



AACOG
Alamo Area Council
of Governments

PHOTOCHEMICAL MODELING UPDATE

Presented by AACOG

AAMPO Transportation Policy Board

January 23, 2023

Current Attainment Status

- On November 7, 2022, the EPA reclassified Bexar County from marginal to moderate nonattainment.
- Triggers 1) additional regulations intended to improve ozone levels in Bexar County, and 2) a tightening of existing regulations already in place under the marginal classification.
- The revision to Texas State Implementation Plan (SIP) was due by January 1; TCEQ targeting December 2023 for submittal
- Attainment date for Bexar County is September 24, 2024 with a 2023 attainment year.
- If Bexar County does not attain the standard, the county could be reclassified to serious nonattainment.

Current Ozone NAAQS Status

Monitor Site	4 th Highest (ppb)			Three-Year Average
	2020	2021	2022	
San Antonio Northwest CAMS 23	69	70	76	71
Camp Bullis CAMS 58	74	78	75	72
Calaveras Lake CAMS 59	66	66	70	66

*Expected certification by EPA no later than May 2023



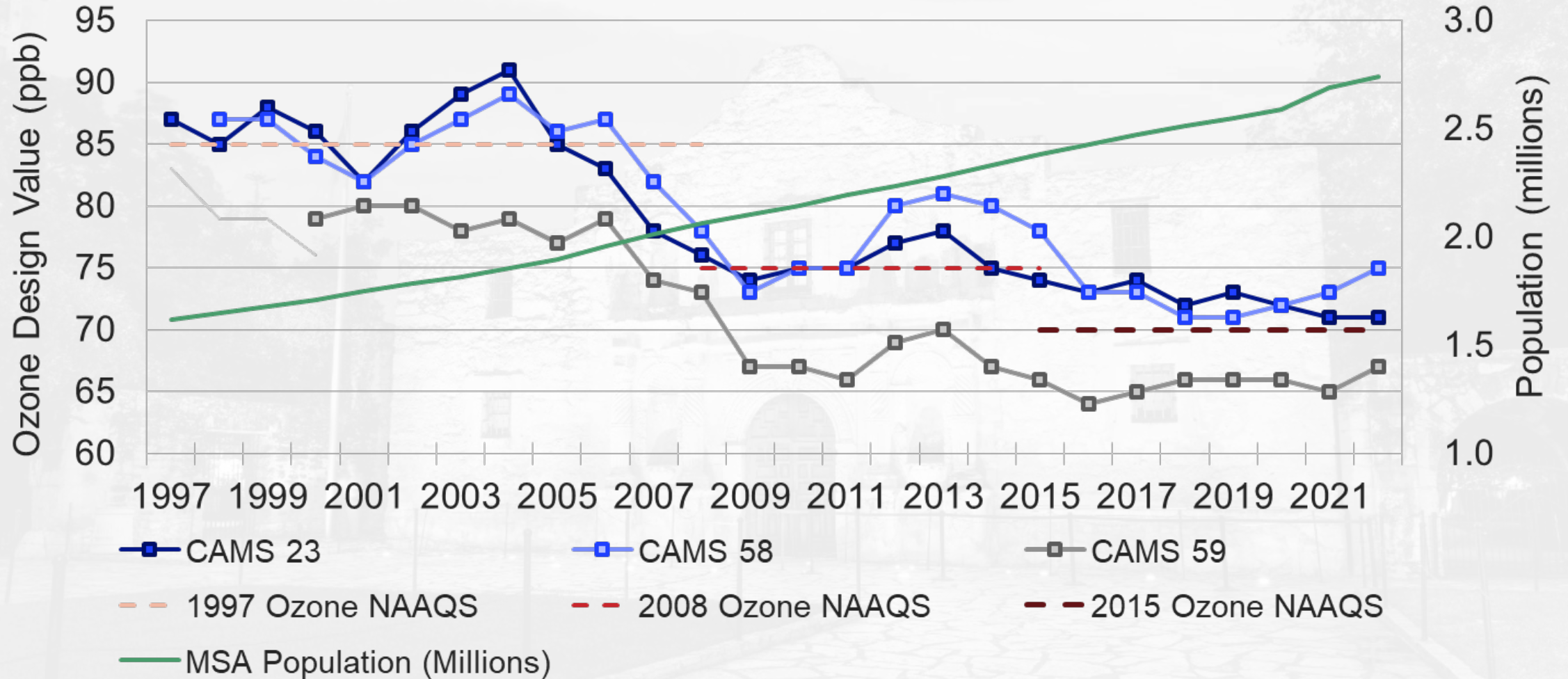
Attaining the Standard in 2023

Monitor Site	4 th Highest (ppb)		Maximum Allowable 4 th -Highest to attain NAAQS in 2023
	2021	2022*	
San Antonio Northwest CAMS 23	70	76	66
Camp Bullis CAMS 58	78	75	59
Calaveras Lake CAMS 59	66	70	76

*Expected certification by EPA no later than May 2023



Bexar County Ozone Trend



MODERATE

(6 years)

Basic I/M

RACT/RACM

Attainment Demo

Contingency Measures

RFP – 15% VOC

**NSR Thresholds &
Offset Ratios**

**100 TPY
1.15 : 1**

Moderate Non-Attainment

- Gasoline vehicles 2-24 years old. Tests emissions-related components. Cost in other Texas cities: \$18.50 - \$25.50
- RACT/RACM: the lowest emission limitation by the application of control technology that is reasonably available considering technological and economic feasibility
- Emissions reductions included in a SIP are sufficient to attain by the NAAQS attainment date
- Contingency measures – implemented without further rulemaking, if necessary
- Must show 15% reduction in volatile organic compounds (VOCs)

Photochemical Modeling

- AACOG conducts ozone analysis using photochemical models that simulate actual high-ozone episodes
