SIP Revision: 2015 Ozone NAAQS, Yuma Redesignation Request and Maintenance Plan

Air Quality Division
November 14, 2023 Draft

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Completeness Criteria
(40 CFR Part 51, Appendix V, § 2.0)

Appendix V § 2.1 - Administrative Materials

(a) A formal signed, stamped, and dated letter of submittal from the Governor or his designee, requesting EPA approval of the plan or revision thereof (hereafter "the plan"). If electing to submit a paper submission with a copy in electronic version, the submittal letter must verify that the electronic copy provided is an exact duplicate of the paper submission.

A letter of submittal will be included with the final State Implementation Plan (SIP) revision.

(b) Evidence that the State has adopted the plan in the State code or body of regulations; or issued the permit, order, consent agreement (hereafter "document") in final form. That evidence shall include the date of adoption or final issuance as well as the effective date of the plan, if different from the adoption/issuance date.

Evidence that the State has adopted the SIP revision will be included in the letter of submittal for the final SIP revision.

(c) Evidence that the State has the necessary legal authority under State law to adopt and implement the plan.

Arizona Department of Environmental Quality has primary responsibility for air pollution control and abatement, and as such, is required to adopt and "maintain a state implementation plan that provides for implementation, maintenance and enforcement of national ambient air quality standards and protection of visibility as required by the clean air act." A.R.S. § 49-404(A). ADEQ also maintains authority to issue and administer rules, adopt county rules, and to submit such rules for approval into the SIP. Copies of Arizona Revised Statutes (A.R.S.), sections 49- 104, 49-106, 49-112, 49-402, 49-404, 49-406, 49-425, 49-471.04, and 49-479, are included in Appendix B, Exhibit B-II.

(d) A copy of the actual regulation, or document submitted for approval and incorporation by reference into the plan, including indication of the changes made (such as redline/strikethrough) to the existing approved plan, where applicable. The submission shall include a copy of the official State regulation/document, signed, stamped, and dated by the appropriate State official indicating that it is fully enforceable by the State. The effective date of any regulation/document contained in the submission shall, whenever possible, be indicated in the regulation/document itself; otherwise the State should include a letter signed, stamped, and dated by the appropriate State official indicating the effective date. If the regulation/document provided by the State for approval and incorporation by reference into the plan is a copy of an existing publication, the State submission should, whenever possible, include a copy of the publication cover page and table of contents.

N/A

(e) Evidence that the State followed all of the procedural requirements of the State's laws and constitution in conducting and completing the adoption/issuance of the plan.

Evidence that ADEQ followed the procedural requirements of Arizona state laws and constitution in adopting this plan will be included in Appendix B upon completion of the public comment process.

(f) Evidence that public notice was given of the proposed change consistent with procedures approved by EPA, including the date of publication of such notice.

Evidence that ADEQ gave notice of the proposed State Implementation Plan revision will be included in Appendix B upon completion of the public comment process.

(g) Certification that public hearing(s) were held in accordance with the information provided in the public notice and the State's laws and constitution, if applicable and consistent with the public hearing requirements in 40 CFR 51.102.

Evidence that ADEQ gave notice of the proposed State Implementation Plan revision will be included in Appendix B upon completion of the public comment process.

(h) Compilation of public comments and the State's response thereto.

A public comment responsiveness summary for this SIP revision will be included in Appendix B, Exhibit B-VIII upon completion of the public comment process.

Appendix V § 2.2 - Technical Support

(a) Identification of all regulated pollutants affected by the plan.

This SIP applies to the 2015 Ozone National Ambient Air Quality Standards (NAAQS) and ozone precursors (NO_x) and VOC. All included provisions regard the regulation of such emissions.

(b) Identification of the locations of affected sources including the EPA attainment/ nonattainment designation of the locations and the status of the attainment plan for the affected areas(s).

This SIP revision is applicable to sources found within the Yuma Ozone nonattainment area, as defined at 83 FR 25776 or 40 CFR 81.303.

(c) Quantification of the changes in plan allowable emissions from the affected sources; estimates of changes in current actual emissions from affected sources or, where appropriate, quantification of changes in actual emissions from affected sources through calculations of the differences between certain baseline levels and allowable emissions anticipated as a result of the revision.

The SIP revision does not contain changes to allowable emissions.

(d) The State's demonstration that the national ambient air quality standards, prevention of significant deterioration increments, reasonable further progress demonstration, and visibility, as applicable, are protected if the plan is approved and implemented. For all requests to redesignate an area to attainment for a national primary ambient air quality standard, under section 107 of the Act, a revision must be submitted to provide for the maintenance of the national primary ambient air quality standards for at least 10 years as required by section 175A of the Act.

The SIP revision contains demonstrations that all Clean Air Act requirements for the Yuma Ozone Nonattainment Area have been met.

(e) Modeling information required to support the proposed revision, including input data, output data, models used, justification of model selections, ambient monitoring data used, meteorological data used, justification for use of offsite data (where used), modes of models used, assumptions, and other information relevant to the determination of adequacy of the modeling analysis.

Information regarding emissions modeling for the Yuma Nonattainment Area is included in the Technical Support Document in Appendix A.

(f) Evidence, where necessary, that emission limitations are based on continuous emission reduction technology.

This SIP revision does not contain changes to allowable emissions.

(g) Evidence that the plan contains emission limitations, work practice standards and recordkeeping/reporting requirements, where necessary, to ensure emission levels.

N/A

(h) Compliance/enforcement strategies, including how compliance will be determined in practice.

N/A

(i) Special economic and technological justifications required by any applicable EPA policies, or an explanation of why such justifications are not necessary.

This SIP revision contains no known deviations from EPA policy.

1 Introduction

Chapter 1 describes the purpose of this State Implementation Plan (SIP) revision for the Yuma ozone nonattainment area, provides an overview and history of the area, and describes general regulatory requirements for redesignation requests and maintenance plans under the Clean Air Act (CAA).

1.1 Statement of Purpose

Pursuant to section 107(d) of the CAA, the U.S. Environmental Protection Agency (EPA) designated and classified an area in northwest Yuma County as a "marginal" nonattainment area for the 2015 Ozone (O_3) National Ambient Air Quality Standards (NAAQS), effective August 03, 2018.[1] EPA based its designation on recorded violations of the standard at the Yuma Supersite, the ozone monitoring site within Yuma County.

This document summarizes the progress of the Yuma area in attaining the ozone NAAQS and demonstrates that all CAA requirements for redesignation to attainment have been satisfied. The clean air quality record for the Yuma nonattainment area from 2021 to 2023, enforceable control measures, and projections of future emissions all show that the area will continue to maintain the air quality standards through 2037. As required by the Clean Air Act, the first maintenance period covered by this SIP revision will last for ten years from 2027 through 2037.[2] With this submittal, ADEQ requests that EPA approve the enclosed maintenance plan and redesignate the Yuma nonattainment area to attainment for the 2015 ozone NAAQS.

Under the authority granted by the Governor and the State of Arizona, the Arizona Department of Environmental Quality (ADEQ) is responsible for the preparation and submittal of this State Implementation Plan revision.[3]

1.2 National Ambient Air Quality Standards

Title I of the CAA requires EPA to set NAAQS for those pollutants that are considered harmful to both public health and the environment. EPA sets standards for six air pollutants: ground-level ozone, particulate matter, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. There are two types of NAAQS: primary and secondary. Primary standards are set to protect human health and secondary standards are established to protect public welfare, such as decreased visibility and damage to animals, crops, vegetation, and buildings.[4]

The standard for each pollutant is set at a maximum concentration in either parts per million (ppm) by volume, parts per billion (ppb) by volume, or micrograms per cubic meter of air ($\mu g/m^3$). Each standard also has a distinct averaging time in order to provide the necessary level of protection. These standards

[1] 83 FR 25776 (June 4, 2018).
[2] See CAA § 175A (42 U.S.C. § 7505(a))
[3] *See* Arizona Revised Statues (A.R.S.) §§ 49-401, 402, 404, and 406.
[4] *See* https://www.epa.gov/criteria-air-pollutants/naaqs-table (last visited August 17, 2022).

are periodically reevaluated and are either retained or revised based on review of scientific literature and analyses.[5]

1.3 Ozone NAAQS

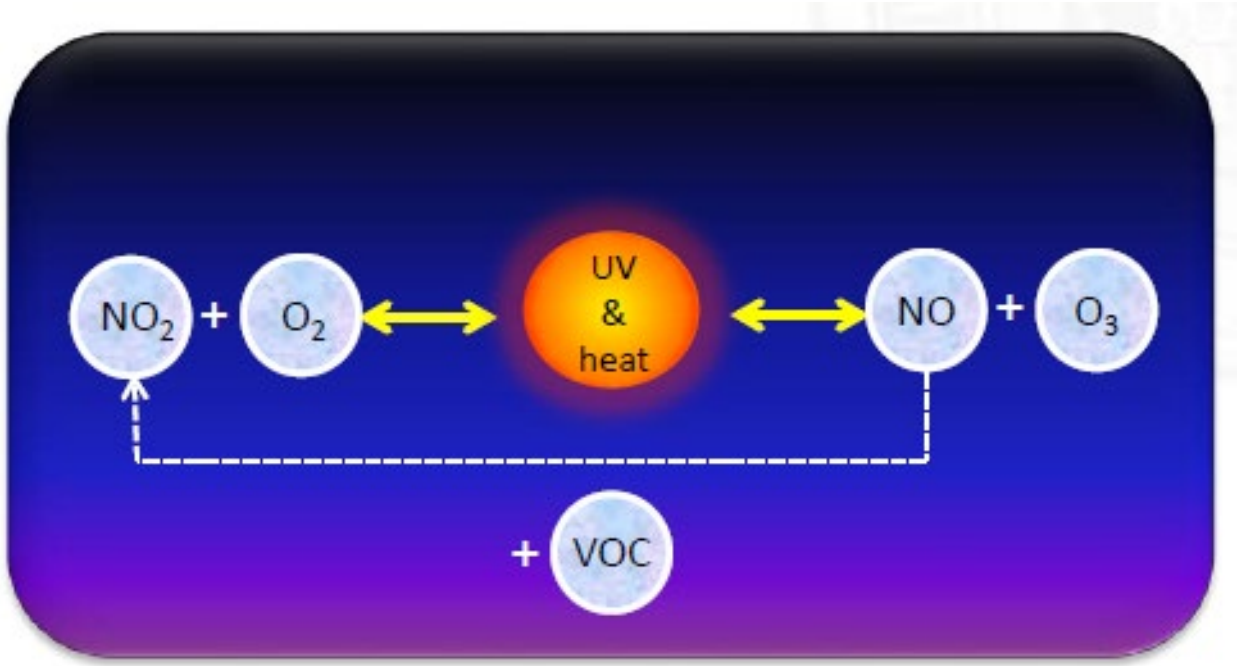
1.3.1 Ozone Formation

Ozone is not a pollutant released directly into the air by any source, but is rather a secondary pollutant formed from a complex process involving a reaction between precursor pollutants and sunlight. Nitrogen oxides (NO_x) and volatile organic compounds (VOCs) are the main precursor pollutants to the formation of ozone, although other molecules are often involved in the process.

Ozone forms naturally in the earth's troposphere[6] as shown in simplified form in Figure 1-1**.** Nitrogen dioxide (NO_2) and oxygen (O_2) react under the sun's heat and ultraviolet rays (i.e. photolyze) to form nitrogen monoxide (NO) and ozone (O_3), and vice versa.[7] In a separate reaction, VOCs can oxidize and the resulting free radicals can convert NO to NO_2. This natural VOC reaction disrupts the equal balance of the photocatalytic reaction and allows for accumulation of ozone in the air.[8]

[5] *See* CAA § 109 (42 U.S.C. 7409 [2015]).
[6] The troposphere is the Earth's lowest atmospheric layer extending "from the earth's surface to about 8 km above polar regions and to about 16 km above tropical regions." EPA, *Air Quality Criteria for Ozone and Related Photochemical Oxidant: Volume II of III*, p. AX2-2 (2006) *available at* https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=149923&CFID=58102340&cftoken=94355181.
[7] *See generally id*. at AX2-3 – AX-2-5; NASA EARTH OBSERVATORY, *Chemistry in the Sunlight*, http://earthobservatory.nasa.gov/Features/ChemistrySunlight/chemistry_sunlight3.php (last visited May 27, 2016).
[8] *See generally id*.

Figure 1-1 Ozone Formation



[9] and VOCs are emitted from live plants, such as pine trees, as byproducts of photosynthesis[10]). However, human activity also produces NO_x and VOCs, which are known as anthropogenic emissions. The most common sources of anthropogenic of NO_x emissions include fossil fuel combustion, such as vehicle engines and industrial boilers that generate heat, steam, or electricity. Anthropogenic VOCs originate from sources such as paints, coatings, and fossil fuel derivatives such as gasoline.[11] As NO_x and VOCs emissions increase and react with sunlight and higher ambient air temperatures, ozone begins to accumulate and reach concentrations that are unhealthy to humans and the environment.

Accumulation of ozone generally occurs in urban areas where manmade NO_x and VOC emissions are high.[12] People living in urban areas are more commonly exposed to the negative effects of ozone, such as reduction in lung function and respiratory inflammation and distress.[13] Ozone can also cause disruptions in environmental ecosystems including, but not limited to, declines in plant growth such as reductions in crop yield.[14]

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[9] EPA, *Air Quality Criteria for Ozone and Related Photochemical Oxidant: Volume I of III*, p. 2-20 (2006) *available at* https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=149923&CFID=58102340&cftoken=94355181.

[10] *See id*. at 2-21; D. Ehhalt, M. Prather, et al*., Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report: Climate Change 2001, Working Group I: The Scientific Basis, Chapter 4*, Section 4.2.3.2.

[11] Yuma Marginal Nonattainment SIP 2020 Revision: Appendix A, Yuma Ozone Emission Inventory Technical Support Document.

[12] *See* EPA, *Criteria for Ozone, supra* note 9 at E-6 ("The daily maximum 1-h O3 concentrations tend to be much higher in large urban areas or in areas downwind of large urban areas.").

[13] *See generally* EPA, *supra* note 9 at E-10 – E-23.

[14] *See generally* EPA, *supra* note 9 at E-23 – E-30.

1.3.2 Federal Ozone Standard: 2015 Ozone NAAQS

On October 1, 2015, EPA revised the air quality standards for ozone, lowering the level of the NAAQS from 75 ppb to 70 ppb.[15]

Compliance with the NAAQS is determined by the form of the standard. The 8-hour ozone standard is met at an ambient monitoring site when the 3-year average of the annual fourth-highest daily maximum 8-hour average ozone concentration is less than or equal to 0.070 ppm.[16] Table 1-1 provides a summary of the level and form of the ozone NAAQS for each of EPA's review cycles from 1971 through 2015.[17]

Table 1-1 Ozone NAAQS History

Date	Final Rule Citation	Primary/ Secondary	Averaging Time	Level	Form
1971	36 FR 8186 (Apr 30, 1971)	Primary and Secondary	1-hour	0.08 ppm	Not to be exceeded more than one hour per year
1979	44 FR 8202 (Feb 8, 1979)	Primary and Secondary	1 hour	0.12 ppm	Attainment is defined when the expected number of days per calendar year, with maximum hourly average concentration greater than 0.12 ppm, is equal to or less than 1
1993	58 FR 13008 (Mar 9, 1993)	EPA decided that revisions to the standards were not warranted at the time			
1997	62 FR 38856 (Jul 18, 1997)	Primary and Secondary	8 hours	0.08 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
2008	73 FR 16483 (Mar 27, 2008)	Primary and Secondary	8 hours	0.075 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
2015	80 FR 65292 (Oct 26, 2015)	Primary and Secondary	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years

[15] *See National Ambient Air Quality Standards for Ozone, Final Rule*, 80 FR 65292 (October 26, 2015).
[16] 40 CFR 50.19.
[17] *See* https://www.epa.gov/criteria-air-pollutants/naaqs-table (last visited May 15, 2023).

1.4 Regulatory Background

1.4.1 Ozone Nonattainment Designation

As noted above, EPA revised the NAAQS for ozone in 2015 by lowering the level of the standard to 70 ppb. Pursuant to CAA Section 107(d)(1), the Governor of Arizona submitted boundary recommendations for the Maricopa and Yuma ozone nonattainment areas to EPA for the purpose of establishing air quality designations for both. On June 4, 2018, EPA finalized the air quality designations for the Yuma area by concurring and adopting Arizona's recommendation. In the same action, EPA classified Yuma as a marginal nonattainment area.[18]

1.4.2 SIP Submittals

This section describes various SIP revisions and associated plans and programs that ADEQ has developed related to ozone nonattainment in the Yuma area.

1.4.2.1 Infrastructure SIP (I-SIP)

Clean Air Act Section 110(a)(1) requires states to submit SIP revisions within three years following the promulgation of new or revised NAAQS that provide for implementation, maintenance, and enforcement of such standards. Each of these SIPs must address certain basic elements or the "infrastructure" of the state's air quality management programs under CAA Section 110(a)(2)(A) through (M). These elements include, but are not limited to, legal authority to develop and adopt rules and SIP revisions to comply with CAA requirements, provisions for establishment and operation of an ambient monitoring network, public and local agency participation in air quality planning, and operation of permitting programs.

ADEQ submitted *Arizona State Implementation Plan Revision under Clean Air Act Sections 110(a)(1) and 110(a)(2) for the 2015 Ozone National Ambient Air Quality Standards* to EPA on September 24, 2018.[19]

1.4.2.2 Nonattainment Area Plan

Under CAA section 182(a), Arizona was required to submit a revised SIP for the Yuma nonattainment area within two years from the effective date of nonattainment designation, including an emissions inventory as described in CAA section 182(a)(1) and new emissions statements regulations under CAA section 182(a)(3)(B).

ADEQ submitted *SIP Revision: Marginal Ozone Plan for the Yuma Nonattainment Area*, *December 17, 2020*, to EPA on December 22, 2020.[20]

1.4.2.3 Permitting Programs

ADEQ has an approved prevention of significant deterioration (PSD) program for all pollutants (except for greenhouse gases) and areas under its permitting jurisdiction. Additionally, at the time of the December 22, 2020 Yuma Ozone nonattainment area plan submittal, ADEQ's nonattainment new source review (NSR) permitting program was fully approved with respect to ozone.

[18] See 83 FR 25776 (June 4, 2018, effective August 3, 2018).
[19] Final action on the ozone infrastructure SIP is still pending as of the drafting of this maintenance plan SIP.
[20] 87 FR 19629 (April 5, 2022).

Subsequent changes to the NSR program requirements related to inter-precursor trading (IPT) provisions for offsets for ozone required corrections to Arizona's NSR rules. The rule amendment addressing IPT was included in *SIP Revision: New Source Review—Municipal Incinerators and Inter-Precursor Trading, November 30, 2022*, submitted to EPA for approval on December 6, 2022.

Chapters 3 and 5 contain additional discussion of ADEQ's SIP revisions applicable to the Yuma ozone planning area and EPA's actions on those submissions.

1.4.2.4 Determination of Attainment by the Attainment Date

Areas classified as marginal nonattainment for the 2015 ozone NAAQS are required to attain the standard three years after the effective date of the nonattainment designation.

