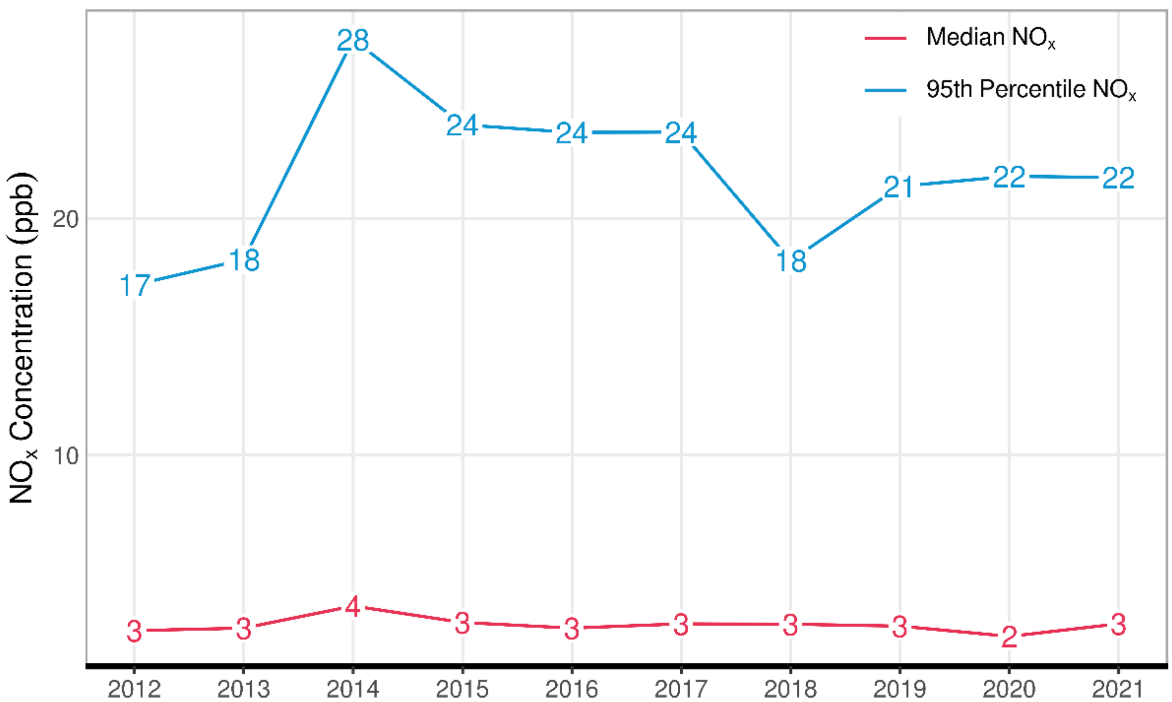

Figure 5-5: Ozone Season NO_x Trends in Bexar County 2015 Ozone NAAQS Nonattainment Area

Like ozone, NO_x concentrations can vary based on location. NO_x values tend to be higher at monitors located in urban areas or near large NO_x sources. Due to these variations, NO_x trends were examined at the six NO_x monitors. Only ozone season NO_x data for days and years with at least 75% completeness were used in this analysis.

Figure 5-6: *Median Ozone Season NO_x Concentrations by Monitor in Bexar County 2015 Ozone NAAQS Nonattainment Area* shows there is variability in median NO_x values by monitor. San Antonio Interstate 35 is a near-road NO_x monitor, and thus it is not surprising that it sees higher readings. Generally, the trend across the years is flat, though San Antonio Northwest shows a notable increase over the years, especially in

2021. The Camp Bullis monitor, a design value setting monitor for 2020 and 2021, showed a decrease in median NO_x concentrations after 2019. This could explain the NO_x-limited ozone chemistry seen in the VOC to NO_x ratio analysis for this monitor.

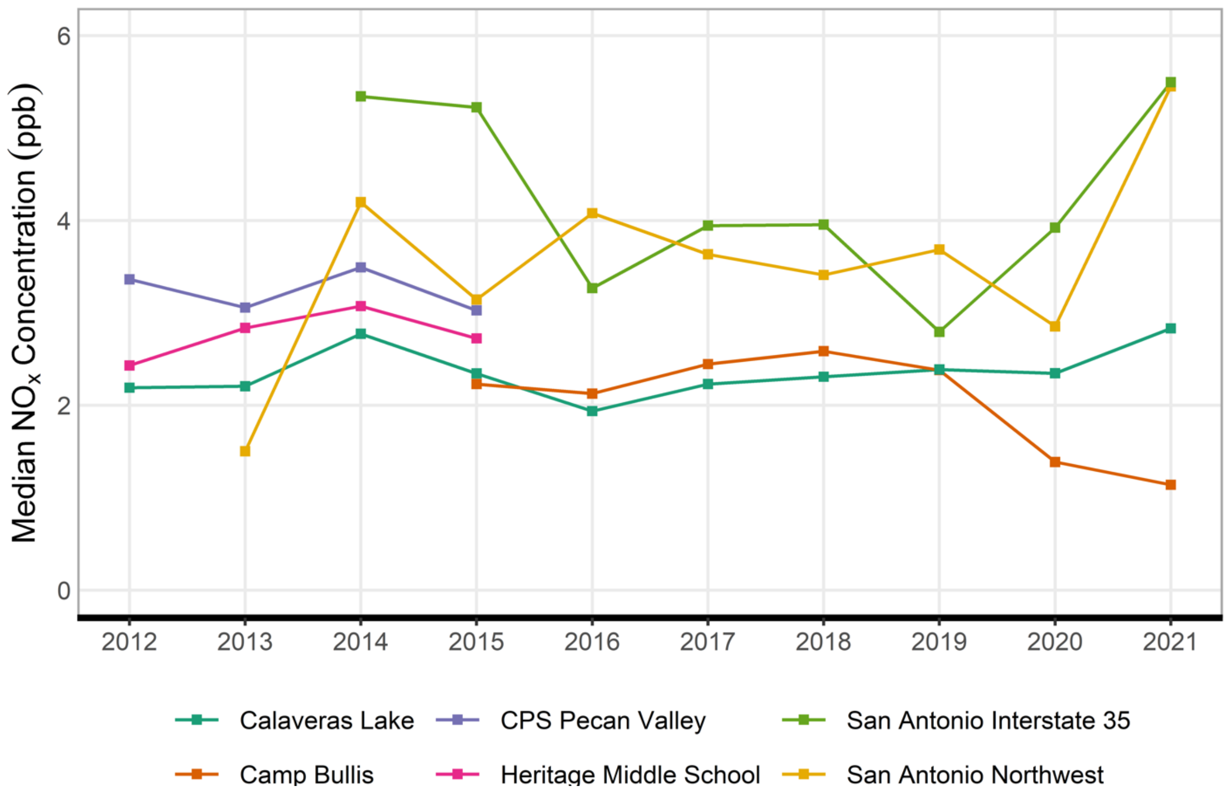

Figure 5-6: Median Ozone Season NO_x Concentrations by Monitor in Bexar County 2015 Ozone NAAQS Nonattainment Area

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. The 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 (SAN) area decreased from the early 2000's through 2021 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).

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 2021 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 the reporting requirements under the TCEQ emissions inventory rule (30 TAC §101.10). Emissions from 2022 were not available in time to be included in this analysis. The emissions trends analysis uses data in tons per year from 2012 through 2021.

Figure 5-7: *Bexar County 2015 Ozone NAAQS Nonattainment Area Point Source NO_X Emissions by Site* 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 96% of the total point source NO_X emissions. Each of these sites reported total NO_X emissions exceeding 100 tons in 2021, with the largest emitter, Calaveras Plant, reporting about 4,000 tons of NO_X in 2021. Overall, NO_X emissions decreased 17% from 2012 to 2021.