- The modeling episode currently being used for the San Antonio area is March 15 to October 31, 2019 (15 ramp up days)
- Houston, Dallas, and other areas in Texas are using the same episode to conduct photochemical modeling analysis
- The 2019 ozone season episode is approved by TCEQ for use in the Texas SIP

Model Runs and Next Steps

- 2019 Baseline and Basecase runs
- 2023, 2026, and 2030 Projection Case Runs
- Anthropogenic Precursor Culpability Assessment (APCA) runs to trace ozone back to source regions and type.

School Bus Inventory

- **Purpose:** Refine MOVES3 county-level school bus population, fuel type, age, VMT inputs in consultation with TTI
- 18 responses received, 2 pending
- Preparing second round of data requests, enticing with Ozone Action Day banners

Smoking Vehicle Reporting Program

- **Purpose:** Reporting system to notify operators of vehicles illegally emitting visible smoke for more than 10 seconds, provide them with resources for repair/replacement
- Application with TxDMV finally moving forward after internal backlog to comply with new statute – necessary to retrieve mailing information by license plate
- Working with NCTCOG to replicate their online reporting system
- Ready to launch phone reporting system upon TxDMV contract execution

Regulatory Updates

Local Initiatives Request for Attainment Demonstration SIP – Help Needed!

- Narrative describing local initiatives implemented within Bexar County to reduce precursors
- Requesting brief summary of air quality improvement initiatives
- TCEQ needs by February 13 to include in SIP

EPA announces intent to revise annual PM_{2.5} standard between 9.0-10.0 µg/m³

- 60-day comment period begins when published in *Federal Register*
- EPA is proposing to retain all other PM standards
- Monitoring network changes to protect air quality in overburdened communities



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2019 vs Other Years

Days > 70 ppb	CAMS 23	CAMS 58	CAMS 59
2010	4	9	2
2011	15	12	7
2012	13	13	3
2013	11	16	1
2014	1	4	1
2015	11	12	1
2016	4	2	1
2017	4	5	0
2018	5	7	4
2019	4	1	0
2020	2	7	1
2021	2	12	0
2022	6	9	2