On October 7, 2022, EPA determined, in accordance with CAA section 181(b)(2)(A) and the provisions of the 2015 Ozone NAAQS SIP Requirements Rule (40 CFR 51.1303), that the Yuma, Arizona area attained the 2015 ozone NAAQS by the marginal area attainment date of August 3, 2021. EPA based its determination on ambient air quality data for the period 2018–2020.[21]

The determination of attainment by the attainment date is not a formal redesignation of the nonattainment area to attainment as provided for under CAA section 107(d)(3). The nonattainment designation remains until EPA determines that the planning area meets additional CAA provisions required for redesignation including the following.[22]

- The area has attained the NAAQS (current)
- The area has a fully approved implementation plan under CAA section 110(k)
- The area has demonstrated that the improvement in air quality is due to permanent and enforceable control measures
- The area has a fully approved maintenance plan under CAA section 175A (demonstrating continued attainment for 10 years after redesignation)
- The area meets all applicable requirements under CAA section 110 and part D (e.g., infrastructure and nonattainment area requirements)[23]

The requirements for redesignation are described in greater detail in section 1.6.1, *Clean Air Act Requirements for Redesignation*, of this document.

1.5 Nonattainment Area Description

The following sections describe the boundary of the nonattainment area and provide information on the geography, climate, population, and economy of Yuma County and the ozone planning area.

[21] 87 FR 60897 (October 7, 2022, effective November 7, 2022).
[22] *See* CAA 107(d)(3)(E)(i) through 107(d)(3)(E)(v).
[23] In general, only those section 110 and part D elements that are linked with a particular nonattainment area's designation and classification, or permitting requirements that are associated with an area's demonstration of continued attainment, are applicable requirements for purposes of redesignation. *See* discussion in Section 5 of this document.

1.5.1 Nonattainment Area Boundary

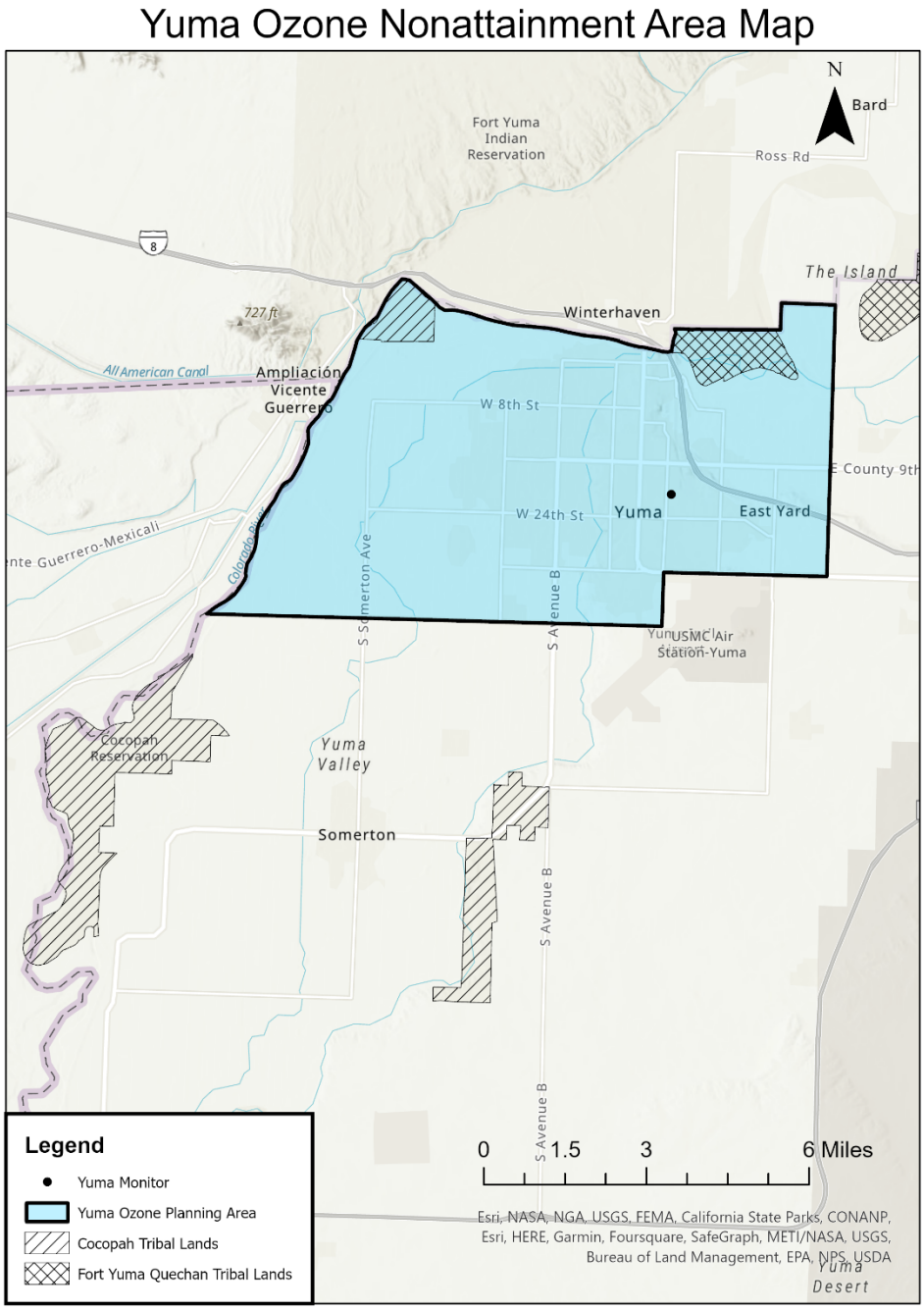
The Yuma ozone nonattainment area is located in northwest Yuma County along the Arizona/California border, approximately 157 miles southwest of Phoenix. The total land area of the nonattainment area is 52 square miles, which comprises approximately 0.94 percent of the total land area of Yuma County, AZ (see Figure 1-2).

The nonattainment area boundary is codified at 40 CFR 81.303 as described in Table 1-2.

Table 1-2 Yuma Ozone Nonattainment Area Description

Designated Area	Designation Type	Classification Type
Yuma County (part): That portion within Yuma County of the area described by the following: 1. Bounded on the north and west by the Arizona state line. 2. Bounded on the south by the line of latitude at 32° 39' 20"N. 3. Bounded on the east by the line of longitude 114° 33' 50"W. 4. And excluding the sections 10, 11, and 12 of township T9S, R23W and any portion in Indian Country.	Nonattainment	Marginal

Figure 1-2 Yuma Ozone Nonattainment Area Map



1.5.2 Geography and Climate

The climatological and meteorological conditions of the Yuma ozone nonattainment area and vicinity are dominated by basin and range topography that contains desert lands, farmlands and mountain ranges. Specifically, Yuma is located in the southwestern corner of Arizona along Interstate 8 where the Gila River meets the Colorado River in the Yuma Desert. Yuma is situated in a low elevation section of the Sonoran Desert and has a desert climate with severely hot summers and warm winters. The Yuma Desert has several masses of sand dunes, south and southeast of the city and near the U.S.-Mexico border, which contain very little vegetation. However, much of the land in the City of Yuma area, and generally along the Interstate 8 corridor extending into both Mexico and California, is used for irrigated agricultural.

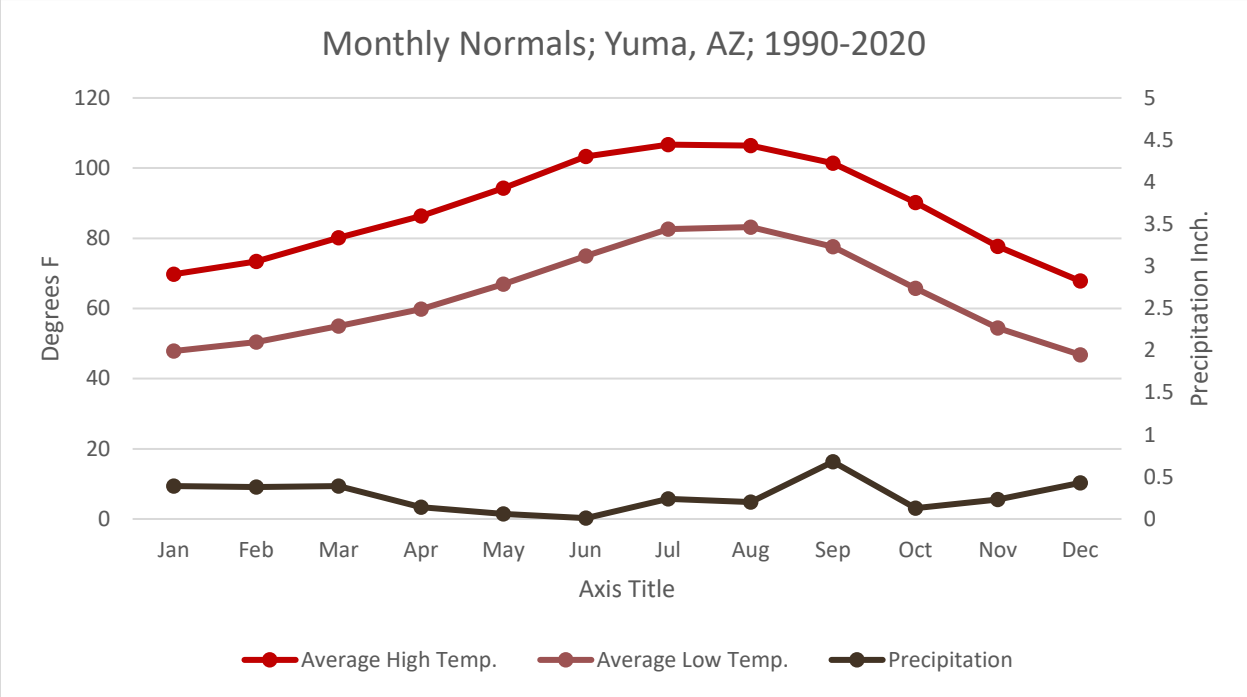
Yuma County's valley and mesa areas are bordered by California and the Colorado River to the west, Mexico to the south, the Gila Mountain Range to the east and the Laguna Mountains to the Northeast.[24] The Gila Mountains are approximately 26 miles long, 5 miles wide, peaking at 3,156 feet, and run south from the Gila River to fade into the Tinajas Atlas Mountains, which follow the same vector south to the Mexican border. The Laguna Mountains are a circular mountain range north of the City of Yuma, north of the Gila River, ranging approximately 7 miles by 7 miles, peaking at approximately 1,080 feet, and bordered on the west by the Colorado River.

During the ozone season from April to September, average high temperatures in Yuma range from about 86° to 107° Fahrenheit (F), with the highest temperatures occurring in July. December and January are the coolest months with an average daily minimum temperature between 47°F and 48°F. The climate in Yuma is characterized by a long, hot season, usually beginning in April and ending in October. Precipitation is variable. An annual average of 3.28 inches of rain falls within the region.[25] See Figure 1-3 for monthly average temperatures and precipitation.

[24] Yuma Ozone Marginal SIP Revision: Technical Support Document Section A.7.

[25] NOAA Online Weather Data (NOWData), monthly climate normals, Yuma, AZ; period of record 1991 to 2020; https://www.weather.gov/wrh/Climate?wfo=psr.

Figure 1-3 Monthly Average Temperatures and Precipitation – Yuma, Arizona



Source: NOAA Online Weather Data (NOWData), monthly climate normal, Yuma, AZ; period of record 1991 to 2020.

1.5.3 Population

Population statistics provide information regarding the number of people impacted by changes in air quality in the Yuma area and can also be used as a surrogate for estimating current and future emissions from certain source categories (*see also* Appendix A, Section A1.4).

The Yuma County population is concentrated in the southwestern portion of the county, around the border cities of Yuma, Somerton, and San Luis, the Cocopah Indian Reservation, and several large military installations. This region is a gateway between southern California and Arizona, via I-8, and a thoroughfare of international ground transportation, via the two San Luis ports of entry. The county seat is the City of Yuma, which lies approximately 157 miles south west of Phoenix and contains nearly half of the county's population. Other communities in Yuma County include the cities of San Luis and Somerton and the town of Wellton.

The population living in Yuma County totaled 231,781 in 2020, and the projected population is expected to grow to 233,060 in 2030 and 251,316 in 2037. The population living in the Yuma ozone nonattainment area totaled 85,390 in 2020, and the population is expected to grow to 97,180 in 2030 and 105,572 in 2037.[26]

[26] Arizona Office of Economic Opportunity provided the population projections for Yuma County. https://www.azcommerce.com/oeo/population/population-projections/

Decennial census data and projected population for the Yuma nonattainment area and Yuma County are shown in Table 1-3.

Table 1-3 Census and Projected Population for the Yuma NAA and Yuma County 2020-2037

Area/Percent Change	2020	2030	2037
Yuma NAA	85,390	97,180	105,572
Yuma NAA Population Change	N/A	13.807%	8.636%
Yuma County	203,843	231,987	252,020
Yuma County Population Change	N/A	13.807%	8.636%

Source: Arizona Office of Economic Opportunity (AOEO); medium series current population and projections for future years.

1.5.4 Economy

The economy in Yuma is largely supported by agriculture activity, which contributes about $2.5 billion of the local GDP for the Yuma area. Yuma County ranks highest in Arizona in terms of crop production and livestock raising. Yuma County is often called the nation's "winter salad bowl," producing 90 percent of all leafy vegetables grown in the United States, from November through March.[27]

Yuma is also home to the U.S. Army Yuma Proving Grounds as well as the Marine Corp Air Defense Station, which are used by both the U.S. Navy and Marine Corp to train combat pilots.[28] As a result, the military is the second largest industry in the Yuma economy.[29] The military presence in Yuma plays a key role in the regional economy, estimated to generate almost $260 million annually in terms of an economic impact on the metro area.

The local economy is also driven by health care service industries, some industrial manufacturing, and small private businesses operating throughout the county.[30] The nonattainment area also hosts I-8, connecting Arizona to Southern California and contributing to on-road mobile source emissions.

[27] Yuma Chamber of Commerce, Local Industry, available at https://www.yumachamber.org/local-industry.html (last accessed January 20, 2023).
[28] U.S. Marine Corp, Marine Corp Air Station Yuma, available at https://www.mcasyuma.marines.mil/ (last accessed May 22, 2020).
[29] Yuma Chamber of Commerce, Local Industry, available at https://www.yumachamber.org/local-industry.html (last accessed January 20, 2023).
[30] *Id*.

Tourism is the third largest industry in Yuma County. Mexican visitors spend an estimated $2.2 billion on food, clothing, entertainment, and other activities in Yuma County each year, representing more than 6 percent of all taxable sales. That spending directly supports more than 2,000 local jobs.[31]

Table 1-4 contains employment data by economic sectors for Yuma County for the years 2018-2021. These data represent annual averages through 2021.

Table 1-4 Employment by Sector for Yuma County: 2018 – 2021

Employment Sector	2018	2019	2020	2021
Total Civilian Labor Force	53,453	54,172	52,060	53,901
Agriculture, Forestry, Fishing, and Hunting	13,075	12,539	11,037	10,370
Natural Resources and Mining	13, 097	12,559	11,059	10,390
Utilities	169	167	159	155
Construction	2,552	3,021	3,439	3,362
Manufacturing	2,673	2,598	2,634	2,771
Wholesale Trade	1,254	1,377	1,664	1,621
Retail Trade	8,244	8,107	7,995	8,214
Transportation and Warehousing	1,209	2,017	1,493	1,570
Real Estate and Rental and Leasing	566	695	634	630

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages. (https://data.bls.gov/cew/apps/data_views/data_views.htm#tab=Tables)

Table 1-5 shows a selected time series of civilian labor force data for the City of Yuma and Yuma County for the years 2018–2021. Complete data for 2022 were not available at the time of developing this document. Table 1-5 reveals that for every year except 2021 during this timeframe, the unemployment rate for the County was over 15 percent. The unemployment rate for the City of Yuma, however, was slightly lower than that for the County, hovering around 12 percent, but dropping to 8.5 percent in 2021.

[31] Yuma Chamber of Commerce, Local Industry, available at https://www.yumachamber.org/local-industry.html (last accessed January 20, 2023).

Table 1-5 Civilian Labor Force and Unemployment Data for the city of Yuma and County

Year	2017	2018	2019	2020	2021
City of Yuma civilian labor force	42,992	43,638	44,909	44,661	43,858
City of Yuma unemployment rate	11.3%	10.9%	11.2%	13.3%	8.5%
Yuma County civilian labor force	93,326	94,398	97,138	94,768	93,693
Yuma County unemployment rate	17.2%	16.9%	16.8%	16.9%	12.9%

Source: Arizona Department of Economic Security, Research Administration, Unemployment Rates and Labor Force Statistics (LAUS), 2022.
*Data are not seasonally adjusted.

1.5.5 Environmental Justice

EPA defines environmental justice as the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.

EPA's Environmental Justice (EJ) Screen is a mapping and screen tool developed by the EPA that uses a nationally consistent dataset and approach for combining environmental and demographic socioeconomic indicators.[32]

EJ Screen provided the information contained in Table 1-4, looking at the communities within the Yuma nonattainment area.

Table 1-6 EPA's EJ Screen Summary

Demographic Indicator	Value	State Average	State Percentile
People of color	73%	44%	81st
Low income population	44%	32%	71st
Limited English-speaking households	11%	4%	88th
Unemployment rate	9%	6%	77th
Population < high school education	23%	12%	82nd
Population > 64 years of age	16%	20%	56th
EPA calculated Demographic index	22%	14%	80th

[32] Environmental Protection Agency, *What is EJ Screen?* (Jun. 26, 2023). Retrieved from https://www.epa.gov/ejscreen/what-ejscreen.

Source: EPA's Environmental Justice Screening Tool

1.6 General SIP Approach

1.6.1 Clean Air Act Requirements for Redesignation

Clean Air Act Title I, Part A, Section 107 contains the planning and control elements necessary for EPA to redesignate a nonattainment area to attainment. Tables 1-6 and 1-7 list those requirements and explain how the demonstrations included in this document satisfy those obligations for the Yuma Ozone planning area. Table 1-8 lists CAA requirements for transportation and general conformity, programs applicable in both nonattainment and maintenance areas.

Table 1-7 Clean Air Act Requirements for Redesignation to Attainment

CAA Citation	Requirement	Action to Meet Requirement	Location in Document
§ 107(d)(3)(E)(i) – Attainment of the Standard	*A nonattainment area cannot be redesignated to attainment unless the EPA Administrator determines that the area has attained the national ambient air quality standard.*	On October 7, 2022, EPA determined that the Yuma nonattainment area had attained the Ozone NAAQS by the applicable attainment date.[33] ADEQ has determined that the Yuma nonattainment area has an attaining design value through 2023. Chapter 2 includes a summary of historical and current air quality data.	Section 1.4 and Chapter 2
§ 107(d)(3)(E)(ii) – Fully Approved Implementation Plan	*The area must have a fully approved implementation plan under section 110(k).*	This SIP revision includes documentation that Clean Air Act requirements for the nonattainment area have been met and includes a maintenance plan demonstrating attainment of the NAAQS through 2037. ADEQ requests full approval of all outstanding SIP obligations for the Yuma ozone area.	Chapters 3 and 5
§ 107(d)(3)(E)(iii) – Permanent and Enforceable Improvement in Air Quality	*The state must demonstrate, and EPA concur, that the improvement in air quality is due to permanent and enforceable reductions in emissions resulting from implementation of the applicable implementation plan and applicable Federal air pollutant control regulations and other permanent and enforceable reductions.*	The measures responsible for bringing the area into attainment are primarily federal measures including vehicle and fuel standards as outlined in Chapter 4.	Chapter 4
§ 107(d)(3)(E)(iv) – Maintenance Plan	*The area must have a fully approved maintenance plan meeting the requirements of CAA section 175A.*	This SIP revision includes a maintenance plan that demonstrates continued attainment through 2037.	Chapter 6

[33] 87 FR 19629 (April 5, 2022).