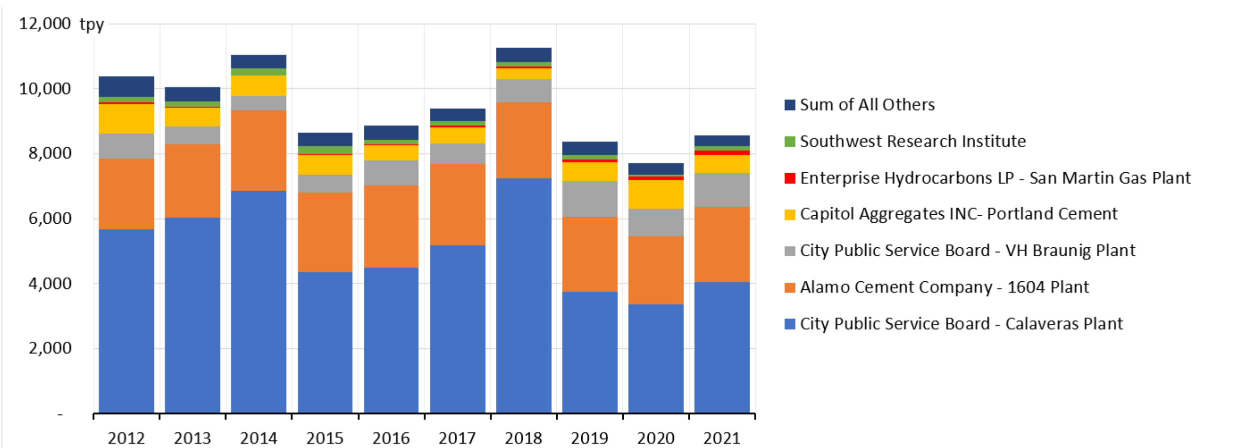

Figure 5-7: Bexar County 2015 Ozone NAAQS Nonattainment Area Point Source NO_X Emissions by Site

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 data in the Bexar County 2015 ozone NAAQS nonattainment area: auto-GC, which record hourly data; and canisters, which record 24-hour data. Due to the reactive nature of VOCs, the 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). Unfortunately, Camp Bullis only has data from 2016 through 2021 and data from 2016 and 2019 did not meet data completeness criteria.

This analysis uses valid ozone season data from March through October. A year was considered valid if there were at least 60% valid days of data during the ozone season and a day was considered valid if there were at least 75% valid hours of data recorded.

Figure 5-8: *Ozone Season Median and 95th Percentile TNMHC in Bexar County 2015 Ozone NAAQS Nonattainment Area* shows results from Camp Bullis. Both metrics declined from 2017 through 2021, with the 95th percentile TNMHC and median TNMHC decreasing by 8% and 13%, respectively.

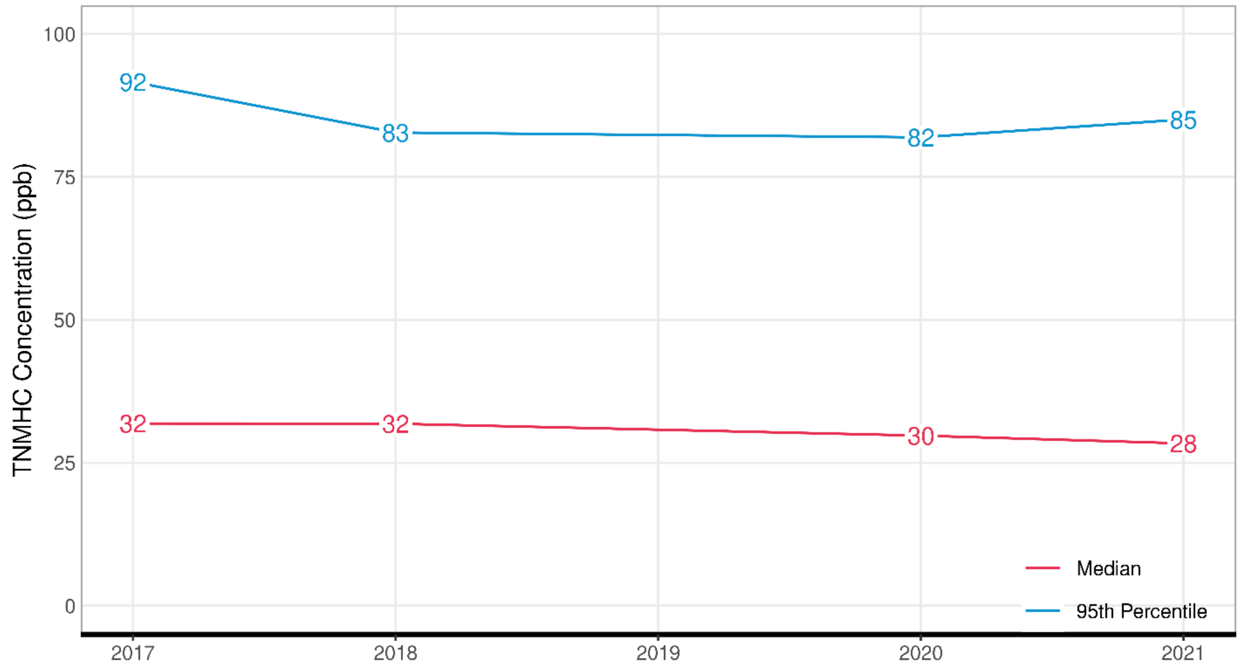

Figure 5-8: Ozone Season Median and 95th Percentile TNMHC in Bexar County 2015 Ozone NAAQS Nonattainment Area

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 not be representative of other sections of the Bexar County 2015 ozone NAAQS nonattainment area.

Using Old Highway 90 canister VOC data, 17 distinct groups of VOC were analyzed to investigate the long term VOC trend 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 flat trend from 2012 through 2021. To avoid seasonal skewing of the data, hours with less than 80% of species measured in a particular group and years with less than 60% valid hours were removed.