Days > 60 ppb	CAMS 23	CAMS 58	CAMS 59
2010	16	26	12
2011	42	38	31
2012	40	40	16
2013	26	42	15
2014	18	36	12
2015	32	31	15
2016	11	11	6
2017	13	19	12
2018	18	23	17
2019	10	10	5
2020	19	33	12
2021	21	30	13
2022	27	33	20

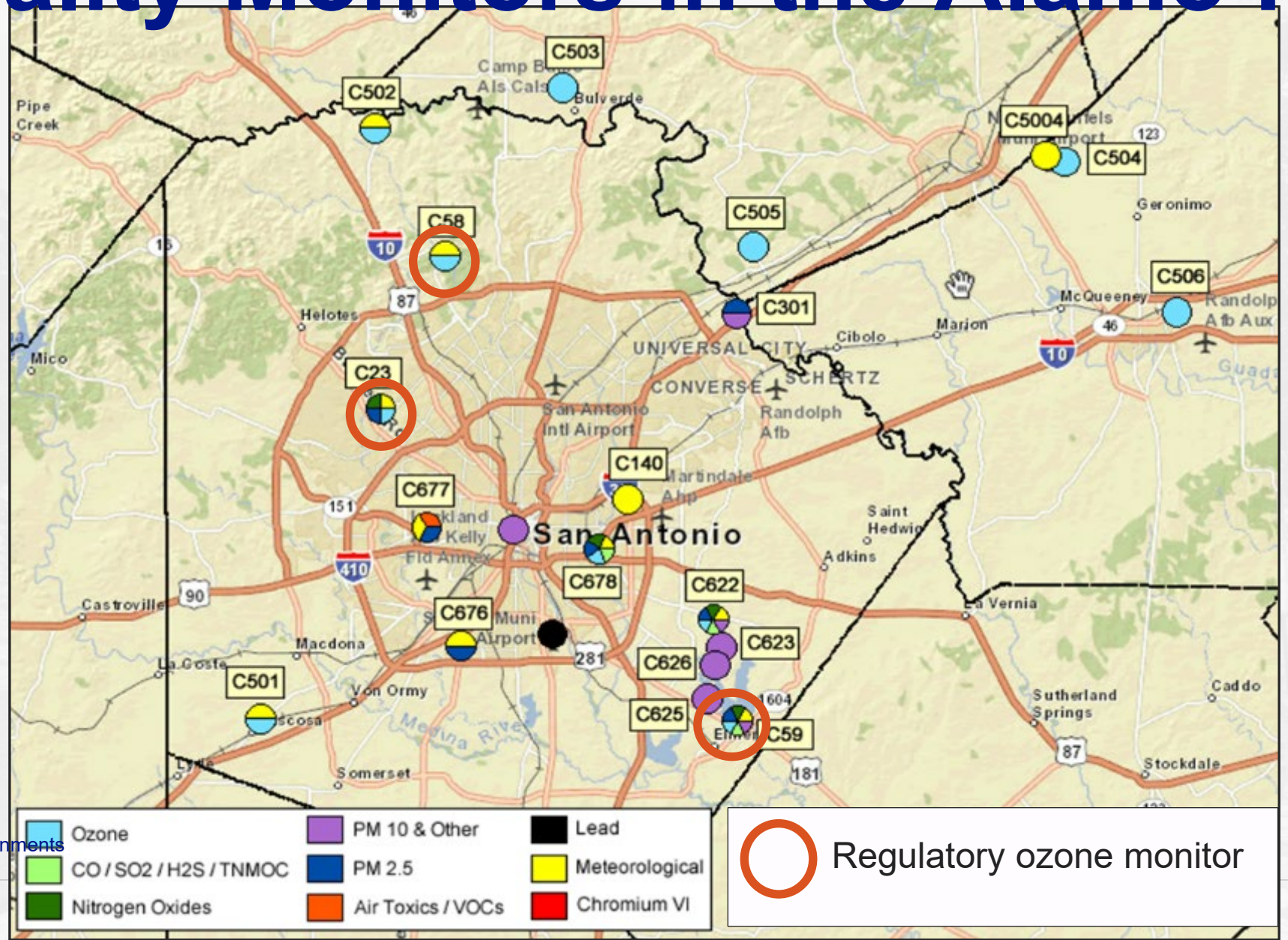
High Ozone Days, 2019

Monitor Site	Number of Days over 60 ppb	Number of Days over 70 ppb
San Antonio Northwest CAMS 23	10	4
Camp Bullis CAMS 58	9	1
Calaveras Lake CAMS 59	4	0