CAA Citation	Requirement	Action to Meet Requirement	Location in Document
		ADEQ requests EPA approval of the maintenance plan elements enclosed with this SIP revision.	
§ 107(d)(3)(E)(v) – Section 110 and Part D Requirements	*The state must meet all requirements applicable to the area under section 110 and part D.*	Demonstrations that all applicable implementation plan requirements have been met are included in Chapter 5.	Chapter 5

Table 1-8 CAA Requirements for Maintenance Plans

CAA Citation	Requirement	Action to Meet Requirement	Location in Document
§ 175A(a) – Plan Revision	*Each state that submits a request to redesignate a nonattainment area to attainment shall also submit a revision to the applicable state implementation plan to provide for maintenance of the NAAQS for at least 10 years after the redesignation. The plan should contain additional measures, as may be necessary, to ensure such maintenance.*	This plan includes a maintenance demonstration for the ozone NAAQS for ten years after redesignation (2027 through 2037).	Chapters 4 and 6
§ 175A(b) – Subsequent Plan Revisions	*Eight years after redesignation as an attainment area the state shall submit to EPA an additional revision of the applicable SIP for maintaining the NAAQS for 10 years after the expiration of the first 10-year maintenance period.*	ADEQ commits to submit an additional SIP revision, eight years after redesignation of the nonattainment area to attainment in order to demonstrate maintenance of the 2015 ozone NAAQS for an additional 10-year period.	No additional location in document.
§ 175A(c) – Nonattainment Requirements Applicable Pending Plan Approval	*Until the maintenance plan is approved and the area is redesignated to attainment, the requirements of CAA title I, part D, Plan Requirements for Nonattainment Areas, shall continue in force and effect with respect to the area.*	ADEQ commits to continue to implement all required provisions as necessary to ensure continued attainment in the area.	No additional location in document.

CAA Citation	Requirement	Action to Meet Requirement	Location in Document
§ 175A(d) – Contingency Provisions	*Each plan revision shall contain contingency provisions to assure that the state will promptly correct any violation of the standard which occurs after the redesignation of the area as an attainment area. Such provisions shall include a requirement that the State will implement all measures which were contained in the state implementation plan for the area before redesignation of the area as an attainment area.*	A contingency plan is included in Section 6.5 below.	Section 6.5

Table 1-9 CAA Requirements for Transportation and General Conformity

CAA Citation	Requirement	Action to Meet Requirement	Location in Document
§ 176(c) – Transportation Conformity	*"Transportation conformity is required by the Clean Air Act section 176(c) (42 U.S.C. 7506(c)) to ensure that federal funding and approval are given to highway and transit projects that are consistent with ("conform to") the air quality goals established by a state air quality implementation plan (SIP)."*[34]	Conformity requirements under section 176(c) require states to establish criteria and procedures for determining the conformity of federally supported projects. State conformity SIP revisions should be consistent with federal regulations regarding consultation, enforcement and enforceability. Arizona is currently revising its procedural and consultation requirements for transportation conformity under A.A.C. Title 18, Chapter 2, Article 14. According to EPA policy, conformity SIP requirements are not	Chapter 7

[34] Source: *General Information for Transportation Conformity*, https://www.epa.gov/state-and-local-transportation/general-information-transportation-and-conformity (July 19, 2017).

CAA Citation	Requirement	Action to Meet Requirement	Location in Document
		applicable for purposes of redesignation requests under CAA section 107(d) "because state conformity rules are still required after redesignation and federal conformity rules apply where state rules have not been approved."[35] Evaluation of on-road mobile sources for regional emissions analyses purposes is included in Chapter 7, *Motor Vehicle Emissions Budget for Transportation Conformity*.	
§ 176(c) – General Conformity	*Similar to Transportation Conformity, which applies to highways and mass transit projects, General Conformity is applicable to all other federally supported activities to ensure that the actions taken by federal agencies in nonattainment and maintenance areas do not interfere with a state's plans to meet national air quality standards.*	General Conformity for the Yuma planning area must be addressed to ensure ozone precursor emissions from any federal actions or plans do not exceed the rates outlined in 40 CFR 93.153(b).[36] Criteria for making determinations and provisions for general conformity are located in the SIP approved rule A.A.C. R18-2-1438.[37] ADEQ commits to review and comment, as appropriate, on any federal agency draft general conformity determination it receives pursuant to 40 CFR 93.155 for activities planned in this air quality planning area.	No additional location in document.

1.6.2 EPA Guidance

ADEQ considered the following guidance in preparation of this plan.

[35] *See* 73 FR 22313 (April 25, 2008).
[36] *See* 58 FR 63253 (November 30, 1993) and 40 CFR Part 93, Subpart B, https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-93/subpart-B.
[37] *See* 64 FR 19916, Approval and Promulgation of Implementation Plans for Arizona and California; General Conformity Rules, U.S. EPA (April 23, 1999).

- *Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area Classifications and State Implementation Plan Requirements*. 81 FR 81276 (November 17, 2016).
- *Implementation of the 2015 National Ambient Air Quality Standards for Ozone: Nonattainment Area State Implementation Plan Requirements*. 83 FR 62998 (Dec. 6, 2018).
- *Procedures for Processing Requests to Redesignate Areas to Attainment*, Calcagni, J., Memorandum, U.S. EPA, September 4, 1992.
- *Review of State Implementation Plans and Revisions for Enforceability and Legal Sufficiency*, Potter, J. C., Adams, T. L., Blake, F. S., Memorandum, U.S. EPA, September 23, 1987.
- *Review of State Implementation Plans and Revisions for Enforceability and Legal Sufficiency*, Alushin, M. S., Eckert, A. W., Seitz, J. S., Memorandum, U.S. EPA, September 23, 1987.
- *Adequacy Review and Conformity Checklist*, U.S. EPA Online SIP Processing Manual, June 1, 2016.

1.7 Intergovernmental Participation/Consultation; Stakeholder Process

Federal law requires consultation and participation by local political subdivisions and federal land managers having authority over land to which the plan applies.[38] The SIP must identify and define the responsibilities of each organization that will participate in developing, implementing, and enforcing the plan. The plan must also include any related agreements or memoranda of understanding among the organizations.[39] Additional consultation procedures are required when transportation conformity budgets are established in the submitted plan.[40]

ADEQ works with its partners and the regulated community to analyze emissions and develop control strategies in order to attain and maintain the NAAQS. Participation is encouraged and technical advice sought through meetings and discussion with governmental departments and agencies, municipalities, members of the regulated community, and other interested parties; and through the public comment process for SIP revisions. Documentation of public notice and hearing as well as a compilation of comments received and State responses is included in Appendix B.

The following tables list the names and roles of governmental entities, the regulated community, and other interested parties participating in the development of this plan.

Table 1-10 Governmental Entities

Name	Role
Arizona Department of Environmental Quality (ADEQ)	Develop state implementation plan and emissions inventories. Analyze and participate in

[38] *See* CAA §§ 110(a)(2)(J), 110(a)(2)(M), and 121.
[39] *See* 40 CFR 51.240 and 51.241.
[40] *See* 40 CFR 93. *See also* Chapter 7.

Name	Role
	developing/documenting appropriate control strategies for the SIP. Prepare motor vehicle emissions budget.
Yuma Metropolitan Planning Organization (YMPO)	Designated transportation planning authority in the Yuma region. Consultation on SIP development and preparation of Yuma planning areas ozone transportation conformity budget. Provide on-road modeling data.
Yuma County	Consultation on SIP development.
Arizona Department of Transportation (ADOT)	Provide technological information for emissions inventory development (e.g., MOVES data, vehicle miles traveled (VMT) data, construction information, etc.). Consultation on transportation related issues.
Federal Highway Administration (FHWA)	Provide technological information for emissions inventory development and motor vehicle emissions budget (e.g., MOVES data, vehicle miles traveled (VMT) data, construction information, etc.). Consultation on transportation related issues.
EPA Region 9	Participate in an advisory capacity throughout the SIP development process including review of the SIP Development Plan (SDP), Inventory Preparation Plan (IPP), and proposed SIP; review and act on the SIP submitted by ADEQ.
Fort Yuma Quechan Tribe	Consultation/notification regarding SIP development.
Cocopah Tribe of Arizona	Consultation/notification regarding SIP development.

Table 1-11 Other Stakeholders

Name	Role
Members of the Public	Review and comment on proposed control strategy and plan.

2 Attainment of the Standard – CAA § 107(d)(3)(E)(i)

"The State must show that the area is attaining the applicable NAAQS."[41]

2.1 Description of the O_3 Monitoring Network

There is currently one ozone monitor in the Yuma area, Yuma Supersite, which is operated by ADEQ. The site is located on the southeast corner of the Rural Metro Administration Facility property 2029 S. Arizona Avenue Yuma, Arizona 85364.The surrounding area is commercial and industrial, with a dirt lot adjacent to the south and I-8 1 km to the northeast. In addition to NAAQS compliance, the site is also used to help understand transport of PM and ozone. The parameters monitored are part of the State or Local Air Monitoring Stations (SLAMS) and meteorological networks. See Figure 2-1 below for a full description of the Yuma Supersite monitor from ADEQ's 2022 Arizona Annual Air Monitoring Network Plan.[42] See Figure 1-2 for a map of the Yuma ozone nonattainment area and monitoring site location. Based upon the location and siting details, Yuma Supersite adequately represents general exposure of the nonattainment area population to ozone.

Quality assurance procedures are conducted on all data collected at the Yuma monitoring site in accordance with 40 CFR Part 58. Data from the monitor are entered into EPA's Air Quality System (AQS) database in accordance with federal guidelines.

[41] *See Procedures for Processing Requests to Redesignate Areas to Attainment*, Calcagni, J., Memorandum, U.S. EPA, September 4, 1992.

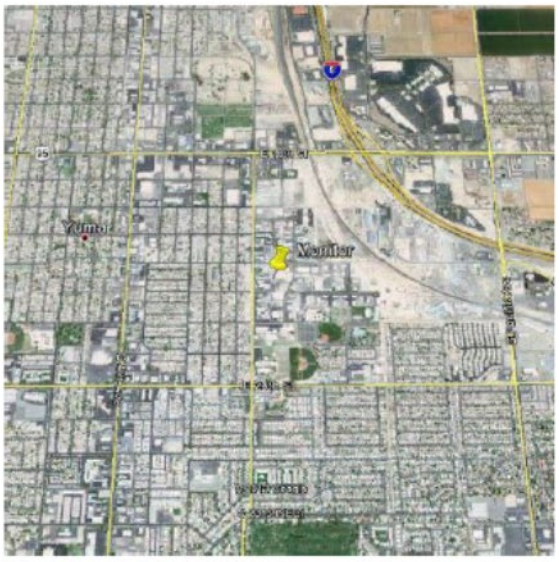
[42] *See "State of Arizona Air Monitoring Network Plan for the Year 2022,"* available at https://www.azdeq.gov/node/3174.

Figure 2-1 Yuma Monitoring Site Information

Site Information			
AQS ID	04-027-8011		
Street Address	2029 S. Arizona Ave. Yuma, AZ 85364		
County	Yuma	Groundcover	Gravel
CBSA	Yuma	Latitude	32.6903
Surrounding Area	Commercial/Industrial	Longitude	-114.6144
Adjacent Roadway Info	91 m – W – Arizona Ave. AADT Count – 12,302	Elevation	60 m
Nearest Assessed Roadway Info	Same	Site Established Date	02/01/2006

Parameters Monitors	
• Wind • O_3 • PM_{10}	• $PM_{2.5}$ • Temp/RH

Site Photos



Aerial view of Yuma Supersite

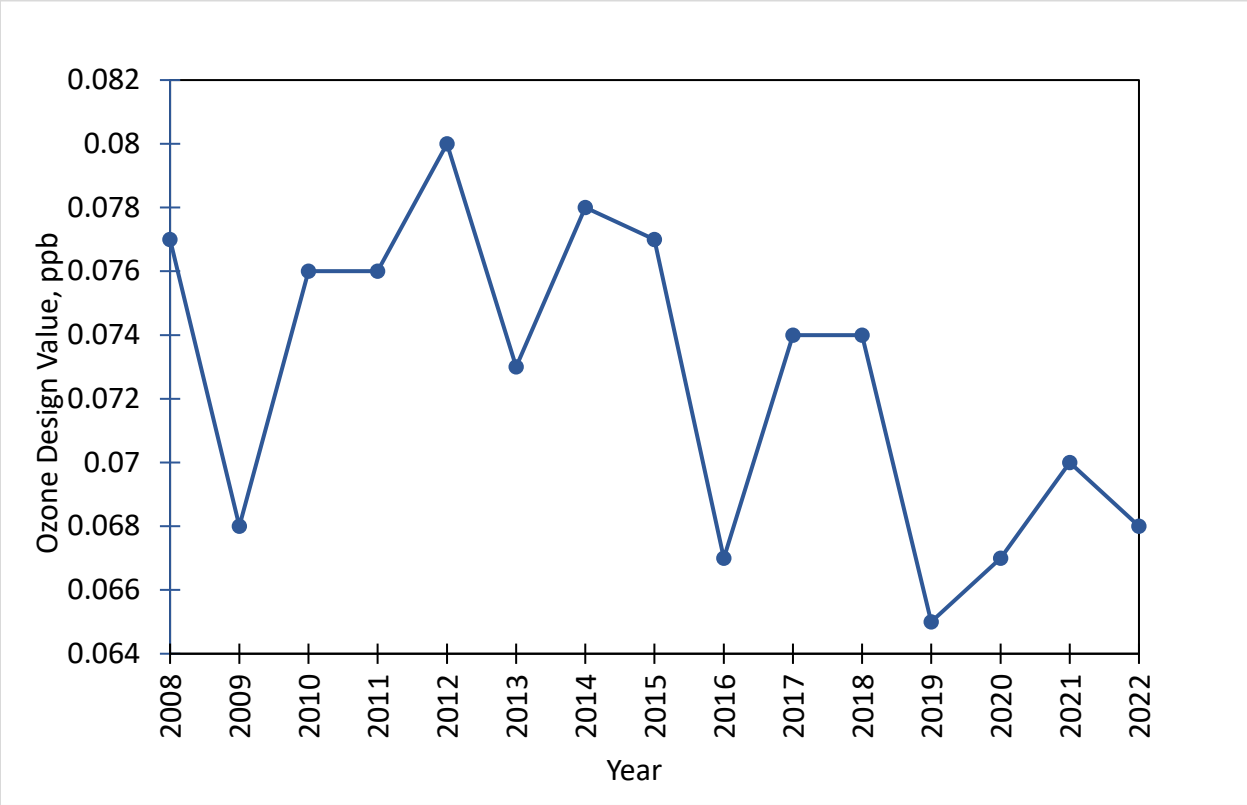
Shelter and Meteorological Tower at Yuma Supersite – 4/2014

2.2 Ambient O_3 Data Trends

The 2015 ozone NAAQS are attained when the three-year average of the annual fourth-highest daily maximum eight-hour average concentration measured at a monitor is less than or equal to 0.070 ppm (70 ppb). This is also known as the design value.

All monitored exceedances must be included when calculating design values for comparison to the NAAQS, unless the state or local agency can show that the exceedances are due to invalid data (e.g., monitor malfunction, etc.) or due to an exceptional/natural event (e.g., wildfire). Figure 2-2 presents the calculated design values for years 2008 through 2022.

Figure 2-2 Yuma Ozone Design Values 2008-2022[43]



[43] EPA's Air Quality System (AQS): https://www.epa.gov/air-trends/air-quality-design-values.

2.3 8-Hour O3 NAAQS Compliance

On October 7, 2022, EPA determined that the Yuma, Arizona area attained the 2015 ozone NAAQS by the marginal area attainment date of August 3, 2021. [44] EPA based its determination on ambient air quality data for the period 2018–2020. Based on complete quality-assured data, the Yuma planning area continues to meet the NAAQS.

Table 2-2 presents the annual fourth highest values for the period 2020-2022 and current (2022) design value for the Yuma Supersite.

Table 2-1 Ozone Compliance Summary 2020-2022

2020 to 2022 Eight-Hour O_3 Compliance (in ppm) (NAAQS eight-hour 0.070 ppm)				
Site Name	**Fourth-Highest Value**			**Three-Year Average**
	2020	**2021**	**2022**	
Yuma County				
Yuma Supersite	0.067	0.070	0.068	**0.068**
Number of Sites in Violation of the NAAQS				**0**

[44] 87 FR 60897 (October 7, 2022, effective November 7, 2022).

3 Fully Approved Implementation Plan – CAA § 107(d)(3)(E)(ii)

"The SIP for the area must be fully approved under CAA section 110(k), and must satisfy all requirements that apply to the area." "An area cannot be redesignated if a required element of its plan is the subject of a disapproval; a finding of failure to submit or to implement the SIP; or -partial, conditional, or limited approval." "… approval action on SIP elements and the redesignation request may occur simultaneously." [45]

Consistent with Clean Air Act requirements, the state previously submitted the following plans applicable to the Yuma ozone nonattainment area.

- *Arizona State Implementation Plan Revision under Clean Air Act Sections 110(a)(1) and 110(a)(2) for the 2015 Ozone Ambient Air Quality Standards*, *September 24, 2018* (infrastructure SIP)
- *SIP Revision: Marginal Ozone Plan for the Yuma Nonattainment Area, December 17, 2020* (nonattainment area plan)
- *SIP Revision: New Source Review—Municipal Incinerators and Inter-Precursor Trading, November 30, 2022,* submitted to EPA on December 6, 2022 (revisions to the nonattainment new source review permitting program)

3.1 Infrastructure SIP

ADEQ submitted *Arizona State Implementation Plan Revision under Clean Air Act Sections 110(a)(1) and 110(a)(2) for the 2015 Ozone Ambient Air Quality Standards*, *September 24, 2018* to meet the infrastructure requirements for Arizona's air quality agencies under CAA Section 110(a)(2)(A) through (M).

EPA proposed approval of Interstate Transport elements under CAA section 110(a)(2)(D)(i)(I) on June 24, 2022.[46] On December 5, 2022, EPA proposed full approval of nine additional infrastructure SIP elements.[47] In the same action, EPA proposed partial disapproval of several elements related to prevention of significant deterioration (PSD) permitting of greenhouse gases (GHG) in all permitting jurisdictions in Arizona and with PSD permitting of all new source review (NSR)-regulated pollutants in Pima County.