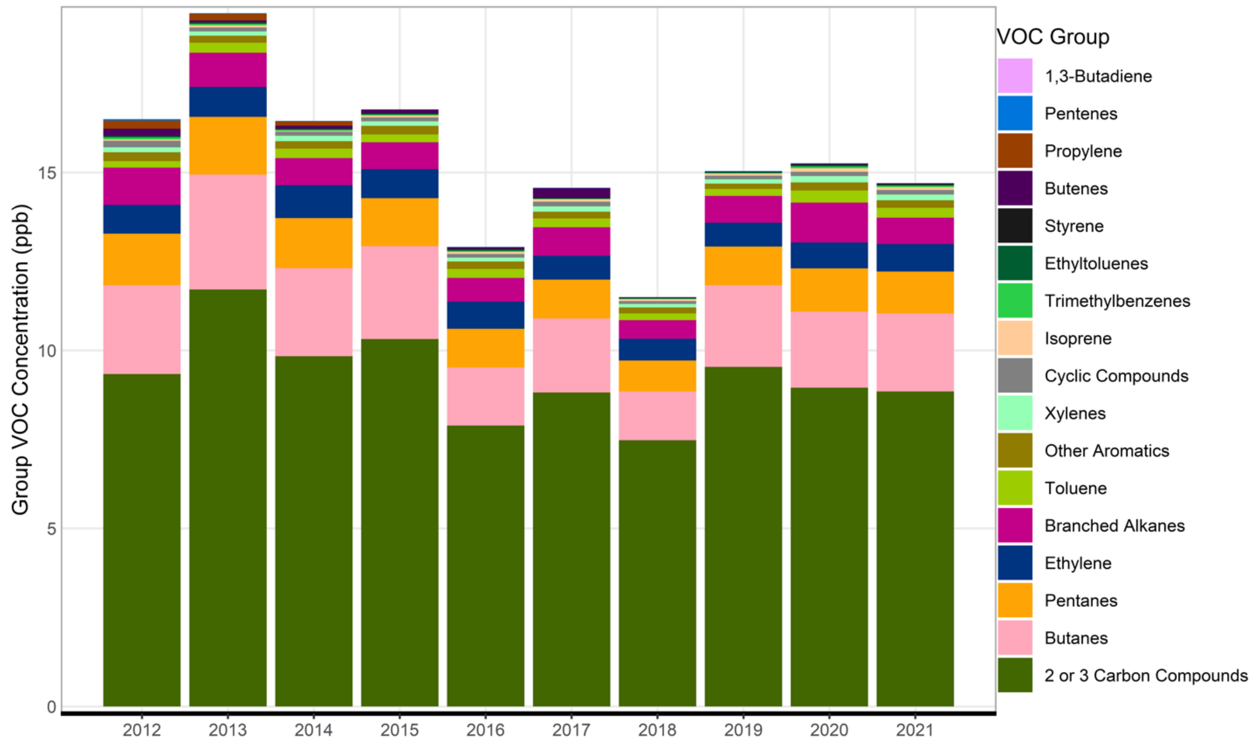

Figure 5-9: Total Concentrations of VOC Groups at Old Highway 90 Canister Site in Bexar County 2015 Ozone NAAQS Nonattainment Area

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 eight reporting sites accounted for 62% of the total point source VOC emissions in the nonattainment area in 2021. Each of these sites reported total VOC emissions exceeding 50 tons in 2021, with the largest emitter, Toyota Vehicle Assembly Plant, reporting almost 300 tons of VOC in 2021. Overall VOC emissions decreased 16% from 2012 to 2021.

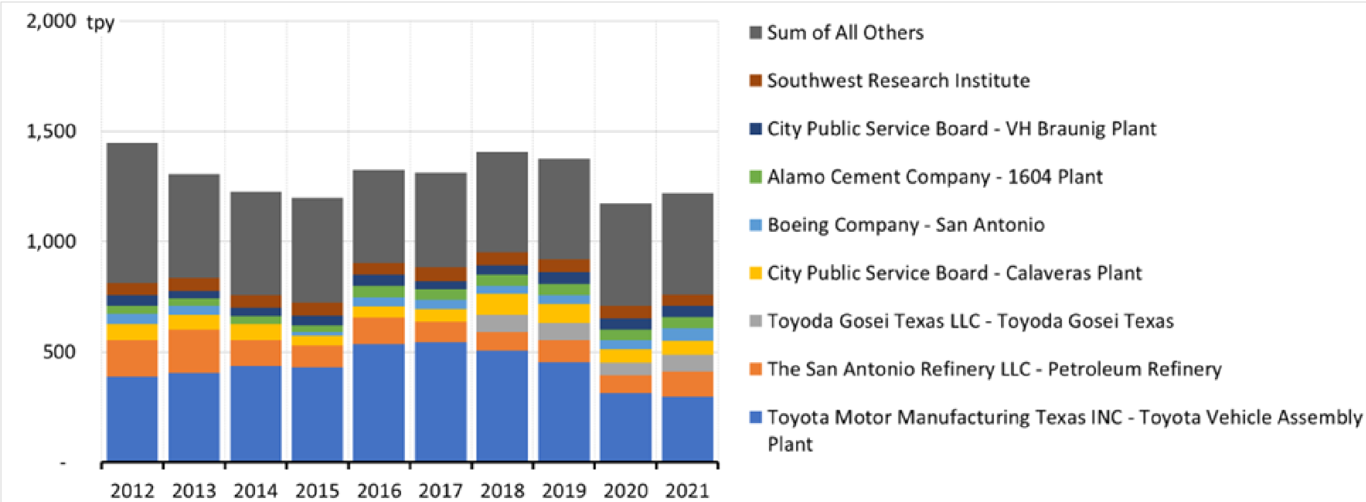

Figure 5-10: Bexar County 2015 Ozone NAAQS Nonattainment Area Point Source VOC Emissions by Site

5.2.4 VOC and NO_x Limitation

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 2021. Figure 5-11: *Median VOC-to-NO_x Ratios During Ozone Season 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.

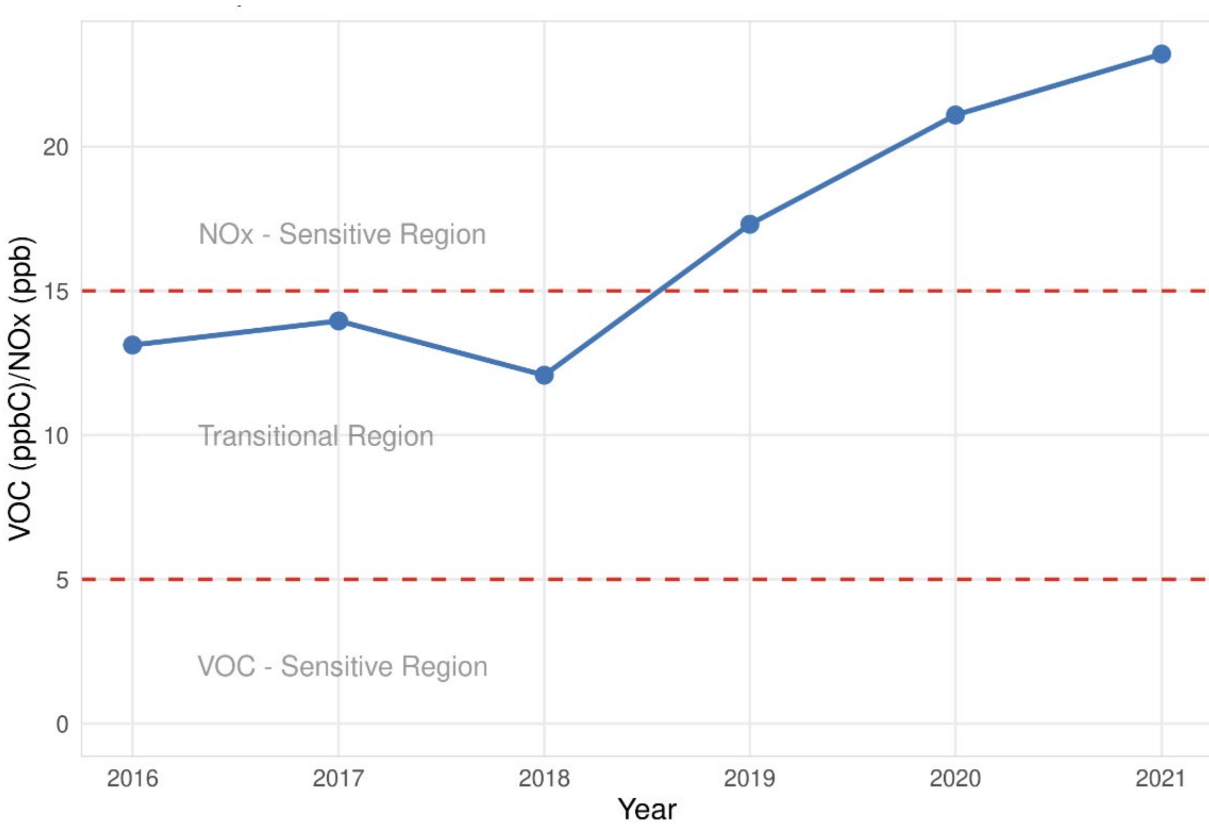

Figure 5-11: Median VOC-to-NO_X Ratios During Ozone Season in the Bexar County Ozone NAAQS Nonattainment Area

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.[21] 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.