State Implementation Plans

- A state's comprehensive, enforceable plan to meet the NAAQS; carried out by the Texas Commission on Environmental Quality (TCEQ)
- Revised as needed to comply with NAAQS requirements (e.g., new source review, emission inventories, control strategies, permitting, modeling, etc.)
- Developed with participation from stakeholders through meetings, comment periods, and public hearings

Air Quality Monitors in the Alamo Region



Requirements for Serious Nonattainment

Serious (9 years to attain):

- Meet all requirements for moderate areas.
- Reduce definition of a major source of VOCs from 100 tons per year to 50 tons per year
- Reduce VOCs 3% annually for years 7 to 9 after the 15% reduction already required by year 6.
- Improve monitoring, in order to obtain more comprehensive and representative data on ozone.
- Require fleet vehicles to use clean alternative fuels.
- Adopt transportation control measures if the number of vehicle miles traveled in the area is greater than expected.
- Require 1.2 to 1 offsets.
- Adopt contingency measures if the area does not meet required VOC reductions.

Mobile Source Emissions

- Ozone precursors nitrogen oxides (NO_x), and volatile organic compounds (VOC) are emitted by on-road mobile vehicles
- Mobile source emissions were calculated for 2019, 2023, 2026, and 2030 based on TTI data

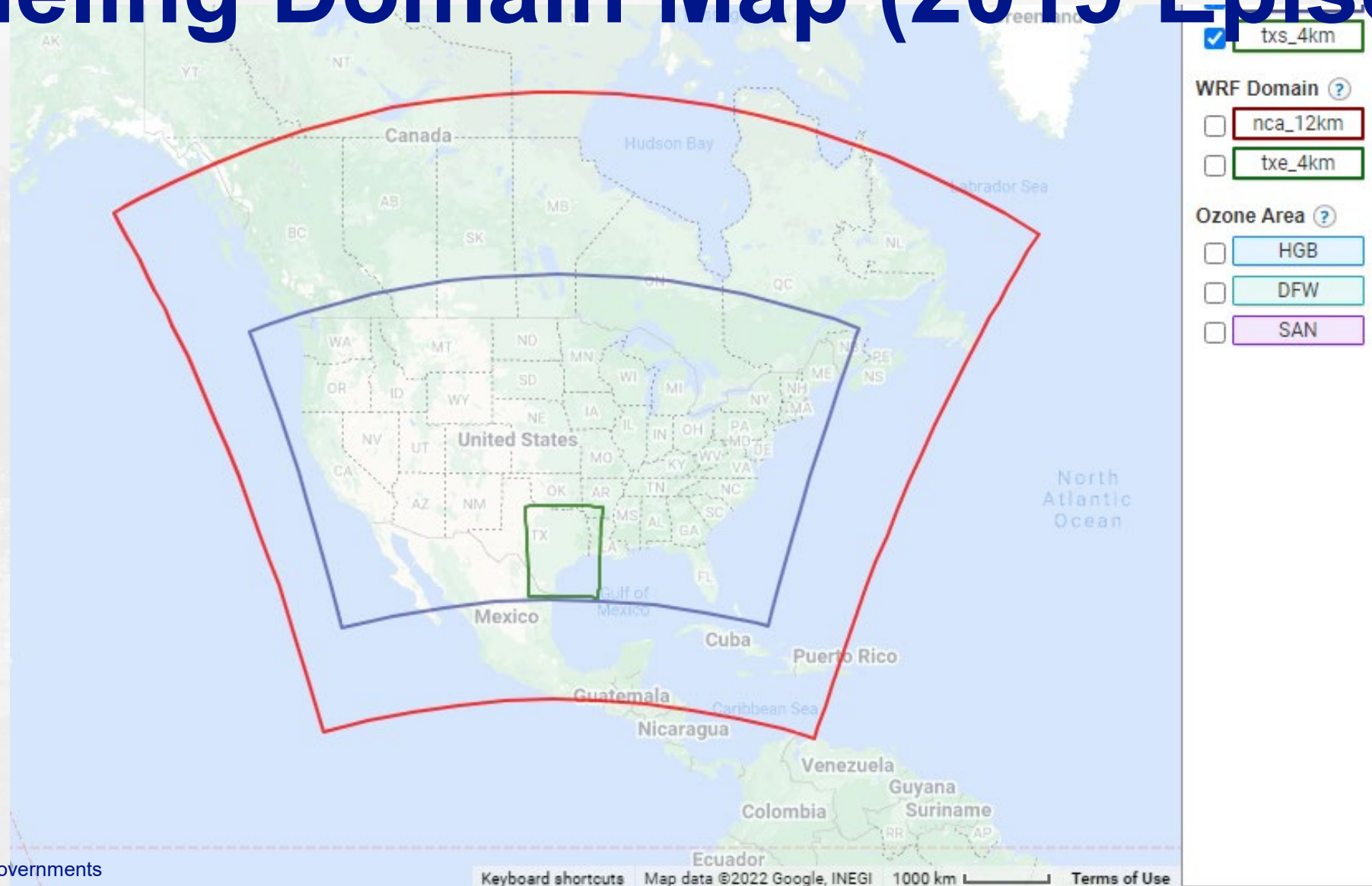
Mobile Source Categories
Motorcycle (MC)
Passenger Car (PC)
Passenger Truck (PT)
Light Commercial Truck (LCT)
Refuse Truck (RT)
Intercity, School, Transit Bus (IB, SB, TB)
Motor Home (MH)
Heavy Duty Truck Idling
Single Unit Short and Long Haul Trucks (SS, SL)
Combination Short and Long Haul Truck (CS, CL)