As noted in EPA's proposal, Pima County currently implements the federal PSD program for all regulated NSR pollutants under a delegation agreement with EPA. All Arizona jurisdictions implement the federal PSD program for GHG, pursuant to delegation agreements with EPA, because Arizona cannot regulate such emissions under state law. In its proposal, EPA further stated, "*If finalized, these partial disapprovals of Arizona's SIP would not create any new consequences for Arizona, the relevant county agencies, or the EPA, as Arizona and the county agencies already implement the EPA's federal PSD program at 40 CFR 52.21, pursuant to delegation agreements, for all regulated NSR pollutants*."

[45] *See Procedures for Processing Requests to Redesignate Areas to Attainment*, Calcagni, J., Memorandum, U.S. EPA, September 4, 1992.
[46] *See* 87 FR 37776 (June 24, 2022).
[47] *See* 87 FR 74349 (December 5, 2022).

In summary, ADEQ implements an approved PSD program (and administers the federal GHG program). As such, state implementation of approved or delegated PSD programs should not preclude redesignation of the Yuma area to attainment.

3.2 Nonattainment Area Plan

Under CAA section 182(a), Arizona was required to submit a revised SIP for the Yuma nonattainment area within two years from the effective date of nonattainment designation including an emissions inventory as described in CAA section 182(a)(1) and new emissions statements regulations under CAA section 182(a)(3)(B). Arizona submitted *SIP Revision: Marginal Ozone Plan for the Yuma Nonattainment Area, December 17, 2020*, to EPA on December 22, 2020.

EPA published a final approval of the submitted base year inventory on April 5, 2022 and final approval of the amended emissions statement rules on July 29, 2022.[48]

3.3 Nonattainment New Source Review

On December 6, 2022, ADEQ submitted *SIP Revision: New Source Review—Municipal Incinerators and Inter-Precursor Trading, November 30, 2022,* to make required corrections to its NSR program related to ozone inter-precursor trading (IPT) provisions for offsets. As of the drafting of this SIP, EPA action on this submission is pending.

See Chapter 5 of this document for additional discussion of required revisions to Arizona's SIP under CAA section 110 and part D for the Yuma ozone planning area.

[48] *See* 87 FR 19629 (April 5, 2022) and 87 FR 45657 (July 29, 2022).

4 Permanent and Enforceable Improvement in Air Quality – CAA § 107(d)(3)(E)(iii)

"The State must be able to reasonably attribute the improvement in air quality to emission reductions which are permanent and enforceable. Attainment resulting from temporary reductions in emission rates (e.g., reduced production or shutdown due to temporary adverse economic-conditions) or unusually favorable meteorology would not qualify as an air quality improvement due to permanent and enforceable emission reductions." [49]

4.1 Sources of Ozone (O_3)

Source categories included in the following emissions inventory for the Yuma planning area are:

- Point Source Emissions
- Nonpoint Source Emissions
- Biogenic Emissions
- On-Road Mobile Emissions
- Nonroad Mobile Emissions

ADEQ compiled a 2020 base year emission inventory for the source categories listed above. Ozone precursor emissions include volatile organic compounds (VOCs) and oxides of nitrogen (NO_x). Point source emissions were gathered from the ADEQ point source database, while other categories (nonpoint, on-road, nonroad, and biogenics) were based on developed emission calculations or National Emissions Inventory (NEI) data.[50]

Point sources represent stationary sources of emissions, such as industrial processes, electrical generating units, and petroleum product storage or transfer facilities. There are also local product manufacturing companies, which contribute to ambient concentrations of ozone precursors, although at lower percentages than larger stationary facilities. There are four predominant point source facilities located in the Yuma ozone NAA, including the Yucca Power Plant (owned and operated by Arizona Public Service), the International Paper Manufacturer facility, the Yuma Regional Medical Center, and Yuma Cogeneration Power.

Nonpoint sources in the Yuma ozone NAA are numerous and widespread throughout the county, making them difficult to record. For this reason, ADEQ estimated the total emissions from different sectors of nonpoint sources using a bottom-up and top-down approach to ensure all potential emitters were accounted for.

[49] *See Procedures for Processing Requests to Redesignate Areas to Attainment*, Calcagni, J., Memorandum, U.S. EPA, September 4, 1992.
[50] *See* Appendix A, Yuma Ozone Emission Inventory Technical Support Document.

Mobile sources, or vehicles, in the Yuma NAA are numerous and contribute a significant volume of precursor emissions into the ambient environment. One of the primary sources of VOC and NOx emissions in the nonattainment area are Passenger Trucks. As noted in Chapter 1, Interstate 8, which connects Arizona to Southern California, goes through the city of Yuma as well as the ozone NAA. Where the I-8 crosses the Colorado River and connects the two states, the average daily traffic count varies between 17,000 vehicles per day to 27,000 vehicles per day traveling in each direction.[51]

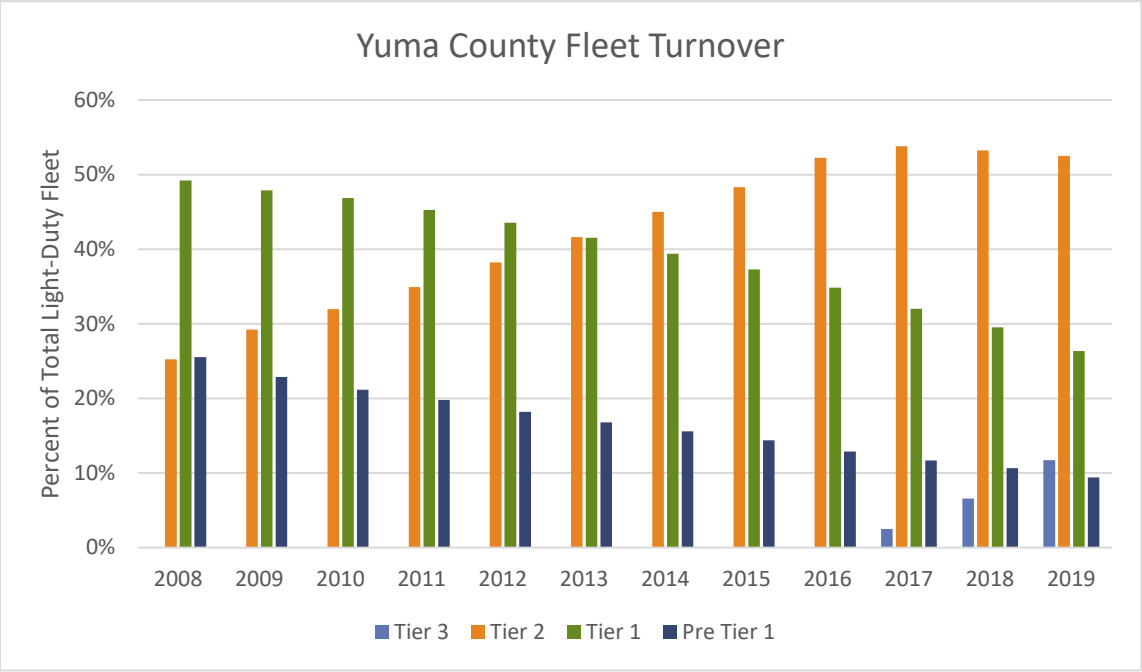
4.2 Federal Emissions Control Measures

4.2.1 Yuma County Fleet Turnover

One of the driving forces behind emission reductions in the Yuma NAA is turnover of the vehicle fleet. Fleet turnover describes the phenomenon of older vehicles, which emit NO_x and VOCs at higher rates, being replaced by newer vehicles with lower emission rates. This fleet turnover, coupled with the Federal Tier 2 & 3 standards, results in the overall reduction of mobile on-road emissions in the NAA. These on-road emissions make up approximately half of the attainment year NO_x and VOC inventories.

ADEQ collected vehicle registration data from the Arizona Department of Transportation (ADOT) to illustrate the occurrence of fleet turnover in the NAA. ADOT was able to provide registration data for 2008 to 2019. Official registration data for 2020 and beyond were unavailable. Figure 4-1 provides the change in vehicle population by tier standard between 2008 and 2019.

Figure 4-1 Yuma County Light-Duty Vehicle Fleet Turnover



The specific model years included in each tier grouping are:

[51] https://ympo.org/maps-more/traffic-counts/

- Pre-Tier 1 – 1993 and under
- Tier 1 – 1994 to 2003
- Tier 2 – 2004 to 2016
- Tier 3 – 2017 to present

These tier groupings include registration data for light-duty gasoline powered cars and trucks. As described throughout the rest of Section 4, the various tier standards set gram/mile emission rate limits for certain model years. Therefore, as lower tier vehicles (Pre-Tier 1 and Tier 1) are replaced with higher tier vehicles (Tier 2 and 3) the overall NO_x and VOC emissions of the fleet are reduced. Figure 4-1 shows that between 2008 and 2019 the number of Pre-Tier 1 and Tier 1 vehicles were reduced by 48 and 25 percent, respectively. The figure also shows the introduction of Tier 3 vehicles in 2017, and the simultaneous growth in Tier 3 and decline in Tier 2 vehicles that took place between 2017 and 2019. Although 2020 to 2023 registration data is not available, ADEQ believes these trends in fleet turnover will continue, which will aid in the sustained preservation of the NAAQS throughout the maintenance period.

4.2.2 Tier 1 Vehicle Standards

Federal Tier 1 vehicle standards were published on June 5, 1991 and were phased-in from 1994 to 1997. Tier 1 standards applied to all new light-duty vehicles with a gross vehicle weight rating (GVWR) less than 8,500 pounds, which included passenger cars, light-duty trucks, sport utility vehicles (SUVs), minivans, and pick-up trucks. However, unlike subsequent tier standards, the Tier 1 standard did not apply to passenger vehicles over 8,500 GVWR.

Emission standards for Tier 1 vehicles were measured using Federal Test Procedure 75 and were expressed in grams per mile. NO_x emission standards ranged from 0.6 to 1.53 grams per mile, and were dependent on both the weight and fuel type of the vehicle. The Tier 1 standard also set emission rates for total hydrocarbons (THC) and non-methane hydrocarbons (NMHC). These hydrocarbon emission rates ranged from 0.32 to 0.8 grams per mile, depending on the specific hydrocarbon type and vehicle weight.

4.2.3 Tier 2 Vehicle and Fuel Standards

Federal Tier 2 vehicle standards introduced on December 21, 1999 required all passenger vehicles in a manufacturer's fleet, including light-duty trucks and SUVs, to meet an average emission standard of 0.07 gram per mile of NOx. Implementation began in 2004, with full compliance required by 2007. The Tier 2 standards also cover passenger vehicles over 8,500 pounds gross vehicle weight rating (the larger pickup trucks and SUVs), which are not covered by the Tier 1 regulations.

The Tier 2 standards required vehicles to be 77 percent to 95 percent cleaner. The Tier 2 rule also reduced the sulfur content of gasoline to 30 ppm starting in January of 2006. Sulfur occurs naturally in gasoline and interferes with the operation of catalytic converters on vehicles, which results in higher NOx emissions. Lower-sulfur gasoline is necessary to achieve the Tier 2 vehicle emission standards.[52]

[52] Control of Air Pollution from New Motor Vehicles: Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements, 65 Fed. Reg. 6,698 (Feb. 10, 2000) (to be codified at 40 C.F.R. pts. 80, 85, 86)

The emission reductions resulting from these vehicle standards are permanent and federally enforceable.

4.2.4 Tier 3 Vehicle and Fuel Standards

Federal Tier 3 vehicle standards require all passenger vehicles in a manufacturer's fleet, including light-duty trucks and SUVs, to meet an average standard of 0.03 gram per mile of NOx. Heavy-duty passenger vehicles must meet average standards of 0.178 to 0.247 gram per mile of NOx depending on vehicle classification. Implementation begins in 2017, with full compliance required by 2025. Compared to standards in 2014, the Tier 3 tailpipe standards for light-duty vehicles are expected to reduce non-methane organic gases (NMOG) and NOx by approximately 80 percent. The Tier 3 program is expected to reduce per-vehicle PM standards by approximately 70 percent. The heavy-duty tailpipe standards represent about a 60 percent reduction in both fleet average NMOG+NOx and per vehicle PM standards. Tier 3 vehicle standards also require evaporative standards that result in a 50 percent reduction in VOC emissions from Tier 2 for all 2017 and later light-duty and on-road gasoline-powered heavy-duty vehicles. The Tier 3 rule also reduced the sulfur content of gasoline to 10 ppm starting in January 2017. Tier 2 standards had limited the sulfur content to 30 ppm. Sulfur occurs naturally in gasoline and interferes with the operation of catalytic converters on vehicles, which results in higher NOx emissions.[53] The emission reductions resulting from these vehicle standards are permanent and federally enforceable.[54]

4.2.5 National Program for GHG Emissions and Fuel Economy Standards

The federal GHG and fuel economy standards apply to light-duty cars and trucks and will achieve significant reductions in GHG emissions.[55] Through 2050, the program is projected to achieve more than 3.1 billion tons of GHG emission reductions.

The EPA and the National Highway Traffic Safety Administration (NHTSA) jointly developed the federal GHG and fuel economy standards for light-duty cars and trucks in model years 2012-2016 (phase 1) and 2017-2025 (phase 2). The EPA also aligned implementation of the Tier 3 program with the second phase of the EPA and NHTSA federal GHG and fuel economy standards program. Together, phases 1 and 2 of the final standards are projected to result in an average industry fleet-wide level of 163 grams/mile of CO2 in model year 2025, which is equivalent to 54.5 mpg if achieved exclusively through fuel economy improvements.[56] The fuel economy standards will result in vehicles consuming less fuel, and which in turn reduces NOx emissions. The emission reductions resulting from these vehicle standards are permanent and federally enforceable.

4.2.6 Heavy-Duty Gasoline and Diesel Highway Vehicles Standards

The federal standards designed to reduce NOx and VOC emissions from heavy-duty gasoline and diesel highway vehicles began to take effect in 2004. A second phase of standards and testing procedures that began in 2007 reduced PM from heavy-duty highway engines, while also reducing highway diesel fuel

[53] Control of Air Pollution from Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards, 79 Fed. Reg. 23,414 (April 28, 2014) (to be codified at 40 CFR Parts 79, 80, et. al.)
[54] *See* U.S. EPA, http://www.epa.gov/otaq/tier3.htm.
[55] *See* 40 CFR 600.
[56] *See* U.S. EPA, http://www.epa.gov/otaq/climate/regs-light-duty.htm.

sulfur content to 15 ppm in order to protect emission control devices from sulfur damage. The total program is expected to achieve a 90 percent reduction in PM emissions and a 95 percent reduction in NOx emissions for these new engines using low-sulfur diesel, compared to pre-standard engines using higher-content sulfur diesel. The emission reductions resulting from these vehicle standards are permanent and federally enforceable.

4.2.7 Large Nonroad Diesel Engines Rule

In May 2004, the EPA promulgated the Tier 4 standard for large nonroad diesel engines, such as those used in construction, agricultural and industrial equipment, to be phased in between 2008 and 2014. The nonroad diesel rules also reduced the allowable sulfur in nonroad diesel fuel to 15 ppm. Prior to the fuel standard change, nonroad diesel fuel averaged about 3,400 ppm sulfur.

The combined engine and fuel rules target NOx, PM, and hydrocarbon emissions from large nonroad diesel engines. The Tier 4 standard created emission rate bins based on engine type and model year. In particular, the NO_x emission rate standard ranges from 0.4 to 3.5 g/kWh. EPA estimated the implementation of NO_x absorber catalyst, the main mechanism used to achieve the needed NO_x emission reductions, would result in a 90 percent reduction in NO_x emissions when compared to baseline levels.[57] The emission reductions resulting from these vehicle standards are permanent and federally enforceable.

4.2.8 Medium- and Heavy-Duty Vehicle Fuel Consumption and GHG Standards

In September 2011, the EPA and the NHTSA promulgated joint rules to reduce GHG emissions and improve fuel efficiency of combination tractor trucks, heavy-duty pickups and vans, and vocational trucks beginning with model year 2014 and applying to all model years by 2018. Depending on truck type, the on-road vehicles must achieve from a 7 percent to 20 percent reduction in CO2 emissions and fuel consumption from the 2020 base year. The decrease in fuel consumption will result in an estimated 7 percent to 20 percent decrease in NOx emissions.[58] The emission reductions resulting from these vehicle standards are permanent and federally enforceable.

4.2.9 Nonroad Spark-Ignition Engines and Recreational Engines Standards

The nonroad spark-ignition and recreational engine standards, effective in July 2003, regulate NOx, hydrocarbons and CO for groups of previously unregulated nonroad engines. These engine standards apply to all new engines sold in the United States and imported after these standards began and applies to large spark-ignition engines (forklifts and airport ground service equipment), recreational vehicles (off-highway motorcycles and all-terrain-vehicles), and recreational marine diesel engines. The regulation varies based upon the type of engine or vehicle.

The large spark-ignition engines contribute to ozone formation and ambient CO and PM levels in urban areas. Tier 1 of this standard was implemented in 2004 and Tier 2 started in 2007. Like the large spark-

[57] Control of Emissions of Air Pollution From Nonroad Diesel Engines and Fuel, 69 Fed. Reg. 38,958 (June 29, 2004) (to be codified at 40 CFR Parts 9, 69, et. al.)

[58] Greenhouse Gas Emissions Standards and Fuel Efficiency Standards for Medium- and Heavy-Duty Engines and Vehicles, 76 Fed. Reg. 51,706 (September 15, 2011) (to be codified at 40 CFR Parts 85, 86, et. al.)

ignition, recreational vehicles contribute to ozone formation and ambient CO and PM levels. For the off-highway motorcycles and all-terrain-vehicles, the exhaust emissions standard was phased-in.

When the nonroad spark-ignition and recreational engine standards are fully implemented in 2020, an overall 72 percent reduction in hydrocarbons, 80 percent reduction in NOx, and 56 percent reduction in CO emissions are expected. These controls will help reduce ambient concentrations of ozone, CO, and fine PM.[59] The emission reductions resulting from these engine standards are permanent and federally enforceable.

4.2.10 Boiler NESHAP

The NESHAP for the industrial, commercial and institutional boiler source category is applicable to boilers and process heaters burning natural gas, coal, oil or biomass. Boilers must comply with the NESHAP by January 31, 2016 for all states. The NESHAP contains work practice standards such as annual boiler tune ups for most boilers. There are also emissions standards for the largest emitting boilers (<1% of all boilers) including a CO standard that is a surrogate for gas-phase hazardous air pollutants (HAPs) and VOC. There is estimated to be a small reduction in VOC emissions due to the NESHAP.[60] The emission reductions resulting from these standards are permanent and federally enforceable.

4.2.11 RICE NESHAP

The RICE (Reciprocating Internal Combustion Engines) NESHAP applies to stationary engines burning natural gas and diesel fuels that generate electricity and power equipment at various facilities including industrial, agricultural, oil and gas production, power generation and other sites. RICE owners and operators had to comply with the NESHAP by May 3, 2013. The NESHAP contains work practice standards such as engine maintenance, requires ultralow-sulfur diesel fuel for some engines, and requires the use of catalytic converters on larger engines. There is estimated to be a slight reduction in VOC emissions due to the NESHAP.[61] The emission reductions resulting from these standards are permanent and federally enforceable.