[21] 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.

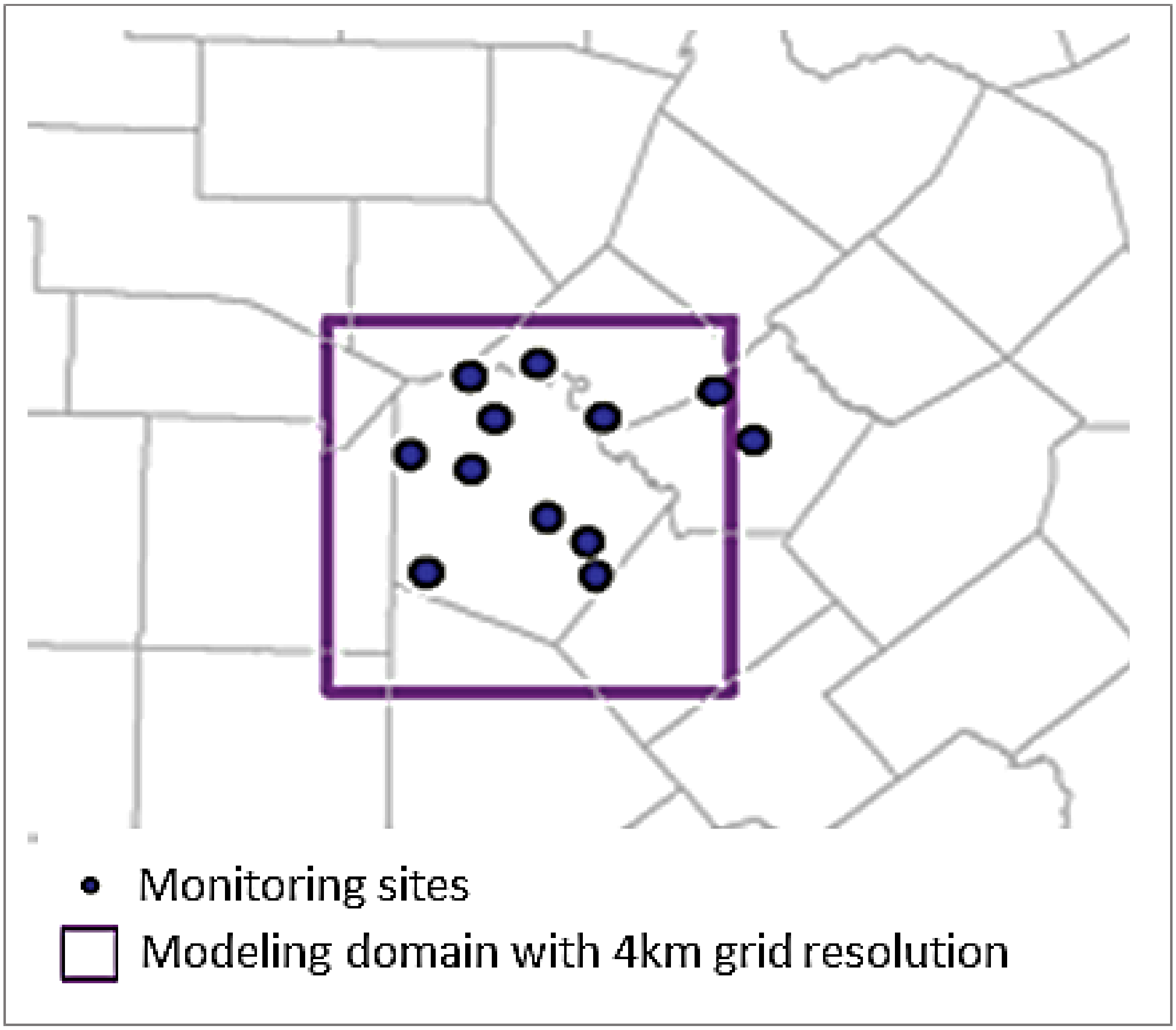

Figure 5-12: Modeling Domain and Monitors for Bexar County VOC and NO_x Sensitivity Analysis

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 6 greater than the decrease of 0.2 ppb from a 20% VOC reductions scenario.

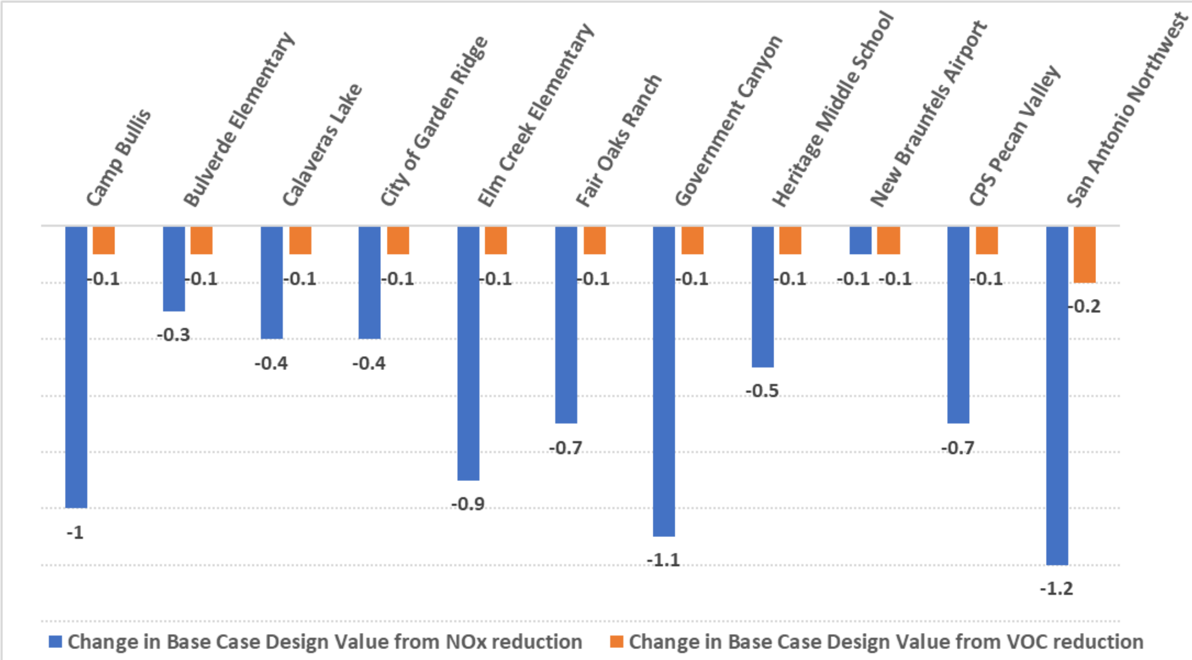

Figure 5-13: Modeled Impact of NO_x and VOC Reductions on 2019 Ozone DVB

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

5.2.5 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 the 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. The EPA developed a statistical model that uses local weather data to adjust the ozone trends according to the 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. The EPA calculated these trends for each of the regulatory ozone monitors in the Bexar County 2015 ozone NAAQS nonattainment area from 2012 through 2021 (EPA, 2022). Although results for all statistics were examined, only the 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 value was calculated from regulatory monitors within the nonattainment area for each year. This allows for easier examination of the results across all three regulatory monitors.

Figure 5-14: *Observed and Meteorologically Adjusted 98th Percentile Ozone Trends for May through September in the Bexar County 2015 Ozone NAAQS Nonattainment Area* confirms that the low ozone in 2014 and 2019 and the high ozone in 2012 were largely influenced by meteorology. In 2018 and 2021, meteorology pushed observed ozone slightly higher. The effect of meteorology was most notable at Camp Bullis. Comparing 2012 with 2021, both measured and meteorologically adjusted 98th percentile ozone decreased, by 15% and 7%, respectively.