Modeling Episode Selection Criteria

EPA Modeling Guidance recommends choosing a time period that:

- Has a sufficient number of exceedance days;
- Follows historically observed patterns;
- Includes a variety of meteorological conditions that frequently correspond to high ozone;
- Has at least five days in the episode for each exceeding regulatory monitor maximum daily average eight-hour value greater than or equal to 60 ppb; and
- Is in the recent past

Modeling Domain Map (2019 Episode)



Photochemical Modeling Setup

- Emission processing: Emissions Processor Version 3 (EPS3)
- Meteorological modeling: Weather Research and Forecast model (WRF) v. 4.1.5
- Air quality modeling: Comprehensive Air-quality Model with Extension (CAMx) version 7.20 (TCEQ is using CAMx 7.10)

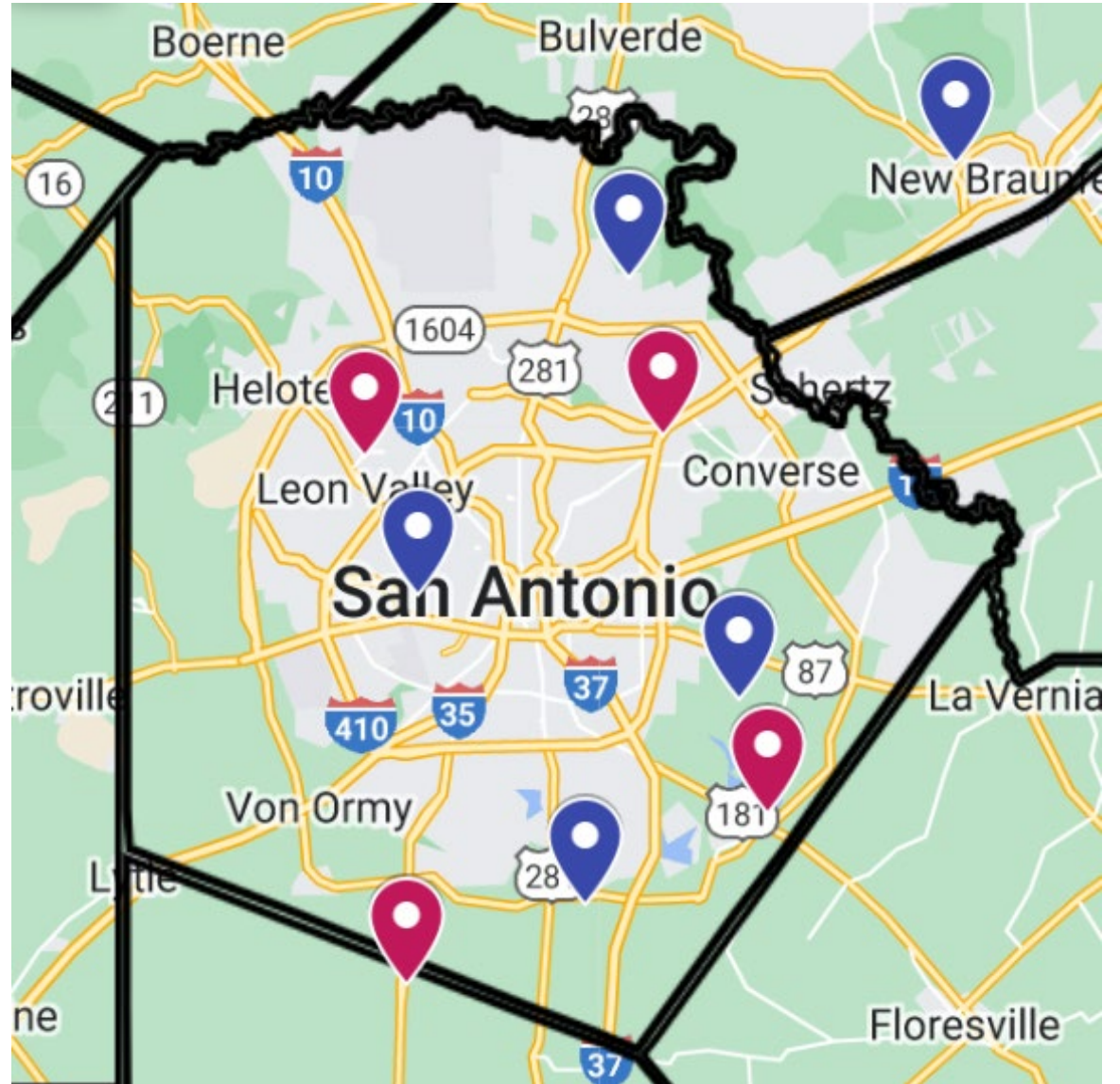


APCA

- The EPA and TCEQ-approved Anthropogenic Precursor Culpability Assessment (APCA) was used to trace ozone back to source regions.