4.2.12 Utility MATS and NSPS Rules

On February 16, 2012, the EPA published final rules for both the (1) MATS for new and existing coal- and oil-fired EGUs and (2) NSPS for fossil-fuel fired electric utility, industrial-commercial-institutional and small industrial-commercial-institutional steam generating units.[62] The MATS reduce emissions of toxic air pollutants from EGUs with a capacity greater than 25 megawatts that burn coal or oil for the purpose of generating electricity for sale and distribution through the national electric grid to the public. For the NSPS, the EPA revised the standards that new coal- and oil-fired power plants must meet for NO_x, SO_2, and PM.

[59] Final Rule: Control of Emissions from Nonroad Large Spark-Ignition Engines, and Recreational Engines (Marine and Land-Based), 67 FR 68242.
[60] *See* U.S. EPA http://www.epa.gov/ttn/atw/boiler/boilerpg.html.
[61] *See* U.S. EPA http://www.epa.gov/ttn/atw/icengines/.
[62] 77 FR 9304.

5 Section 110 and Part D Requirements – CAA § 107(d)(3)(E)(v)

"For the purposes of redesignation, a State must meet all requirements of section 110 and Part D that were applicable prior to submittal of the complete redesignation request." [63]

5.1 CAA Section 110 – Implementation Plans

5.1.1 Infrastructure SIP

Clean Air Act Section 110(a)(1) requires states to submit SIPs within three years following the promulgation of new or revised NAAQS to provide for implementation, maintenance, and enforcement of such standards. Each of these SIPs must address certain basic elements or the "infrastructure" of its air quality management programs under CAA Section 110(a)(2)(A) through (M). These elements include, but are not limited to, provisions for establishment and operation of ambient monitoring, public and local agency participation in air quality planning, and operation of permitting programs. The provisions of Section 110(a)(2) are primarily general program requirements.[64] The timing of SIP submittals for emissions inventories and other air quality planning obligations specific to nonattainment areas are subject to the provisions of CAA, Title I, Part D – "Plan Requirements for Nonattainment Areas" (*see* Section 5.2 below).

ADEQ submitted *Arizona State Implementation Plan Revision under Clean Air Act Sections 110(a)(1) and 110(a)(2) for the 2015 Ozone National Ambient Air Quality Standards* on September 24, 2018 to meet the infrastructure requirements for Arizona's air quality agencies under CAA Section 110(a)(2)(A) through (M). See Chapter 3 for discussion of EPA's proposed actions on ADEQ's submission.

5.1.2 Nonattainment New Source Review/Prevention of Significant Deterioration

Clean Air Act 110(a)(2)(C) requires provisions for the implementation of both Part C Prevention of Significant Deterioration (PSD) permitting programs in attainment (and maintenance) areas and Part D nonattainment New Source Review (NSR) permitting programs in nonattainment areas.[65]

Arizona Revised Statutes Title 49, Chapter 3, Articles 1, 2, and 3 establish ADEQ and local agency authority for preconstruction review and permitting. Under the air permits program, sources that emit regulated pollutants are required to obtain a permit before constructing, changing, replacing, or operating any equipment or process which may cause air pollution. This includes equipment designed to reduce air pollution. Permits are also required if an existing facility that causes air pollution transfers ownership, relocates, or otherwise changes operations.

Per the authority noted above, new sources and modifications to existing sources in Arizona are subject to state requirements for preconstruction review and permitting under Arizona Administrative Code

[63] *See Procedures for Processing Requests to Redesignate Areas to Attainment*, Calcagni, J., Memorandum, U.S. EPA, September 4, 1992.
[64] The requirements of CAA 110(a)(2) generally apply to attainment, nonattainment, and unclassifiable areas.
[65] The term New Source Review or NSR is sometimes used to refer to both the nonattainment NSR and PSD permitting programs.

(AAC), Title 18, Chapter 2, Articles 2, 3, 4, and 5 or relevant county rules. All new major sources and major modifications to existing major sources in Arizona are also subject to the nonattainment NSR provisions of these rules or PSD for attainment areas.

ADEQ has an approved PSD program for all pollutants and areas under its permitting jurisdiction, except for greenhouse gases (GHGs). ADEQ's nonattainment NSR permitting program is fully approved with respect to ozone, except for inter-precursor trading provisions for offsets. See Section 5.2 for further discussion of ADEQ's nonattainment NSR program.

5.2 CAA Part D – Plan Requirements for Nonattainment Areas

Under CAA section 182(a), the state was required to submit a revised SIP for the Yuma nonattainment area within two years from the effective date of nonattainment designation to meet applicable CAA Title I, Part D requirements under Subpart 1, *Nonattainment Areas in General* and Subpart 2, *Additional Provisions for Ozone Nonattainment Areas*. Nonattainment area plan requirements included an emissions inventory as described in CAA section 182(a)(1) and new emissions statements regulations under CAA section 182(a)(3)(B). Arizona submitted *SIP Revision: Marginal Ozone Plan for the Yuma Nonattainment Area*, *December 17, 2020*, to meet applicable Subpart 1 and Subpart 2 requirements on December 22, 2020.

CAA Section 172(c)(5) requires permits for construction and operation of new or modified major stationary sources located in ozone nonattainment areas, in accordance with Section 173. At the time of the 2020 nonattainment area SIP submittal, ADEQ's nonattainment new source review (NSR) permitting program was fully approved with respect to ozone. EPA, however, notified ADEQ that in order to be approvable in the future the state's NSR program must be amended to conform to the inter-precursor trading (IPT) provisions for offsets in 40 CFR 51.165(a)(11) and part 51 Appendix S. Under 40 CFR 51.1314, ADEQ was required to submit a nonattainment NSR plan for the Yuma Nonattainment Area by August 3, 2021, three years from the effective date of the nonattainment designation.

On January 29, 2021, following various court challenges, the D.C. Court of Appeals vacated the IPT program on the basis that the IPT program, contained in EPA's 2008 and 2015 ozone NAAQS implementation rules, violated the unambiguous language of the Clean Air Act [*Sierra Club v. EPA*, 985 F.3d 1055 (D.C. Cir., 2021)]. Therefore, to comply with both 40 CFR 51.1314 and the *Sierra Club v. EPA* ruling, ADEQ was required to remove the ozone IPT program from its rules.

ADEQ removed the authorization for ozone IPT that was based upon EPA's previous implementation of the 2008 and 2015 ozone NAAQS that had been located in Arizona Administrative Code (A.A.C.) R18-2-404(A). The rule amendment addressing IPT was included in *SIP Revision: New Source Review—Municipal Incinerators and Inter-Precursor Trading, November 30, 2022*, submitted to EPA for approval on December 6, 2022.

ADEQ has primary authority for air permitting in the Yuma area. ADEQ's nonattainment NSR permitting program is fully approved with respect to ozone except for inter-precursor trading provisions for offsets. Furthermore, after redesignation of the area, PSD requirements will apply. ADEQ implements an approved PSD program (and administers the federal GHG program). With respect to the PSD requirements, ADEQ has an EPA-approved PSD program under CAA sections 160 through 165 of the CAA, except for greenhouse gases (GHGs), and the EPA has delegated to ADEQ the authority to administer the federal PSD program for GHGs under 40 CFR 52.21. These programs will apply to ozone emissions from new major sources and major modifications upon redesignation of the area to attainment. Thus, new major sources and major

modifications to existing major sources with significant O_3 emissions, as defined under 40 CFR 51.166 and 52.21, will be required to obtain a PSD permit. As such, state implementation of an approved or delegated PSD programs should not preclude redesignation of the Yuma ozone area to attainment.

See Chapter 3 for discussion of EPA's actions on ADEQ's CAA Part D submissions.

6 Maintenance Plan – CAA § 107(d)(3)(E)(iv)

Redesignation requirements in CAA section 107 require states to develop a maintenance plan under CAA 175A to assure continued attainment after redesignation. The September 4, 1992, EPA Memorandum *Procedures for Processing Requests to Redesignate Areas to Attainment* (1992 Guidance), recommends several core provisions to consider when developing maintenance plans. Those elements and ADEQ's demonstrations to meet those provisions are outlined in Sections 6.1 through 6.5 below.

6.1 Attainment Emissions Inventory

"The State should develop an attainment emissions inventory to identify the level of emissions in the area which is sufficient to attain the NAAQS. This inventory, … should include the emissions during the time period associated with the monitoring data showing attainment." "Where the State has made an adequate demonstration that air quality has improved as a result of the SIP … the attainment inventory will generally be the actual inventory at the time the area attained the standard."[66]

This SIP revision includes an attainment, interim, and final year (final year of the first 10-year maintenance period) inventory for primary emissions of O_3. The methodologies used to develop these inventories are provided in Appendix A, *Yuma O_3 Emissions Inventory Technical Support Document.* An outline of the inventory years is included in Table 6-1 below.

When developing an ozone SIP revision, it can be helpful to determine if an area is NO_x-limited vs. VOC-limited. This is because the process of ozone formation is in part controlled by the relative availability of NOx and VOC in the air in a given location. The results of this type of chemical process analysis helps planning agencies develop the most effective controls for reducing ozone formation in a given area. For example, if an area is NO_x-limited with respect to ozone production, controls focused on reducing NO_x emissions are likely more impactful.

Given that the Yuma NAA currently has a clean data determination, and projected final maintenance year ozone precursor emissions are below attainment year levels (discussed later in this section), the development of specific NO_x or VOC controls was unnecessary for this SIP revision. Therefore, ADEQ did not conduct a chemical process analysis for the Yuma NAA. However, given the mix of both agricultural and industrial sources in the NAA, it is likely that some portions of the NAA are NO_x-limited, while others are VOC-limited. Additionally, this mix of NOx of VOC limited areas also likely depends on the specific point in the ozone season.

Table 6-1 Emission Inventory Outline

Inventory Year	Inventory Purpose	Data Source
2020	Attainment Year	2020 NEI & ADEQ Internal Point Source Database, and other data sources
2030	Interim Year	Projected data sources and potential to emit

[66] *See Procedures for Processing Requests to Redesignate Areas to Attainment*, Calcagni, J., Memorandum, U.S. EPA, September 4, 1992.

2037	Final Year of First 10-Year Maintenance Period	Projected data sources and potential to emit

Source categories included in these inventories are:

- Point Source Emissions
- Nonpoint Source Emissions
- Biogenic Emissions
- On Road Mobile Emissions
- Non-road Mobile Emissions

Point source emissions were gathered from the ADEQ point source databases while other categories (nonpoint, on-road, non-road, and biogenics) were based on developed emission calculations, NEI data, or EPA's Motor Vehicle Emissions Simulator (MOVES3).

Although lightning strikes are another natural source of NO_x, these emissions were excluded from the inventories. Lightning NO_x emission estimation algorithms are used in photochemical modeling; however, photochemical modeling was not performed for this SIP revision. Additionally, the EPA's NEI does not include NO_x emissions from lightning. Calculating lightning NO_x using bottom-up approaches requires activity data such as length of lightning stroke, number of strokes per flash, the estimated energy discharge, and the amount of N_2O produced per joule.[67] ADEQ does not have accurate sources of these activity data for the Yuma area to determine lightning NO_x emissions for the inventory years.

Moreover, lightning strikes overall are assumed to be fairly consistent from year to year, and therefore would be held constant in the inventories. As a result, ADEQ believes inclusion of this source would not provide insight regarding NAAQS compliance during the maintenance period.

[67] https://www3.epa.gov/ttnchie1/ap42/ch14/final/c14s03.pdf

Figure 6-1 represents the total annual VOC emissions in 2020 by source category. Figure 6-2 represents the total annual NO_x emissions in 2020 by source category.

Figure 6-1 2020 Attainment VOC Emissions Inventory

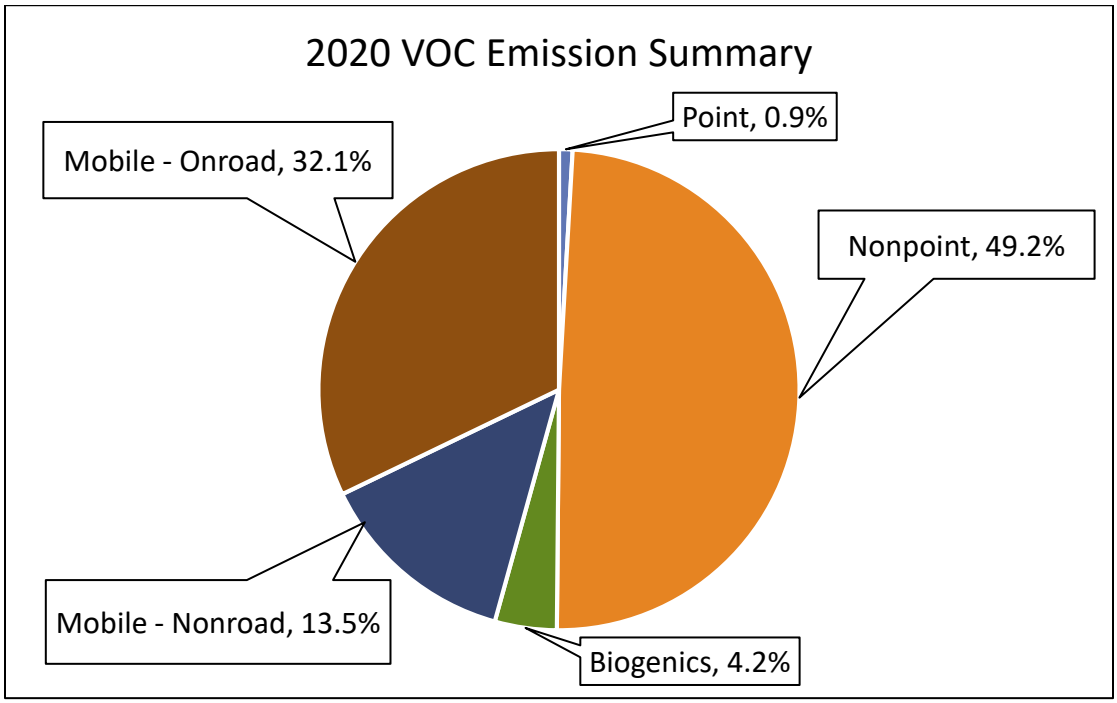
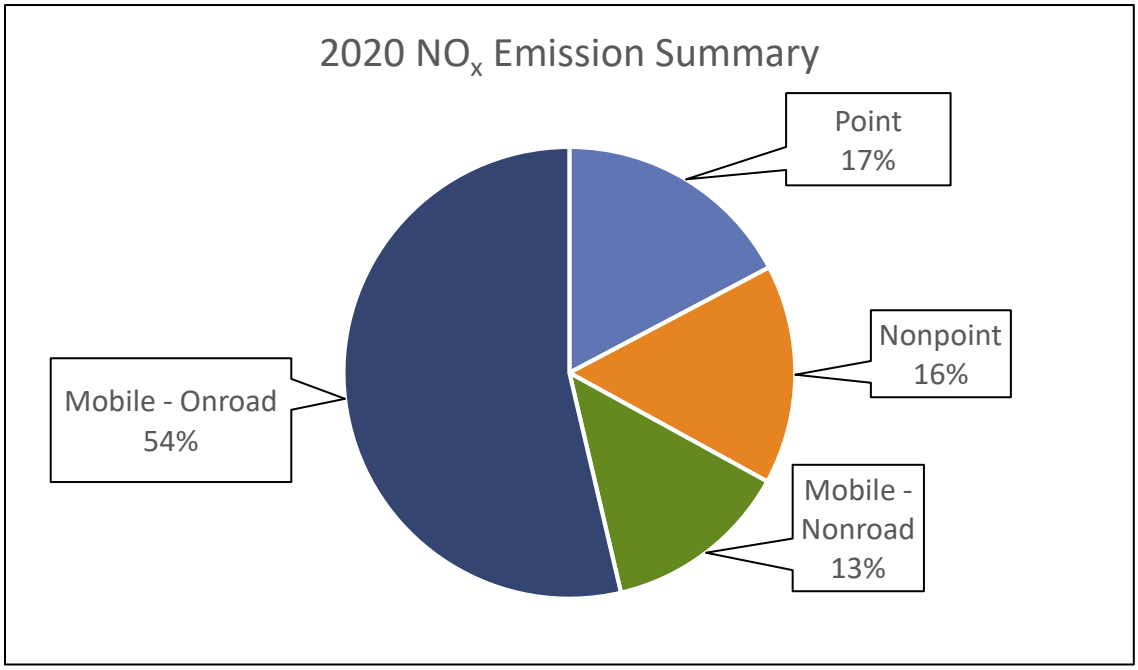


Figure 6-2 2020 Attainment NO_x Emissions Inventory



ADEQ used its State & Local Emissions Inventory System (SLEIS) to develop the attainment year point source emission inventory. The point source sector contains concrete plants, recycling yards, and power plants, among others. The largest VOC source sector in the planning area is the nonpoint sector, representing 36.5% of total VOC emissions. Emission sources included in the nonpoint sector are:

- Industrial Processes
- Miscellaneous Area Sources
- Railroad Equipment
- Biogenic
- Solvent Utilization
- Stationary Source Fuel Combustion
- Storage and Transport
- Waste Disposal, Treatment, and Recovery

The on-road mobile source sector is the largest NOx sector in the inventory, representing 51.2% of total NO_x emissions. Passenger cars and trucks are the largest source of both NO_x and VOC emissions in the Yuma area. Table 6-2 presents emission totals for 2020.

Table 6-2 2020 Attainment Year Emission Summary

Source Type	Ozone Season Day (OSD) Emissions (lb/day)	
	VOC	**NO_x**
Point	103.78	1,661.71
Nonpoint	5,754.19	1,409.77
Mobile - Non-road	1,791.98	1,619.88
Mobile - On-road	8,125.72	4,919.88
Total	**15,777**	**9,611**

6.2 Maintenance Demonstration

"A State may generally demonstrate maintenance of the NAAQS by either showing that future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory, or by modeling to show that the future mix of sources and emission rates will not cause a violation of the NAAQS." "In both instances, the demonstration should be for a period of 10 years following the redesignation."

"The projected inventory should consider future growth, including population and industry, should be consistent with the attainment inventory, and should document data inputs and assumptions." "Any assumptions concerning emission rates must reflect permanent, enforceable measures."[68]

This SIP revision demonstrates maintenance of the NAAQS by showing future emissions will remain near or below attainment period levels. Projections of attainment year inventories for all point, nonpoint, and mobile sources in the nonattainment area are included in Table 6-3 on the following page.

These projections indicate that point source VOC and NO_x emissions in the area will remain constant in the projected year inventories, because facilities' potential to emit (PTE) is used to estimate projected emissions in the interim and final year inventories. Non-road VOC emissions are projected to remain relatively stable, with a 2.1 percent reduction between the attainment and final maintenance year, while non-road NO_x emissions are anticipated to see a 51.7 percent reduction over the same period. Table 6-3 shows on-road VOC and NO_x emissions are reduced by roughly 52.8 and 55.8 percent between the interim and final year, respectively. Nonpoint source VOC and NO_x emissions are anticipated to see an increase of approximately 17 percent from the interim to the final maintenance year.