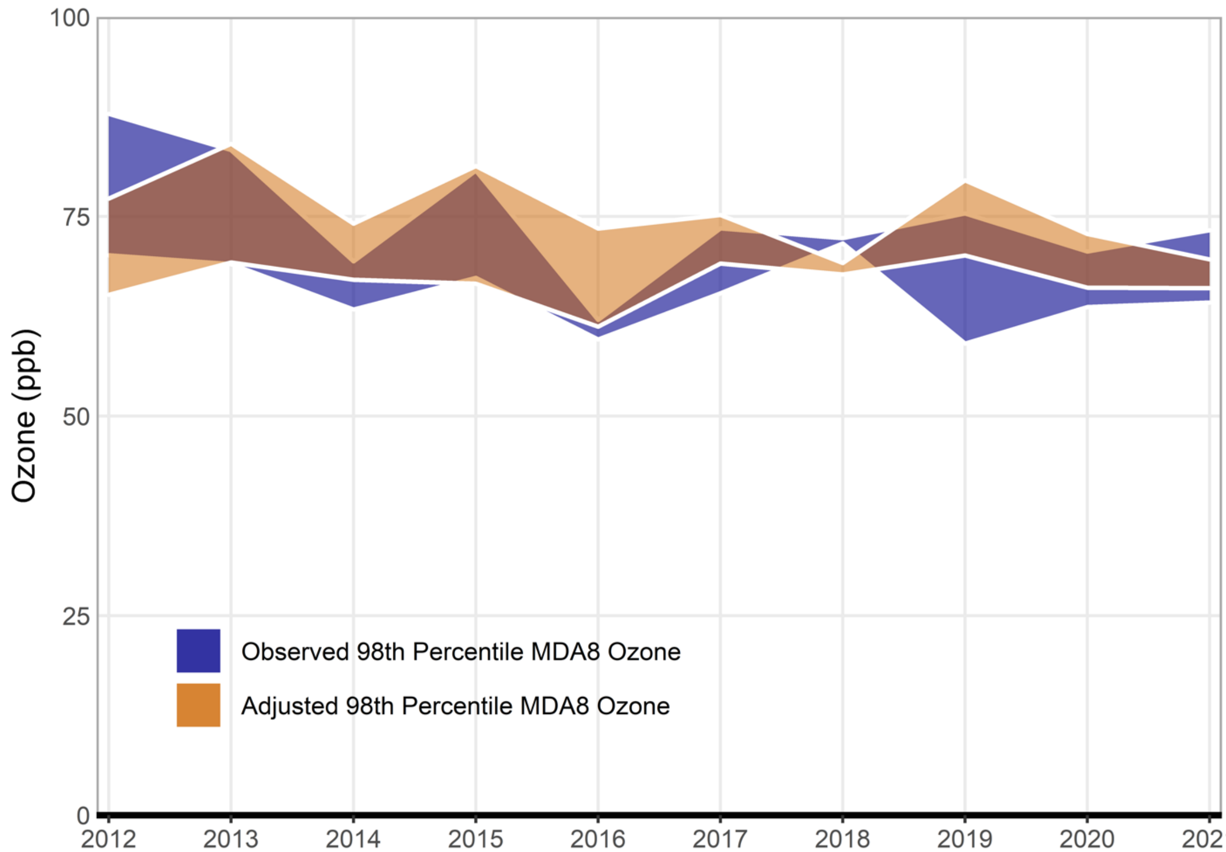

Figure 5-14: Observed and Meteorologically Adjusted 98th Percentile Ozone Trends for May through September in the Bexar County 2015 Ozone NAAQS Nonattainment Area

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 5-1: *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-killometer (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 large VOC emissions while lower altitude trajectories traversed over areas with less emissions.

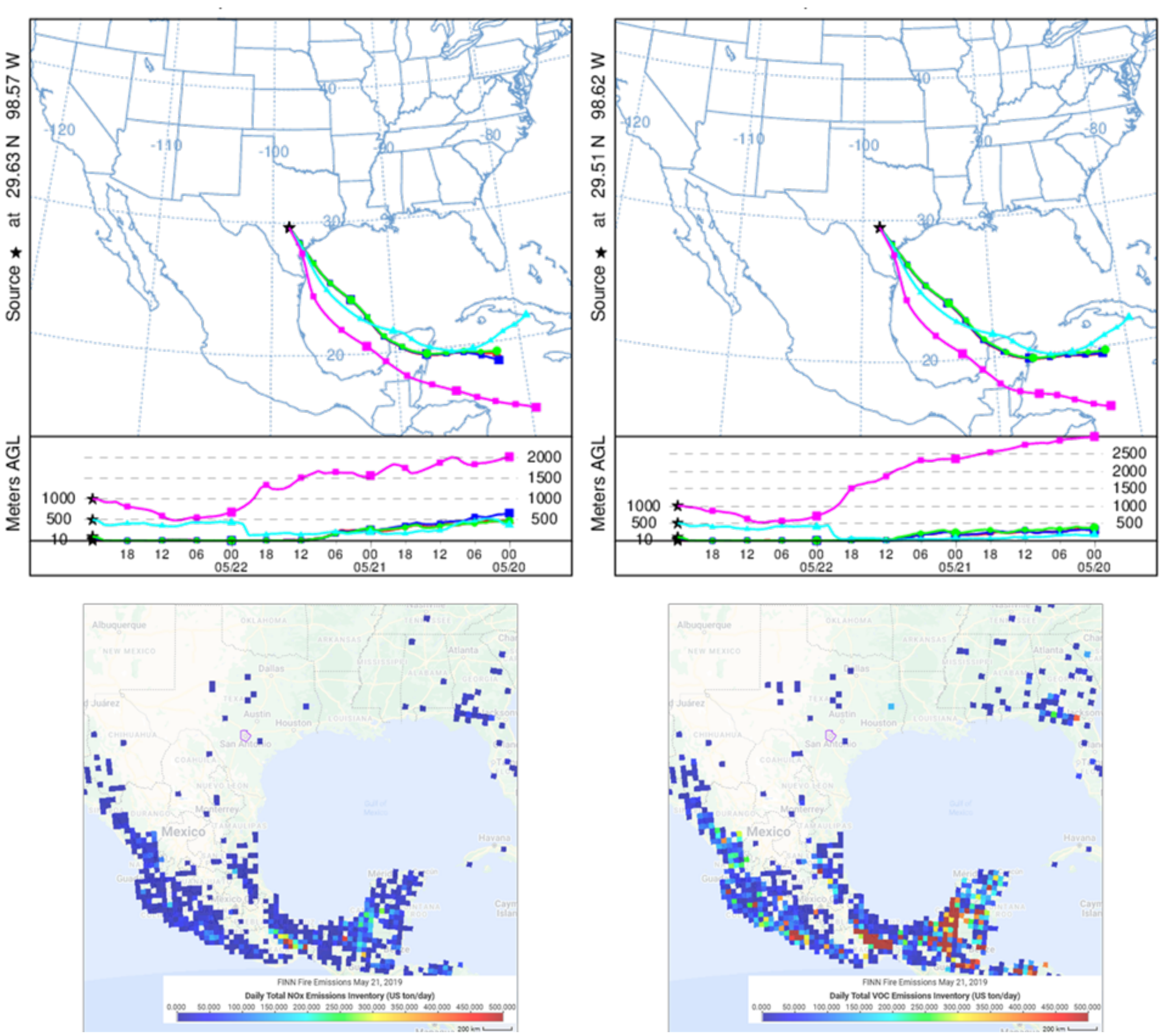

Figure 5-15: Back Trajectories Ending on May 22 at Camp Bullis (top left) and San Antonio Northwest (top right), and May 21 Fire Emissions of NO_x (bottom left) and VOC (bottom right)