- APCA uses the photochemical grid model to estimate the contributions from multiple source areas, categories, and pollutants.
- APCA uses multiple tracer species to track the fate of ozone precursor emissions (VOC and NO_x) and the ozone formation caused by these emissions
- This information indicates how ozone concentrations will respond to reductions in VOC and NO_x precursor emissions

Fine Particulate Matter (PM_{2.5}) Monitors in the MSA

- Bexar County: 7 monitors
- Atascosa County: 1 monitor
- Comal County: 1 monitor



 Regulatory

 Non-Regulatory

Regulatory PM Monitor Compliance

Regulatory Monitor	County	Most-recent certified data (2019-2021)	
		Annual mean	24-hr mean
San Antonio NW CAMS 23	Bexar	8.8 µg/m ³	21.6 µg/m ³
Calaveras Lake CAMS 59	Bexar	7.6 µg/m ³	20.6 µg/m ³
San Antonio Interstate 35 CAMS 1069	Bexar	8.6 µg/m ³	20.0 µg/m ³
Palo Alto Hwy 16 CAMS 1090	Atascosa	Insufficient Data*	Insufficient Data*

* CAMS 1090 will have sufficient data once 2023 data has been certified (May 2024)

2021: 8.9 µg/m³
2022: 9.1 µg/m³

2021: 22.4 µg/m³
2022: 27.2 µg/m³