As seen in Table 6-3, projected total VOC and NO_x emissions in 2037 are below 2020 levels. In the final year of the first 10-year maintenance period (2037), VOC emissions are 13 percent lower than attainment year levels, and NO_x emissions see a reduction of 3.8 percent over the same period. As previously mentioned, ozone formation in the Yuma NAA is only a concern during the ozone season. Given the 2020 ozone DV was below the NAAQS, and the final maintenance year emissions are less than the 2020 attainment year emissions, ADEQ is projecting that the Yuma NAA will show maintenance in the final maintenance year.

In conclusion, maintenance of the 8-hour ozone NAAQS is demonstrated as follows.

- Based on projections, on-road emissions in the Yuma area are expected to decrease due to federally enforceable emissions reduction programs
- The Yuma planning area is expected to experience a 13 and 3.8 percent reduction in Ozone Season Day (OSD) VOC and NO_x emissions between 2020 and 2037, respectively.

The reduction in emissions between the attainment and final maintenance years demonstrates that the area will continue to maintain the NAAQS through the maintenance period

Following redesignation, any new sources are subject to Prevention of Significant Deterioration (PSD) permitting procedures (*see* Section 5.1). PSD regulations were established to preserve air quality in areas where ambient concentrations are below the NAAQS and require stationary sources to undergo

[68] *See Procedures for Processing Requests to Redesignate Areas to Attainment*, Calcagni, J., Memorandum, U.S. EPA, September 4, 1992.

preconstruction review, utilizing best available control technology (BACT), before a facility is constructed, modified, or reconstructed.

Table 6-3 Yuma O_3 Seasonal Day Emissions Summary by Source Category (pounds per day)

	2020		2030		2037	
Source Category	**VOC**	**NO_x**	**VOC**	**NO_x**	**VOC**	**NO_x**
Point	103.78	1,661.71	1,383.69	4,628.18	1,383.69	4,628.18
Nonpoint	5,754.19	1409.77	6,280.89	1,556.44	6,738.06	1,660.1
Mobile – Non-road	1,791.98	1,619.88	1,720.39	923.31	1,753.58	782.09
Mobile – On-road	8,125.72	4,919.88	4,462.16	2,497.38	3,838.35	2,173.66
Total	**15,777**	**9,611**	**13,847**	**9,605**	**13,714**	**9,244**

6.3 Ambient Air Quality Monitoring Network

"Once an area has been redesignated, the State should continue to operate an appropriate air quality monitoring network, in accordance with 40 CFR Part 58, to verify the attainment status of the area."[69]

ADEQ commits to continue operating an air quality monitoring network as necessary to verify continued ozone attainment in the Yuma area. Any future changes to the network will be made in consultation with local stakeholders and EPA.

6.4 Verification of Continued Attainment

"Each State should ensure that it has the legal authority to implement and enforce all measures necessary to attain and to maintain the NAAQS. Sections 110(a)(2)(B) and (F) of the Clean Air Act, as amended, and regulations promulgated at 40 CFR 51.110(k), suggest that one such measure is the acquisition of ambient and source emission data to demonstrate attainment and maintenance.

[69] *See Procedures for Processing Requests to Redesignate Areas to Attainment*, Calcagni, J., Memorandum, U.S. EPA, September 4, 1992.

Regardless of whether the maintenance demonstration is based on a showing that future emission inventories will not exceed the attainment inventory or on modeling, the state submittal should indicate how the state will track the progress of the maintenance plan. This is necessary due to the fact that the emission projections made for the maintenance demonstration depend on assumptions of point and area source growth."[70]

Progress of the maintenance plan will be tracked, in part, through updates to reported emissions inventories and permit applications received for sources of VOC and NOx. ADEQ commits to perform a comprehensive review of the factors and assumptions that were used in developing the attainment and projected inventories to determine whether significant change has occurred. The review will be performed for the interim projection year 2030 and may include the following elements.

- Permit applications and source reports (point sources, prescribed burns, construction)
- Population data
- Agricultural activity
- Wildfire/prescribed burn data
- Land area
- Employment data
- Vehicle miles traveled
- Review of any changes to emissions inventory methodology and source-specific emission estimates

6.4.1 Legal Authority to Ensure Continued Attainment

Arizona Revised Statutes Title 49, "The Environment," divides responsibility for meeting the requirements of the CAA among the state, county agencies, and regional planning organizations. Currently the state and three county agencies, including the Maricopa County Air Quality Department, Pima County Department of Environmental Quality, and the Pinal County air Quality Control District operate air quality control programs under direct or delegated authority.[71]

ADEQ has primary responsibility for air pollution control and abatement, and as such, is required to "maintain a state implementation plan that provides for implementation, maintenance and enforcement of National Ambient Air Quality Standards and protection of visibility as required by the Clean Air Act" for areas outside of tribal lands.[72] ADEQ is also responsible for coordinating, along with local officials, the development, adoption, and enforcement of control measures and permits where no local air quality control program exists. In addition, ADEQ has original jurisdiction for mobile and certain stationary

[70] *Ibid.*
[71] *See* ADEQ's *Arizona State Implementation Plan Revision under Clean Air Act Sections 110(a)(1) and 110(a)(2) for the 2015 Ozone National Ambient Air Quality Standards*, September 24, 2018, for more information on state and county authority to implement and enforce measures necessary to attain and to maintain the O_3 NAAQS. Please note that Yuma County does not currently operate an air quality control program.
[72] A.R.S. § 49-401 and 404.

sources including smelting of metal ores, coal-fired electrical generating stations, and portable sources but may delegate jurisdiction to a local agency as allowed under state law.[73]

Because Yuma County does not have a delegated air enforcement program, ADEQ retains primary authority for air pollution control in the Yuma area, in collaboration with local stakeholders and governmental authorities.

ADEQ will maintain the necessary resources to actively enforce any violations of the provisions contained in this plan and will submit to EPA any changes to rules or emission limits applicable to planning area VOC and NOx sources as a SIP revision.

6.5 Contingency Plan

"Section 175A of the Act also requires that a maintenance plan include contingency provisions, as necessary, to promptly correct any violation of the NAAQS that occurs after redesignation of the area."

"For the purposes of section 175A, a State is not required to have fully adopted contingency measures that will take effect without further action by the State in order for the maintenance plan to be approved. However, the contingency plan is considered to be an enforceable part of the SIP and should ensure that the contingency measures are adopted expediently once they are triggered. The plan should clearly identify the measures to be adopted, a schedule and procedure for adoption and implementation, and a specific time limit for action by the State. As a necessary part of the plan, the State should also identify specific indicators, or triggers, which will be used to determine when the contingency measures need to be implemented."[74]

The following contingency provisions describe the steps to evaluate the need for additional reasonable measures to prevent future violations of the NAAQS. The type and scope of any new control measures will be determined following an evaluation of the ambient exceedances that caused the contingency plan to be triggered. Additionally, the State will continue to implement all measures which were contained in the state implementation plan for the area before redesignation of the area as an attainment area.

Adoption of any additional control measures would be subject to the necessary Arizona administrative, legal, and legislative processes. ADEQ would solicit input from interested and affected parties in the area prior to selecting appropriate control measures. This process would include publication of notices, an opportunity for a public hearing, and other measures required by Arizona law.

6.5.1 Contingency Plan Timeline

As part of Arizona's maintenance plan for the Yuma area, Arizona commits to two separate levels of contingent response to any renewed exceedance and/or violation of the 2015 ozone NAAQS. The first step, a "warning level response," initiates a study to investigate whether the observed exceedance requires further evaluation or action to ensure maintenance going forward. The second step, an "action level response," would identify and implement any needed control measures necessary to ensure maintenance. Specifics of Arizona's contingency response are described in the following sections.

[73] A.R.S. § 49-107 and 402.

[74] *See Procedures for Processing Requests to Redesignate Areas to Attainment*, Calcagni, J., Memorandum, U.S. EPA, September 4, 1992.

6.5.1.1 Warning Level Response

A warning level response would be triggered if an annual (1-year) 4th high monitored concentration is above the level of the 2015 ozone NAAQS (0.070 ppm). A warning level response would initiate a study to determine whether the high ozone concentrations indicate a trend towards higher ozone levels and whether emissions are significantly higher than projected in the maintenance plan. The study would include the following elements:

- An assessment of whether actual emissions have deviated significantly from the emissions projections contained in this maintenance plan for the nonattainment area, along with an evaluation of which source sectors are responsible for any emissions increases; and
- A study of whether unusual meteorological conditions during the high-ozone year led to the elevated monitored ozone concentrations.

Should it be determined through the warning level study that action is necessary to ensure maintenance, Arizona will follow the procedures for control selection and implementation outlined under the action level response below. The warning level study will be completed no later than the beginning of the following summer ozone season (April 1).[75]

6.5.1.2 Action Level Response

An action level response would be triggered if a three-year design value exceeds the level of the 2015 ozone NAAQS (0.070 ppm). This response would follow a study to determine whether additional control measures are needed to assure attainment and maintenance of the 2015 ozone NAAQS.

6.5.2 Evaluation of New Measures

Once an action level response is triggered, ADEQ will perform an analysis to determine the need for adoption and implementation of new measures. The evaluation will examine the following factors for the contributing area:

- The level, distribution, and severity of ambient ozone concentrations;
- The weather patterns contributing to ozone levels;
- Potential contributing emission sources;
- The geographic applicability of possible contingency measures;

[75] The ozone season for the Yuma nonattainment area runs from April 1st through October 31st. This timeframe was affirmed in ADEQ's 2015 Ozone NAAQS Boundary Recommendations and Technical Support Document submitted to EPA on September 27, 2016. The boundary recommendations for the Yuma ozone NAA were approved and published in EPA's *Additional Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards* rule on June 4, 2018 (see 40 CFR Part 81.303 and 83 FR 25776).

- Upwind emission trends, including the impact of existing or forthcoming control measures that have not yet been implemented; and
- Air quality contributions from outside the maintenance area.

6.5.3 Potential Contingency Measures

The selection of emission reduction measures to be implemented will be based upon their potential to reduce O_3 concentrations at violating monitors in the nonattainment area, cost effectiveness, emission reduction potential, economic and social considerations, ease and timing of implementation, and other appropriate factors. When considering these criteria, priority will be given to measures that can be in place within 18 months.

Potential additional control measures that could be implemented as contingency measures are listed below in Table 6-4. Because it is not possible to determine what control measures, if any, will be appropriate at an unspecified time in the future, this list is neither comprehensive nor in order of priority.

Table 6-4 Potential O_3 Contingency Measures

Emissions Category	Potential Contingency Measure
Motor Vehicles	Anti-idling control program for mobile sources, targeting diesel vehicles
Motor Vehicles	Diesel exhaust retrofits
Motor Vehicles	Traffic flow improvements
Motor Vehicles	Park and ride facilities
Motor Vehicles	Rideshare/carpool program

7 Motor Vehicle Emissions Budget for Transportation Conformity

7.1 Introduction

"Transportation conformity is required by the Clean Air Act section 176(c) (42 U.S.C. 7506(c)) to ensure that federal funding and approval are given to highway and transit projects that are consistent with ("conform to") the air quality goals established by a state air quality implementation plan (SIP). Conformity, to the purpose of the SIP, means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the national ambient air quality standards."[76]

The conformity rules at 40 CFR 51.390 and 40 CFR 93 require SIPs to include maximum allowable emissions or a "budget" for on-road mobile sources determined to be significant under 40 CFR 93.109. Projected emissions from future transportation projects are compared to the approved budget to ensure they do not exceed levels demonstrated necessary to attain and maintain the NAAQS.

Motor vehicle emissions budgets (MVEBs) are needed only when there is a control strategy SIP for nonattainment areas or a maintenance demonstration. According to 40 CFR 93.101, a "*control strategy implementation plan revision is the implementation plan which contains specific strategies for controlling the emissions of and reducing ambient levels of pollutants in order to satisfy CAA requirements for demonstrations of reasonable further progress and attainment …*"

The rule defines motor vehicle emissions budget as "*… that portion of the total allowable [highway and transit] emissions defined in the submitted or approved control strategy implementation plan revision or maintenance plan … for the purpose of meeting reasonable further progress milestones or demonstrating attainment or maintenance of the NAAQS …*"

CAA Section 176(c)(6) provides for a one-year delay for transportation conformity to apply in newly designated nonattainment areas. Based on the Yuma Ozone Nonattainment Area's effective designation date of August 3, 2018, conformity applied in the area beginning August 3, 2019.

The Yuma Metropolitan Planning Organization (YMPO) is the designated transportation planning authority in the Yuma region. Since state planning obligations for a nonattainment area classified as "marginal" did not include requirements to develop additional control strategies and to demonstrate reasonable further progress and attainment, ADEQ did not create a conformity related emissions budget for the area when developing the Yuma nonattainment area plan.[77] In lieu of approved emission budgets, YMPO was required to rely on interim emission tests as described in 40 CFR 93, Subpart A to demonstrate conformity with the ozone NAAQS.

[76] Source: *General Information for Transportation Conformity*, https://www.epa.gov/state-and-local-transportation/general-information-transportation-and-conformity (July 19, 2017).
[77] ADEQ submitted *SIP Revision: Marginal Ozone Plan for the Yuma Nonattainment Area, December 17, 2020*, to EPA on December 22, 2020.

Requests to redesignate to attainment, however, require the state to demonstrate continued maintenance of the NAAQS. Therefore, on-road mobile sources are evaluated to determine significance and the need to develop a conformity budget for the area.

7.2 Transportation Conformity Requirements – Criteria for Approval

Several criteria must be satisfied for EPA to find a MVEB in a submitted control strategy implementation plan or maintenance plan adequate for transportation conformity purposes.[78]

- The maintenance plan is endorsed by the Governor's designee and subjected to a State public hearing.
- Before the maintenance plan is submitted to EPA, consultation among federal, State, and local agencies should occur; full implementation plan documentation provided to EPA; and EPA's stated concerns, if any, addressed.
- The MVEB is clearly identified and precisely quantified.
- The MVEB, when considered together with all other emissions sources, is consistent with applicable requirements for maintenance.
- The MVEB is consistent with and clearly related to the emissions inventory and the control measures in the submitted maintenance plan.

As required by 40 CFR 93.105, ADEQ consulted with YMPO, Yuma County, the Arizona Department of Transportation (ADOT), Federal Highway Administration (FHWA), and EPA during the development of the MVEB proposed in this Maintenance Plan. Additionally, ADEQ consulted with the Fort Yuma Quechan Tribe and the Cocopah Tribe of Arizona during the development of this Maintenance Plan. Public comment and hearing documentation as well as response to comments received is included in Appendix B. Technical documentation is provided in Appendix A.

7.3 Pollutants and Emissions Sources

The transportation conformity rules apply in all nonattainment and maintenance areas for transportation-related criteria pollutants for which the area is designated nonattainment or has a maintenance plan. In ozone planning areas, the rules require evaluation of the precursor pollutants volatile organic compounds (VOC) and nitrogen oxides (NO_x).[79] ADEQ considered exhaust and evaporative emissions from on-road mobile sources in developing the Yuma MVEB.

[78] *See* 40 CFR 93.118(e)(4)(i-v) for a complete list of requirements.
[79] 40 CFR 93.102(b)(2)(i)

7.4 Evaluation of On-Road Mobile Sources

As required under EPA guidance, the latest available planning assumptions and data were used to establish the MVEB.[80] Current and forecasted vehicle miles traveled (VMT) and vehicle populations come from YMPO data and analyses. Other default planning assumptions come from the EPA 2020 NEI County Data Manager (CDM) supporting data.[81] The EPA 2020 NEI inputs for Yuma County include State, Local, and Tribal air agency information.

7.5 Proposed Motor Vehicle Emission Budgets

Table 7-1 summarizes the MVEBs for 2030 and 2037 for VOC and NO_x. These values represent the maximum pounds per day of emissions that will be allowed from on-road mobile sources. To address the uncertainty of projecting future emissions, the MVEB was developed by adding a safety margin to the on-road inventory projections. EPA has indicated that safety margins are allowed, if maintenance can be modeled with the increased emissions. Since maintenance can be demonstrated with the increased on-road mobile source emissions, the 2030 and 2037 MVEBs incorporate a safety margin.

Similar to the approach that the Maricopa Association of Governments (MAG) used for their 8-hour Ozone Redesignation Request and Maintenance Plan MVEB for the Phoenix ozone nonattainment area, an additional ten percent of the projected on-road emissions from 2030 was added to the 2030 MVEB. [82] This safety margin will account for potential changes to the modeled transportation network and the evolution of regional transportation policy and economic conditions over time, as well as any uncertainty associated with the methodology and inputs of the MOVES model itself. The same methodology was applied to the 2037 MVEB.

Table 7-1 Proposed Motor Vehicle Emissions Budgets

Yuma Ozone Nonattainment Area	2030 (Pounds per Ozone Season Day)		2037 (Pounds per Ozone Season Day)	
	NOx	VOC	NOx	VOC
Net Inventory	2,497	4,462	2,173	3,838
Safety Margin (10%)	250	446	217	384
Total (Net Inventory + Safety Margin)	2,747	4,908	2,390	4,222
Conformity Budget*	2,747	4,908	2,390	4,222

[80] 40 CFR 93.110(a), (h); *See also* December 2008 EPA-DOT Guidance.
[81] *See* Yuma O_3 Technical Support Document for complete methodology and data inputs.
[82] Maricopa Association of Governments, MAG Eight-Hour Ozone Redesignation Request and Maintenance Plan for The Maricopa Nonattainment Area

* Budgets established by rounding emissions to the next highest integer

7.6 Conclusion -Transportation Conformity

Once EPA finds the maintenance budgets contained in this revision to be adequate or approves the Maintenance Plan, YMPO will apply the provisions of the EPA transportation conformity regulations 40 CFR 93 Section 93.118(b). The Maintenance Plan establishes motor vehicle budgets for the final maintenance year of 2037 and the interim year of 2030. In accordance with 40 CFR 93 Section 93.118(b) and per agreement with EPA, YMPO will interpolate ADEQ's interim year 2037 mobile source VOC and NO_x emissions budgets in its transportation conformity horizon years.

Due to the Yuma area ozone monitor's proximity to a major transit corridor (Interstate 8) that carries close to 30,000 daily vehicles of all engine and fuel types, on-road sources significantly affect the concentrations of ozone observed in the Yuma NAA. Additionally, Yuma is one of the nation's largest agricultural hubs, meaning transportation of agricultural products in and out of the area contributes heavily to overall emissions of ozone precursor. ADEQ expects on-road emissions to decrease throughout the maintenance period due to federally enforceable vehicle standards and other emission reduction programs.

8 Conclusion

The Yuma area was designated nonattainment for the 2015 O_3 NAAQS in 2018. At the time of the designation the area was also classified as a marginal nonattainment area. Under CAA section 182(a), the state was required to submit a revised SIP for the Yuma nonattainment area within two years from the effective date of nonattainment designation including an emissions inventory as described in CAA section 182(a)(1) and new emissions statements regulations under CAA section 182(a)(3)(B). Arizona submitted *SIP Revision: Marginal Ozone Plan for the Yuma Nonattainment Area*, *December 17, 2020*, to EPA on December 22, 2020. EPA published a final approval of the submitted nonattainment area plan in 2022.