Emission plumes from large fires are assumed to extend above the 1000 mAGL back trajectory pictured in Figure 5-1. The 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 5-2: *FINN Fire Plume Height for Different Size Fires.*[22]

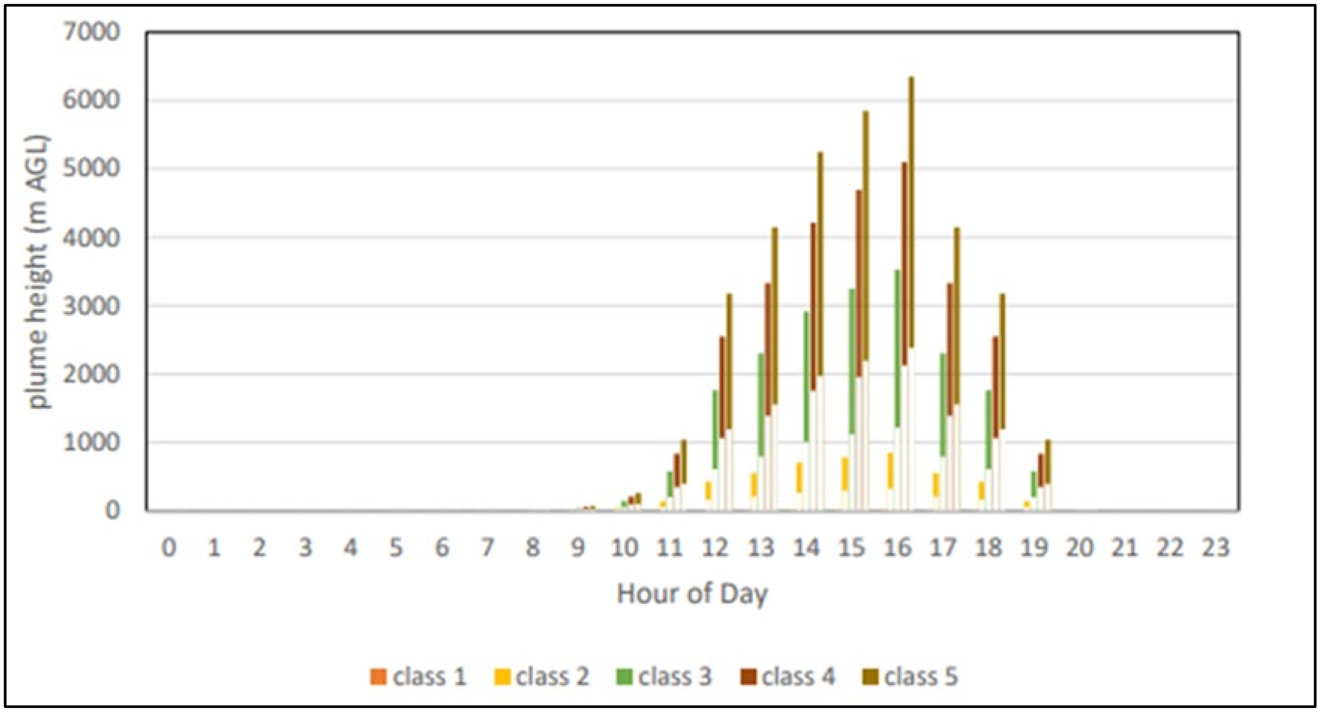

Figure 5-16: FINN Fire Plume Height for Different Size Fires

To analyze the influence of fire emissions, Comprehensive Air Quality Model with Extensions (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 5-1 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 5-3: *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 5-1, with the maximum fire influence decreasing as it traverses Texas.

[22] 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/projectinfoFY18_19/18-022/18-022%20Final%20Report.pdf.

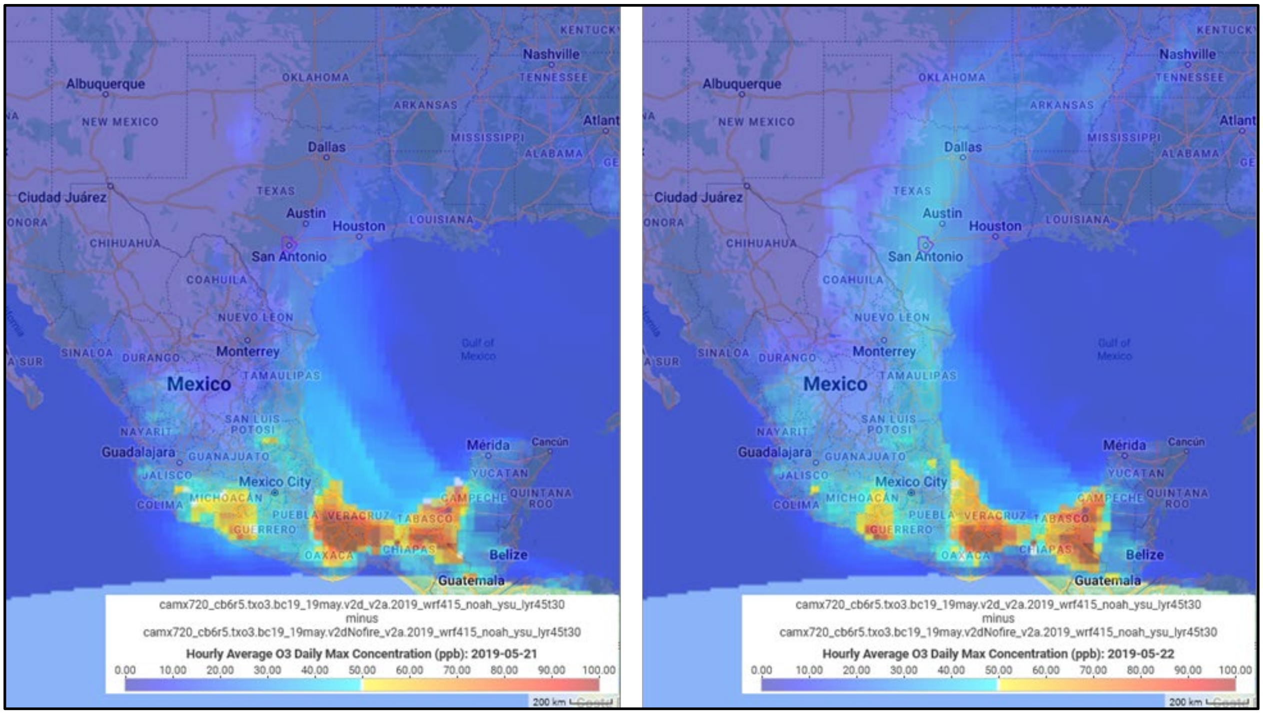

Figure 5-17: Maximum Difference in Hourly Ozone Concentration Modeled With and Without Fire Emissions, May 21 (left) and May 22 (right)

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 5-4: *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.