On October 7, 2022, EPA determined, in accordance with CAA section 181(b)(2)(A) and the provisions of the 2015 Ozone NAAQS SIP Requirements Rule (40 CFR 51.1303), that the Yuma, Arizona area attained the 2015 ozone NAAQS by the marginal area attainment date of August 3, 2021. The nonattainment designation remains, however, until EPA determines that the planning area meets additional provisions required for redesignation under CAA 107(d)(3)(E)(i) through 107(d)(3)(E)(v), including a demonstration that the area will continue to maintain the NAAQS for at least ten years after redesignation to attainment. The analyses and data contained in this plan demonstrate that all redesignation requirements have been met. The clean air quality record, enforceable control measures, and projections of future emissions all show that the area will continue to maintain the 2015 O_3 air quality standards through 2037.

Based on the information provided in this State Implementation Plan (SIP) and criteria established in Section 107(d)(3)(E) of the CAA, ADEQ requests that EPA approve this revision to the Arizona SIP and redesignate the Yuma nonattainment area to attainment for the 2015 8-hour O_3 NAAQS. The monitoring data clearly show that that the region has attained the 2015 8-hour ozone standard, and the maintenance demonstration shows that the future emission inventories are expected to be lower than the attainment year inventory through the implementation of the various federal control measures, ensuring continued attainment of the ozone NAAQS in the Yuma area.

Appendix A: Yuma O_3 Emission Inventory Technical Support Document

ADEQ
Arizona Department of Environmental Quality

Appendix A
Yuma Ozone Emission Inventory Technical Support Document

Air Quality Division
November 14, 2023 Draft

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Glossary of Terms

AADT	Annual Average Daily Traffic
ADA	Arizona Department of Agriculture
ADEQ	Arizona Department of Environmental Quality
ADOA	Arizona Department of Administration
ADOT	Arizona Department of Transportation
CFR	Code of Federal Register
EI	Emission Inventory
EIIP	Emission Inventory Improvement Program
EPA	U.S. Environmental Protection Agency
MOVES	Motor Vehicle Emission Simulator
NA	Non-attainment Area
NAAQS	National Ambient Air Quality Standard
NEI	National Emission Inventory
NAICS	North American Industry Classification System
OSD	Ozone Season Day
QA	Quality Assurance
QAP	Quality Assurance Plan
QC	Quality Control
RAM	Responsibility Assignment Matrix
SCC	Source Classification Code
SIP	State Implementation Plan
TAU	Technical Analysis Unit
TSD	Technical Support Document

A1 Introduction

A1.1 Purpose

The Arizona Department of Environmental Quality (ADEQ) is preparing this Technical Support Document (TSD) to support a re-designation of the Yuma ozone (O_3) Nonattainment Area (NA) to a Maintenance Area (MA).

Yuma was designated as a marginal nonattainment area for the 2015 ozone National Ambient Air Quality Standards (NAAQS) by the United States Environmental Protection Agency (EPA) effective August 3, 2018[1]. According to EPA's September 1992 memorandum *Procedures for Processing Requests to Redesignate Areas to Attainment,* a state may demonstrate maintenance of the NAAQS by either showing future emissions of a pollutant or its precursors will not exceed the level of the attainment inventory, or by modeling to show that the future mix of sources and emission rates will not cause a violation of the NAAQS.[2] ADEQ will demonstrate maintenance of the 2015 ozone NAAQS for the Yuma NA by showing future precursor emissions will not exceed the level of the attainment inventory (also referred to as the base year inventory throughout this TSD). Additionally, this guidance document also states that O_3 nonattainment areas should have inventories based on a "typical summer day", which will herein be referred to as an ozone season day (OSD). Given this, the inventories found throughout this TSD are provided in pounds per OSD.

ADEQ selected 2020 as the base year for EI development for the maintenance plan, because it is the most current and comprehensive emission inventory for Yuma County, AZ at this time. Emission inventories are developed as outlined in Table A-1.

Table A-1: Emission Inventory Outline

Inventory Year	Inventory Purpose	Data Source
2020	Base Year	2020 NEI & ADEQ Internal Point Source Database, and other data sources
2030	Interim Year	Projected data sources and potential to emit
2037	Final Year of First 10-Year Maintenance Period	Projected data sources and potential to emit

[1] Federal Register, Vol. 83, No. 107, June 4, 2018

[2] https://www.epa.gov/sites/default/files/2016-03/documents/calcagni_memo_-_procedures_for_processing_requests_to_redesignate_areas_to_attainment_090492.pdf

A1.2 Ozone Sources

Source categories included in the inventory are:

- Point Source Emissions
- Nonpoint Source Emissions
    - Biogenic Emissions
- On Road Mobile Emissions
- Non-road Mobile Emissions

ADEQ compiled a 2020 base year emission inventory from the above listed source categories. A more detailed description of these sectors is provided in Section A6. Point source emissions were gathered from the ADEQ point source databases while other categories (nonpoint, on-road, non-road, and biogenics) were based on developed emission calculations, NEI data, or MOVES modeling.

Although lightning strikes are another natural source of NO_x, emissions of NO_x as a result of lightning strikes were excluded from the inventories. Lightning NO_x emission estimation algorithms are used in photochemical modeling, however, photochemical modeling was not performed for this SIP revision. Additionally, the EPA's NEI does not include NO_x emissions from lightning, and calculating lightning NOx using bottom-up approaches requires activity data such as length of lightning stroke, number of strokes per flash, the estimated energy discharge, and the amount of N_2O produced per joule.[3] ADEQ does not have accurate sources of these activity data for the Yuma area to determine lightning NO_x emissions for the inventory years.

Moreover, lightning strikes overall are assumed to be fairly consistent from year to year, and therefore would be held constant in the inventories, as a result, the inclusion of this source would not provide insight regarding NAAQS compliance during the maintenance period.

A1.3 Ozone Season

The ozone season for Yuma NA was selected from April 1st through October 31st. This selection was based on ADEQ's 2015 Ozone NAAQS Boundary Recommendations and Technical Support Document that was submitted to EPA on 9/27/2016. The boundary recommendations for the Yuma O_3 NA was approved and published in the Additional Air Quality Designations for the 2015 Ozone National Ambient Air Quality Standards rule on 6/4/2018 (40 CFR Part 81, Vol. 83, No. 107). The OSD emissions are the average emissions during a typical ozone season work day as defined in 40 CFR 51.1300(q).

[3] https://www3.epa.gov/ttnchie1/ap42/ch14/final/c14s03.pdf

A1.4 Population

The Yuma ozone NA is located in the Sonoran Desert region of southwestern Arizona, approximately 157 miles southwest of Phoenix. The total land area of the Yuma O_3 NA is 52 square miles, which comprises approximately 0.94% of the total land area within Yuma County, AZ (5,523 square miles).

A description of the Yuma O_3 NA is outlined in Table A-2, as codified at 40 CFR 81.303. Figure A-1 is a detailed map of the Yuma ozone NA. Population estimates for the Yuma O_3 NA is also presented in Table A-2[4].

Yuma County is located in the southwestern corner of Arizona, bordered by Imperial County, California and Baja California, Mexico to the west and Sonora, Mexico to the south. The Yuma County population is concentrated in the southwestern portion of the county, around the border cities of Yuma, Somerton, and San Luis, the Cocopah Indian Reservation, and several large military installations. This region is a gateway between southern California and Arizona, via I-8, and a thoroughfare of international ground transportation, via the two San Luis ports of entry. The County seat is Yuma, which lies approximately 157 miles south west of Phoenix and contains nearly half of the county's population. Other communities in Yuma County include cities of San Luis and Somerton and the town of Wellton.

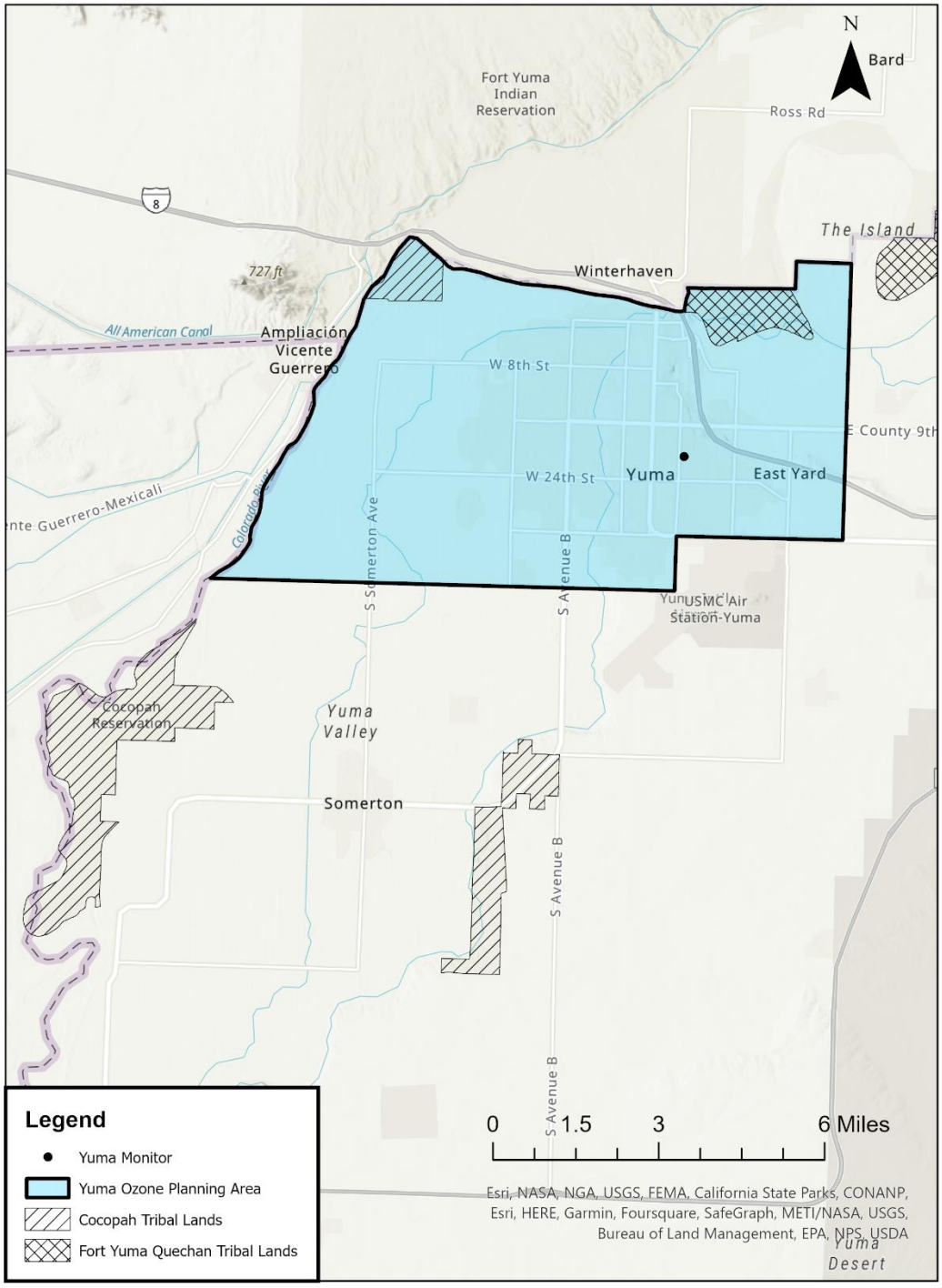
[4] Yuma County 2020 population based on 2020 Census Data Blocks

Table A-2: Geographic Location and Population

Yuma County	
Land Area	5,520.7 mi^2
2020 Population	203,843
2030 Projected Population	231,987
2037 Projected Population	252,020
Yuma Ozone NA[5]	
Land Area	52 mi^2
2020 Population	85,390
2030 Projected Population	97,180
2037 Projected Population	105,572
Nonattainment Designated Area (40 CFR 81.303)	
That Portion within Yuma County of the area described by the following: 1. Bounded on the north and west by the Arizona state line 2. Bounded on the south by the line of latitude at 32° 39’ 20” N 3. Bounded on the east by the line of longitude 114° 33’ 50” W 4. And excluding the section 10, 11, and 12 of township T9S, R23W and any portion in Indian Country.	

[5] AOEO provided the population projections for Yuma County. https://www.azcommerce.com/oeo/population/population-projections/

Figure A-1: Yuma Ozone NA



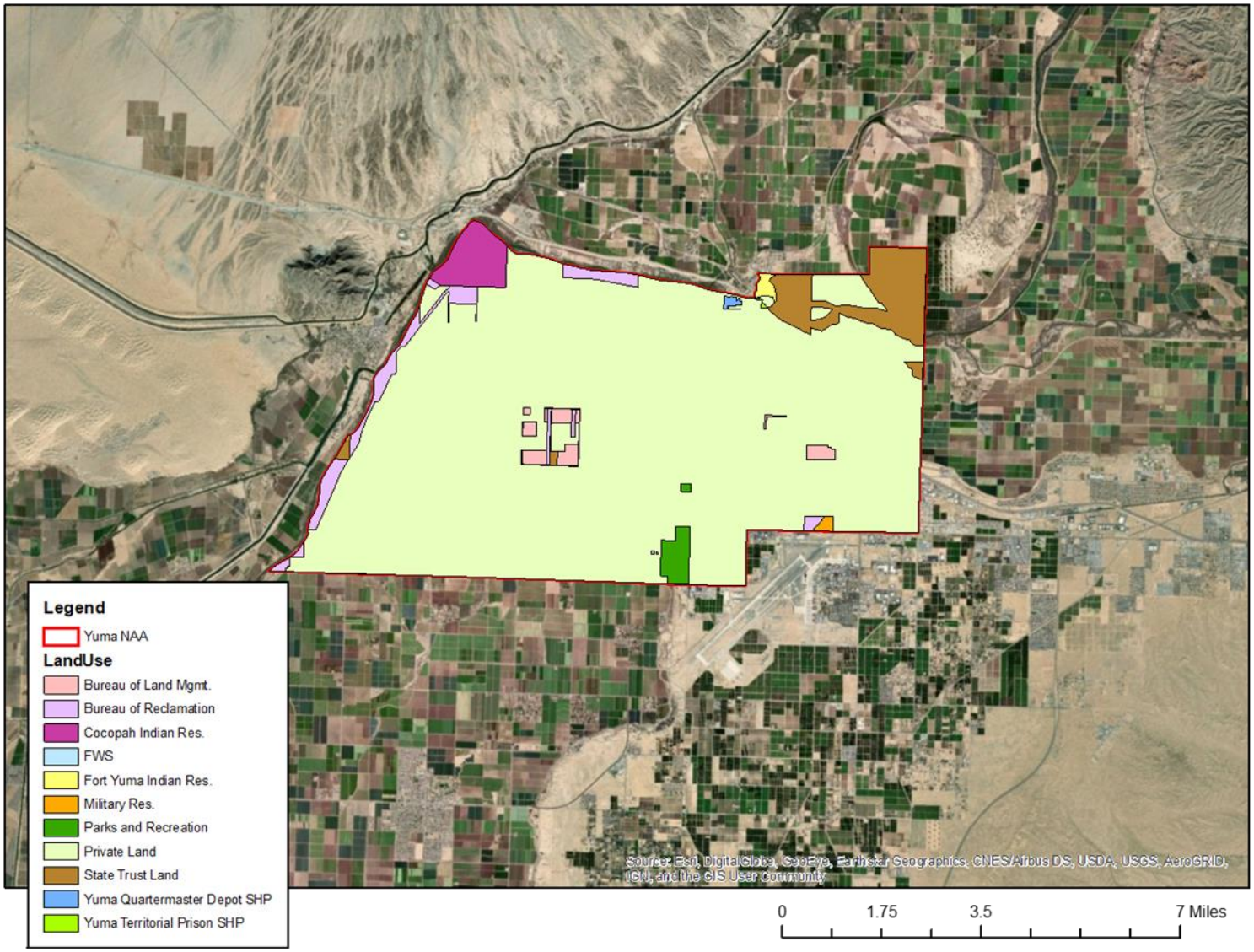
A1.5 Land Use

The major land owners in the Yuma O_3 NA are private owners, state trust land, Bureau of Reclamation, and Indian Reservations. A breakdown of the land owners in the Yuma O_3 NA is presented in Table A-3 and Figure A-2.

Table A-3: Yuma Ozone NA Land Owners

Yuma Ozone NA		
Land Owner	**Area (square miles)**	**Percentage**
Bureau of Land Management	0.56	1.08
Bureau of Reclamation	1.33	2.56
Cocopah Indian Reservation	1.05	2.02
Fort Yuma Indian Reservation	0.12	0.23
Parks and Recreation	0.45	0.86
Yuma Quartermaster Depot SHP	0.05	0.09
Yuma Territorial Prison SHP	0.01	0.02
Military Res.	0.06	0.12
Private Land	45.77	88.13
State Trust Land	2.54	4.89
Total NA Land Area	**51.94**	

Figure A-2: Land Owners in Yuma Ozone NA



A2 Monitoring Network

There is currently one ozone monitor in the Yuma area, Yuma Supersite, which is operated by ADEQ. The site is located on the southeast corner of the Rural Metro Administration Facility property. The surrounding area is commercial and industrial, with a dirt lot adjacent to the south and I-8 1 km to the northeast. In addition to NAAQS compliance, the site is also used to help understand transport of PM and ozone. The parameters monitored are part of the State or Local Air Monitoring Stations (SLAMS) and meteorological networks. See Figure A-3 below for a full description of the Yuma Supersite monitor from ADEQ's 2022 Arizona Annual Air Monitoring Network Plan.

Ozone design value concentration at Yuma Supersite for 2018-2020 is 68 ppb, 2019-2021 is 67 ppb, and 2020-2022 is 68 ppb.

The ADEQ data for Yuma has been collected and quality assurance procedures have been conducted in accordance with 40 CFR Part 58. Data from the monitor are entered into EPA's Air Quality System (AQS) database in accordance with federal guidelines.

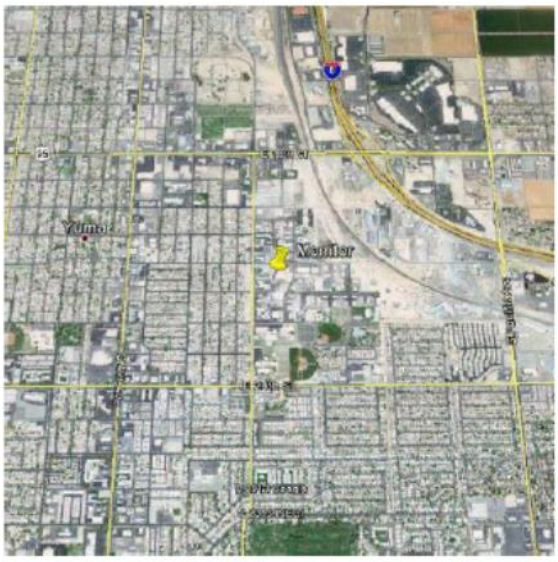
As mentioned above, the monitor site is in close proximity to residential and industrial areas. Based upon the location and siting details, the site adequately represents general exposure of the Yuma O_3 NA population to ozone.