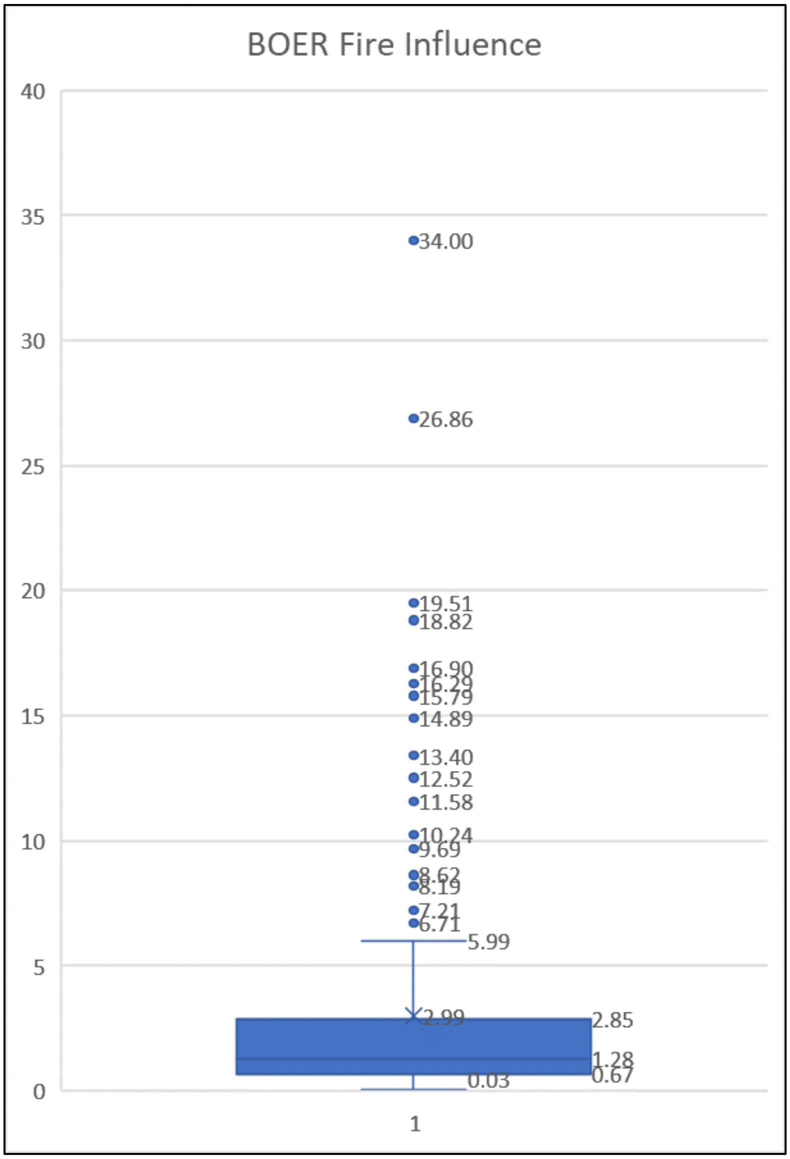

Figure 5-18: Box and Whisker Plot of the Maximum Difference in Hourly Ozone With and Without Fire Emissions at Camp Bullis

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 5-1, 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. The 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 the Blue Skyway Collaborative

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

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

There are nearly 4,000 SmartWay partners in the U.S., including most of the nation's largest truck carriers, all the Class 1 rail companies, and many of the top Fortune 500 companies. Since its founding, SmartWay has reduced oil consumption by 336 million barrels.[23] Since 2004, SmartWay partners have prevented the release of 2,700,000 tons of NO_X and 112,000 tons of particulate matter into the atmosphere.[24] Approximately 247 Texas companies are SmartWay partners, 12 of which are in Bexar County.[25] 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.

The Blue Skyways Collaborative was created to encourage voluntary air emission reductions by planning or implementing projects that use innovations in diesel engines, alternative fuels, and renewable energy technologies applicable to on-road and non-road sources.[26] The Blue Skyways Collaborative partnerships include international, federal, state, and local governments, non-profit organizations, environmental groups, and private industries.

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

Energy efficiency (EE) measures are typically programs that reduce the amount of electricity and natural gas consumed by residential, commercial, industrial, and municipal energy consumers. Examples of EE measures include increasing insulation in homes; installing light-emitting diode or compact fluorescent light bulbs; and replacing motors and pumps with high efficiency units. Renewable energy (RE) measures include programs that generate energy from resources that are replenished or are otherwise

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[23] https://www.epa.gov/smartway/smartway-program-successes
[24] https://www.epa.gov/smartway/smartway-trends-indicators-and-partner-statistics-tips
[25] https://www.epa.gov/smartway/smartway-partner-list
[26] https://blueskyways.org/

not consumed as with traditional fuel-based energy production. Examples of renewable energy include wind energy and solar energy projects.

Texas leads the nation in RE generation from wind. As of 2021, Texas has 34,370 megawatts (MW) of installed wind generation capacity, 25.9% of the 132,753[27] MW installed wind capacity in the U.S. Texas' total net electrical generation from renewable wind generators in 2021 was 99.47 million megawatt-hours (MWh), approximately 26.3% of the 378.2[28] million MWh total wind net electrical generation for the U.S. In 2021, total net electrical generation from renewable wind generators in Texas was 11.9% more than in 2020.

Texas non-residential solar electricity generation in 2021 totaled 17.2 million MWh, a 69.5% increase from 2020.[29] The 2021 total installed solar electricity generation capacity in Texas was 10,374 MW, a 73% increase from 2020.[30]

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

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

5.3.1.3 Cross-State Air Pollution Rule (CSAPR)

The EPA originally finalized CSAPR to help eastern states meet FCAA interstate transport obligations for the 1997 eight-hour ozone, 1997 fine particulate matter ($PM_{2.5}$), and 2006 $PM_{2.5}$ NAAQS by requiring reductions in electric generating unit (EGU) emissions that cross state lines. The rule required reductions in ozone season NO_X emissions for states under the ozone requirements and in annual sulfur dioxide (SO_2) and NO_2 for states under $PM_{2.5}$ requirements. Texas was included in the original CSAPR program for the 1997 eight-hour ozone and 1997 $PM_{2.5}$ standards.

On September 7, 2016, the EPA signed the final CSAPR Update Rule for the 2008 eight-hour ozone standard. The EPA's modeling showed that emissions from within Texas no longer significantly contribute to downwind nonattainment or interference with maintenance for the 1997 eight-hour ozone NAAQS even without implementation of

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27 https://www.eia.gov/electricity/annual/html/epa_04_07_b.html
28 https://www.eia.gov/electricity/annual/xls/epa_03_01_b.xlsx
29 https://www.eia.gov/electricity/annual/xls/epa_03_21.xlsx
30 https://www.eia.gov/electricity/annual/html/epa_04_07_b.html

the original CSAPR ozone season NO_x emissions budget. Accordingly, sources in Texas are no longer subject to the emissions budget calculated to address the 1997 eight-hour ozone NAAQS. However, this rule finalized a new ozone season NO_x emissions budget for Texas, effective for the 2017 ozone season, to address interstate transport with respect to the 2008 eight-hour ozone NAAQS. On July 10, 2018, the EPA published a proposed close-out of CSAPR, proposing to determine that the CSAPR Update Rule fully addresses interstate pollution transport obligations for the 2008 eight-hour ozone NAAQS in 20 covered states, including Texas. The EPA's modeling analysis projects that by 2023 there will be no remaining nonattainment or maintenance areas for the 2008 eight-hour ozone NAAQS in the CSAPR Update region and therefore the EPA would have no obligation to establish additional control requirements for sources in these states. As a result, these states would not need to submit SIP revisions establishing additional control requirements beyond the CSAPR Update. The final rule was published on December 21, 2018 with an effective date of February 19, 2019 (83 FR 65878). On September 13, 2019, the D.C. Circuit Court remanded the CSAPR Update back to the EPA after finding that the rule is inconsistent with the FCAA and allows upwind states to continue their significant contributions to downwind air quality problems beyond the attainment dates for those downwind areas. On October 1, 2019, the D.C. Circuit Court vacated the CSAPR close-out rule.

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

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

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

5.3.1.4 Texas Emissions Reduction Plan (TERP)

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

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

From 2001 through August 2022, $1,192,434,745 in DERI grants were awarded for projects projected to help reduce an estimated 189,151 tons of NO_X in the period over which emissions reductions are reported for each project under the program. This includes $96,637,493 going to activities in the San Antonio Area, which includes Bexar County, with an estimated 11,977 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.

Three other 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 2022, the program awarded $28,702,701, with an estimated 1,303 tons of NO_X reduced in the period over which emissions reductions are reported for each project under the program. In the San Antonio Area $403,479 was awarded to projects with an estimated 16 tons of NO_X reduced in the period over which emissions reductions are reported for each project under the program.

The Texas Clean Fleet Program (TCFP) was established in 2009 to provide grants for the replacement of light-duty and heavy-duty diesel vehicles with vehicles powered by alternative fuels, including: natural gas, liquefied petroleum gas, hydrogen, methanol (85% by volume), or electricity. This program is for larger fleets; therefore, applicants must commit to replacing at least 10 eligible diesel-powered vehicles with qualifying alternative fuel or hybrid vehicles. From 2009 through August 2022, $69,363,635 in TCFP grants were awarded for projects to help reduce an estimated 671 tons of NO_X in the period over which emissions reductions are reported for each project under the program. In the San Antonio Area, $10,559,210 in TCFP grants were awarded with an estimated 77 tons of NO_X reduced in the period over which emissions reductions are reported for each project under the program.

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

TNGVGP grants were awarded for projects to help reduce an estimated 1,668 tons of NO_x in the period over which emissions reductions are reported for each project under the program. In the San Antonio Area, $3,840,886 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 FY 2017, both the TCFP and TNGVGP required that the majority of the grant-funded vehicle's operation occur in the Texas nonattainment areas, other counties designated as affected counties under the TERP, and the counties in and between the triangular area between Houston, San Antonio, and Dallas-Fort Worth. Legislative changes in 2017 expanded the eligible areas into a new Clean Transportation Zone, to include the counties in and between an area bounded by Dallas-Fort Worth, Houston, Corpus Christi, Laredo, and San Antonio.

5.3.1.5 Clean School Bus Program

HB 3469, 79th Texas Legislature, 2005, Regular Session, established the Clean School Bus Program, which provides monetary incentives for school districts in the state for reducing emissions of diesel exhaust from school buses through retrofit of older school buses with diesel oxidation catalysts, diesel particulate filters, and closed crankcase filters. As a result of legislative changes in 2017, this program also includes replacement of older school buses with newer, lower-emitting models. Through August 2022, the TCEQ Clean School Bus Program has awarded $53,053,626 in grants for 7,860 retrofit and replacement activities across the state. This amount includes $4,694,101 in federal funds. Of the total amount, approximately $2,972,332 has been awarded for 740 school bus retrofit and replacement projects in the San Antonio Area, resulting in a projected 12 tons of NO_x reduced in the period over which emissions reductions are reported for each project under the program.

5.3.1.6 87th Texas Legislature, 2021

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

HB 4472, Relating to the TERP

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

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

HB 4772 added New Technology Implementation Grant (NTIG) projects that reduce flaring emissions and other site emissions to the list of projects that TCEQ must give preference to when awarding grants. The requirement that flaring and other oil and gas site emissions reduction projects capture waste heat to generate electricity solely for on-site service was removed under the NTIG program. These changes may yield more grant awards to reduce flaring and other emissions under the NTIG program.

5.3.1.7 Local Initiatives

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 C: *Local Initiatives.*

5.4 CONCLUSIONS

The 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.

The eight-hour ozone design values decreased from 2012 through 2022, but after 2016 remained flat. The 2022 eight-hour design value for the nonattainment area was 75 ppb, a 6% decrease from 2012.

On average, background ozone contributed about 73% to maximum daily ozone concentrations on low ozone days, and locally produced ozone contributes roughly 27%. The contribution averages are nearly identical for high ozone days, 72% and 28%, respectively. Overall, background ozone is decreasing, and local production is increasing slightly on both high and low ozone days.

Point source NO_x and VOC emissions decreased 17% and 16%, respectively, in the Bexar County 2015 ozone NAAQS nonattainment area according to emissions data from 2012 through 2021. 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 benefit from both NO_x and VOC reductions, ozone decreases in larger amounts with the reductions in NO_x. This proposed Bexar County AD SIP revision documents a fully evaluated photochemical modeling analysis and a thorough weight-of-evidence assessment. Based on the TCEQ's modeling and available data, the Bexar County area is not expected to attain the 2015 ozone NAAQS by the September 24, 2024 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 area and continues to work toward this goal. Texas continues to invest resources in air quality scientific research for better understanding of atmospheric chemical processes and the advancement of pollution control technology, refining quantification of emissions, and improving the science for ozone modeling and state implementation plan (SIP) analysis. Additionally, the TCEQ is working with the United States Environmental Protection Agency (EPA), local leaders, and the scientific community to evaluate new measures for addressing ozone precursors. This chapter describes ongoing technical work that will be beneficial for identifying effective and efficient approaches for improving air quality and management in Texas and the Bexar County ozone nonattainment area.

6.2 ONGOING WORK

6.2.1 Emissions Inventory Improvement Projects

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

6.2.2 Air Quality Research Program

6.2.2.1 TCEQ Applied Research 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 the TCEQ's Air Quality Research and Contract Projects webpage (https://www.tceq.texas.gov/airquality/airmod/project/).

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;
- to integrate AQRP research with the work of other organizations and to communicate the results of AQRP research to air quality decision-makers and stakeholders.

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

Statewide projects:

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

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

6.2.3 Wildfire and Smoke Impact

The TCEQ is reviewing ambient air monitoring data from monitors in the San Antonio area and has determined that there were ozone episodes that appear to have been influenced by smoke from fires outside the United States in 2020, 2021, and 2022.

Each spring, agricultural fires are set in Mexico and Central America to prepare fields for planting. The smoke from these fires often reaches Texas, carrying ozone precursors and particulate matter (Andrae, 2019; Coggan et al., 2019). Wang et al. (2018) shows that the Mexican and Central American agricultural fires can affect Texas air quality.

In 2022, the San Antonio area had high ozone episodes in June, September, and October. High ozone episodes on September 13 and October 6 were likely influenced by fires. On September 13, 2022, smoke plumes covered large portions of Texas and satellites detected moderate, possibly dense, aerosols over San Antonio on this day so precursors in the smoke could have contributed to the ozone formation. On October 6, 2022, smoke plumes covered the southern Great Plains including Texas, and the Hazard Mapping System (HMS) showed numerous fires in Arkansas and Mississippi that could have contributed to the high ozone observed at three San Antonio area monitors.

In 2021, the San Antonio area had high ozone episodes in April, May, June, July, September, and October. High ozone episodes on April 11, June 18, and September 23, 2021 were most likely influenced by fires. On April 11, fires in Mexico, North Texas, and Oklahoma possibly influenced San Antonio's high ozone. On June 18, the HMS showed smoke plumes over most of the San Antonio area, so fires may have influenced the ozone. On September 23, satellite images showed the presence of aerosols over the San Antonio area so wildfires in the Pacific northwest and Rocky Mountains could have contributed to the high ozone.

In 2020, the San Antonio area had high ozone episodes in April, August, and October. On August 19 and 20, 2020, HMS showed smoke plumes over most of Texas and satellites detected the presence of aerosols. This indicates that California wildfires may have caused the high ozone values in San Antonio on August 19 and 20, 2020. On October 6 and 7, 2020, satellite images showed fires along the gulf coast and smoke from these fires could have influenced San Antonio ozone on these days. On September 13, 2020, satellite images showed fires along the gulf coast, and HYSPLIT trajectories passed through the smoke plume suggesting wildfires could have influenced San Antonio ozone on this day.

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Appendices Available Upon Request

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