Figure A-3: Monitoring Network

Site Information			
AQS ID	04-027-8011		
Street Address	2029 S. Arizona Ave. Yuma, AZ 85364		
County	Yuma	Groundcover	Gravel
CBSA	Yuma	Latitude	32.6903
Surrounding Area	Commercial/Industrial	Longitude	-114.6144
Adjacent Roadway Info	91 m – W – Arizona Ave. AADT Count – 12,302	Elevation	60 m
Nearest Assessed Roadway Info	Same	Site Established Date	02/01/2006

Parameters Monitors	
• Wind • O_3 • PM_{10}	• $PM_{2.5}$ • Temp/RH

Site Photos



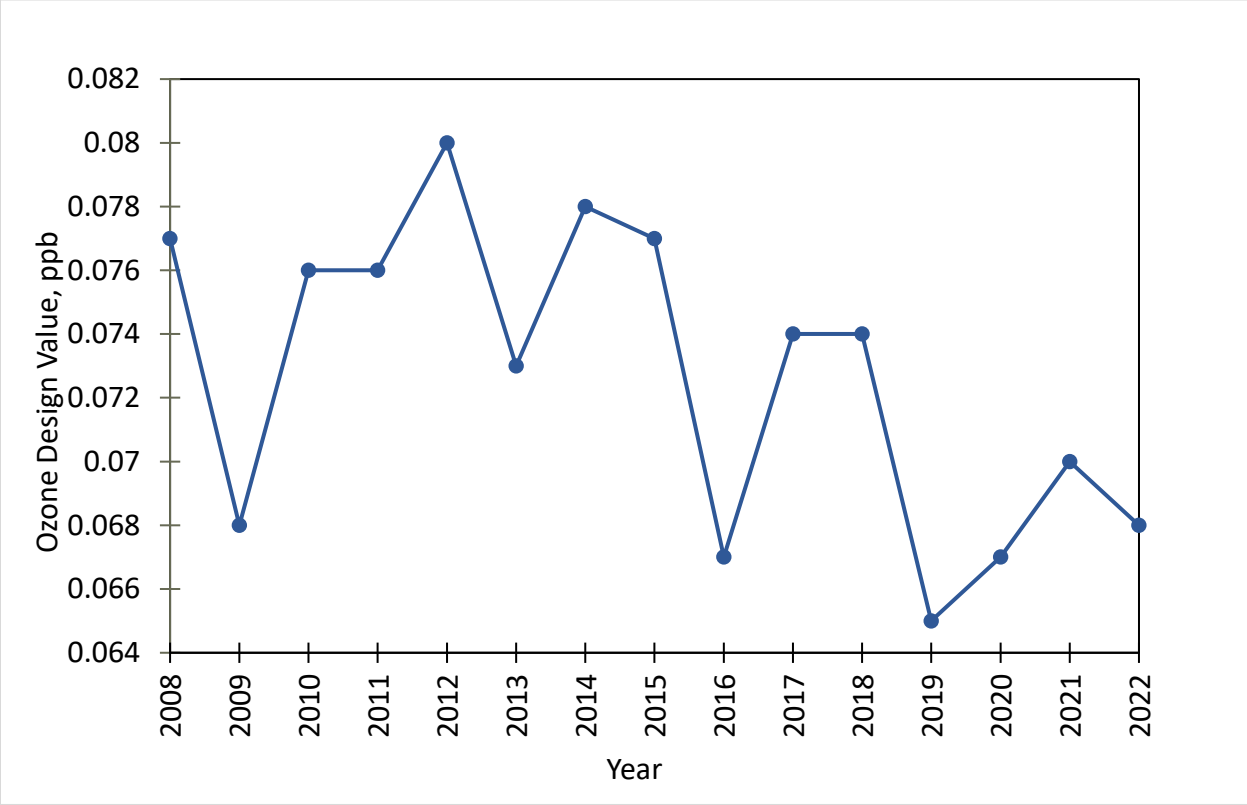
Aerial view of Yuma Supersite

Shelter and Meteorological Tower at Yuma Supersite – 4/2014

A3 Ambient Air Quality

The 2015 ozone standard is attained when the three-year average of the annual fourth-highest daily maximum eight-hour average concentration measured at a monitor is less than or equal to 0.070 ppm (70 ppb). This is also known as the design value. Figure A-4 presents the design values for years 2008 through 2022.

Figure A-4: Yuma Ozone Design Values 2008-2022[6]



[6] EPA's Air Quality System (AQS): https://www.epa.gov/air-trends/air-quality-design-values

A4 Meteorological Trends

This section examines the meteorological conditions of the Yuma O_3 NA, specifically focusing on trends in wind speed and direction and the possible impact of these conditions on ambient ozone concentrations.

The climatological and meteorological conditions of the Yuma O_3 NA and vicinity are dominated by basin and range topography and its elevation. Yuma has a hot desert climate with severely hot summers and warm winters. Yuma lies in the southwest corner of Arizona in the Sonoran Desert, near the eastern borders of California and north of Mexico. The city is in proximity of the Gulf of California, the Colorado and Gila rivers, and has topography of desert lands, farmlands and mountains.

Meteorological conditions play a critical role in the formation and distribution of ozone. Daytime in the Yuma area is generally conducive to ozone formation because of the near constant heat and sunlight. Average high temperatures in the ozone season from April to October, range from about 86 to 107° Fahrenheit (F), with highest temperatures occurring in July. January is the coolest month with an average daily minimum temperature of 47°F. The climate in Yuma is characterized by a long, hot season, usually beginning in April and ending in October. Precipitation is variable. An annual average of 3.6 inches of rain falls within the region[7].

To examine the meteorological trends in the Yuma area, ADEQ looked at both diurnal and seasonal average wind speed and direction. To perform this analysis ADEQ averaged wind speeds and directions for each hour of the day for the Yuma Supersite monitor during 01/01/2019 to 12/31/2021. Wind roses were created using 2019-2021 data for the entire time period and ozone season months of April through September. The results are presented in the following sections.

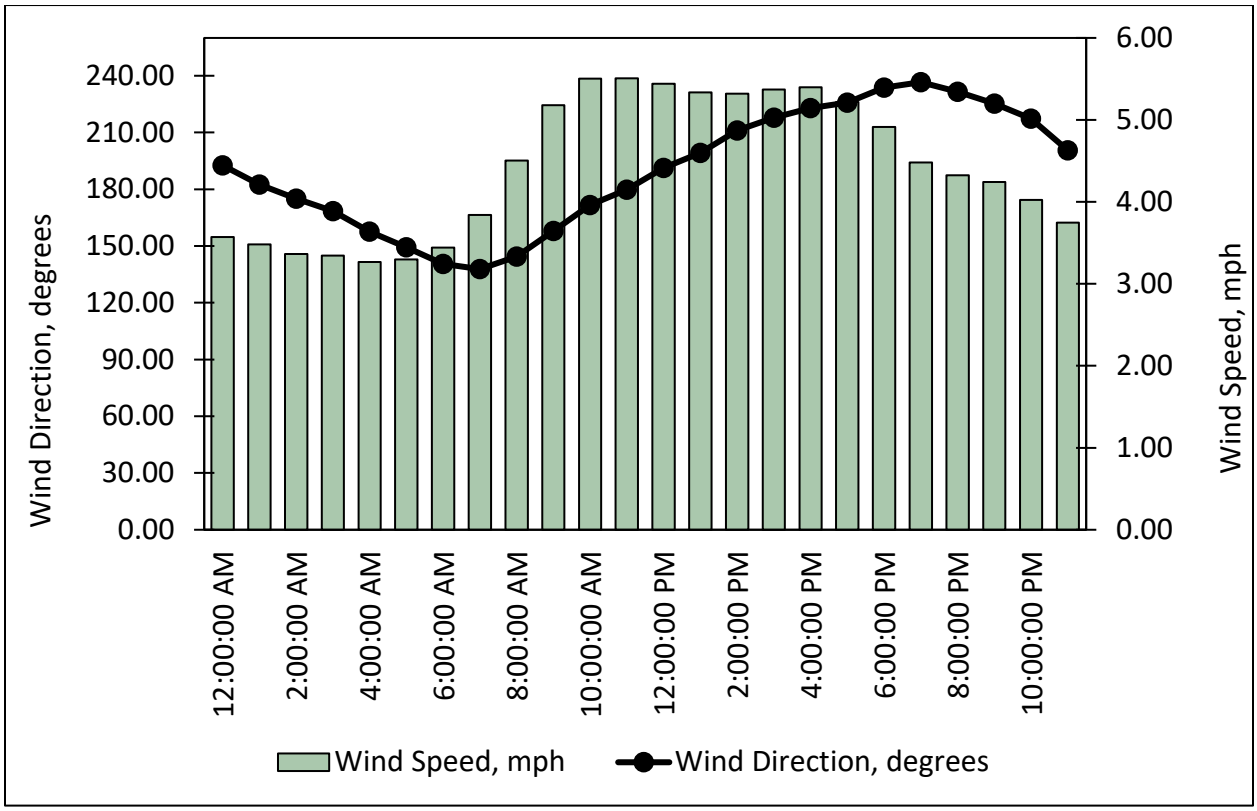
A4.1 Diurnal Wind Speed & Direction

ADEQ averaged wind speed and wind direction data from the Yuma meteorological station for 2019-2021 to create an average profile for the area. These average values were used as the basis for creating the diurnal profile presented in Figure A-5 and Table A-4. Based on this data, the Yuma area generally experiences lower wind speeds at night. In the early morning hours, wind speeds generally increase. Peak wind speeds are observed from 10:00 AM into early afternoon. Wind speeds decrease in the afternoon hours and evening. Wind direction is generally from the northwest in the morning. During the afternoon and night hours, winds tend to shift and come out of the southwest.

Because of the abundance of sunlight and heat, higher 8-hour ozone concentrations generally begin around noon, with elevated 1-hour ozone concentrations measured well into the late afternoon, when ambient temperature and sunlight intensity are at their peak.

[7] U.S. Climate Data - Yuma, Arizona

Figure A-5: Diurnal Average Wind Speed & Direction in Yuma



Wind patterns in Yuma suggest that ozone and ozone precursors can be transported in the morning from the northwest and impact the Yuma monitor. The NOx and VOC rich air mass can become photochemically active during the transport process and begin to produce ozone. During the absence of the photochemical process at night, or during cloud cover, ozone precursors can accumulate over time and when conditions are right, rapid ozone production can occur.

Table A-4: Diurnal Average Wind Speed & Direction

Hour	Wind Direction (Degrees)	Wind Speed (mph)
12:00:00 AM	192.68	3.57
1:00:00 AM	182.55	3.48
2:00:00 AM	175.09	3.36
3:00:00 AM	168.43	3.34
4:00:00 AM	157.56	3.27
5:00:00 AM	149.29	3.30
6:00:00 AM	140.56	3.44
7:00:00 AM	137.80	3.84
8:00:00 AM	144.50	4.50
9:00:00 AM	157.92	5.18
10:00:00 AM	171.61	5.50
11:00:00 AM	179.80	5.51

Hour	Wind Direction (Degrees)	Wind Speed (mph)
12:00:00 PM	191.33	5.44
1:00:00 PM	199.27	5.33
2:00:00 PM	211.12	5.32
3:00:00 PM	217.83	5.37
4:00:00 PM	222.98	5.40
5:00:00 PM	225.85	5.22
6:00:00 PM	233.79	4.92
7:00:00 PM	236.59	4.48
8:00:00 PM	231.56	4.32
9:00:00 PM	225.22	4.24
10:00:00 PM	217.34	4.02
11:00:00 PM	200.65	3.75

A4.2 Seasonal Wind Speed & Direction

ADEQ averaged wind speed and wind direction data from the Yuma station to create an average profile for the Yuma area. When examining seasonal average wind speed no clear correlation exists. Seasonal average wind speeds in the Yuma area deviate by a small amount. The peak wind speeds are observed in late spring and summer, whereas the minimum wind speeds are observed in fall and winter. Seasonal wind direction appears to come out from southwest in spring and west-northwest in summer. In fall and winter, the wind direction is from the west. Figure A-6and Table A-5 show the seasonal profile for wind speed and wind direction in Yuma area.

Figure A-6: Yuma Area Seasonal Average Wind Speed & Direction

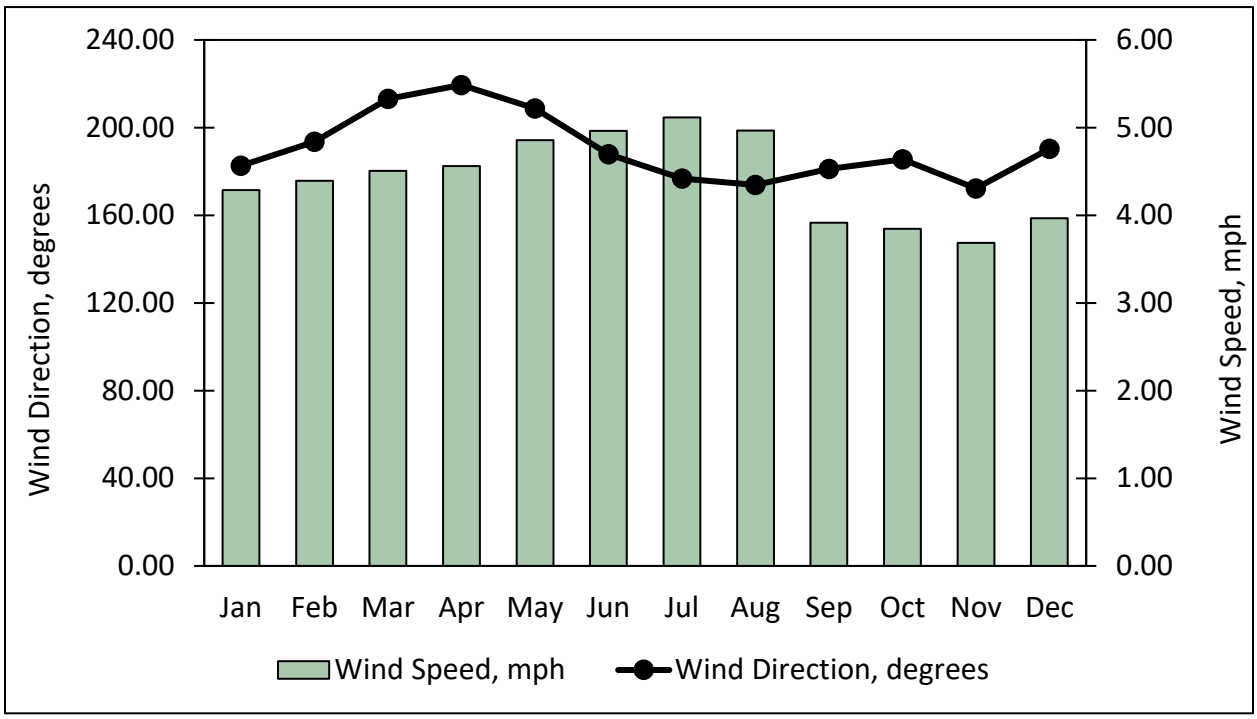


Table A-5: Yuma Area Seasonal Average Wind Speed & Direction

Month	Wind Direction (Degrees)	Wind Speed (mph)
Jan	182.58	4.29
Feb	193.52	4.39
Mar	213.07	4.51
Apr	219.45	4.56
May	208.77	4.86
Jun	187.91	4.96
Jul	176.74	5.12
Aug	173.76	4.97
Sep	181.17	3.91
Oct	185.52	3.85
Nov	172.27	3.69
Dec	190.26	3.97

A4.3 Wind Roses

Figure A-7 presents the wind rose showing wind patterns at the Yuma Supersite monitor for 2019-2021 wind data. As it is shown, the northerly and southerly winds are more frequent. Northerly winds are more frequent in the winter.

Figure A-7: Yuma Monitor Wind Rose (2019-2021)

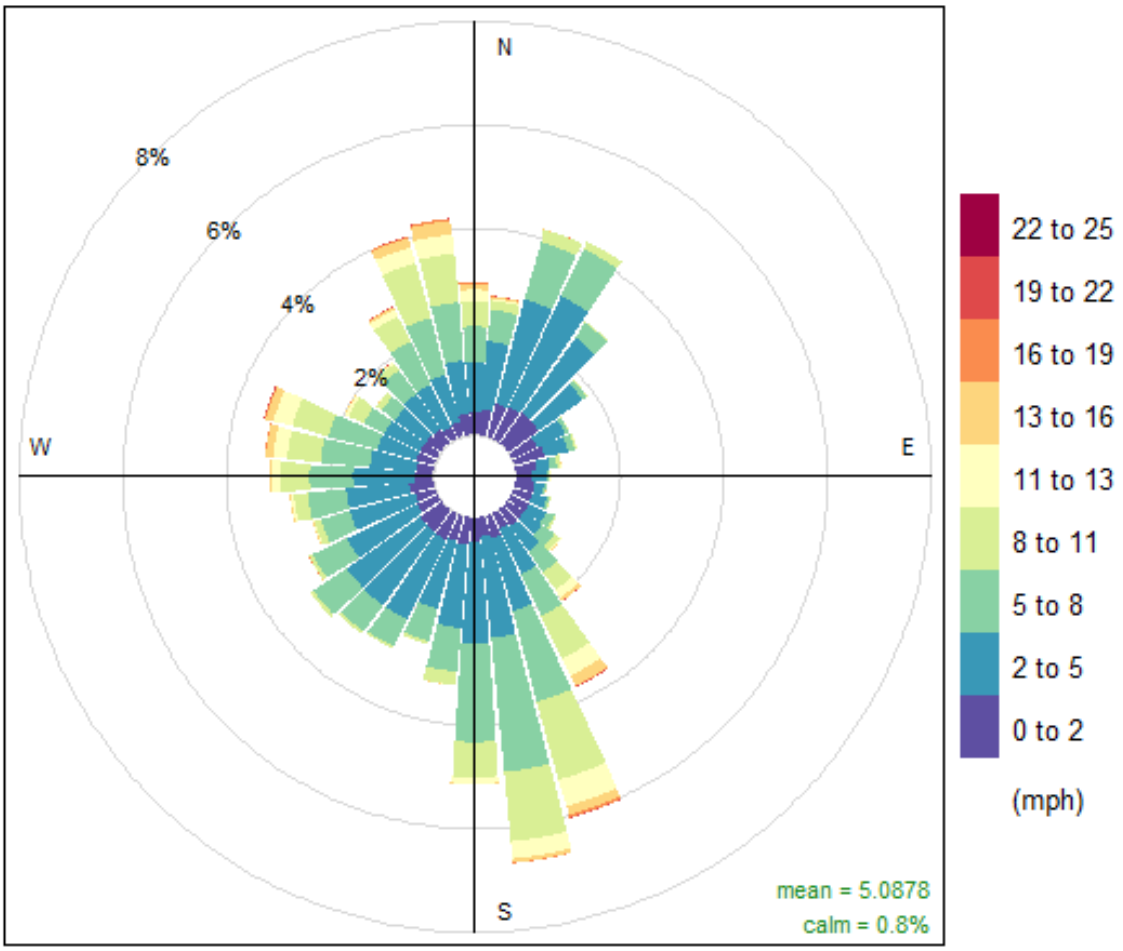
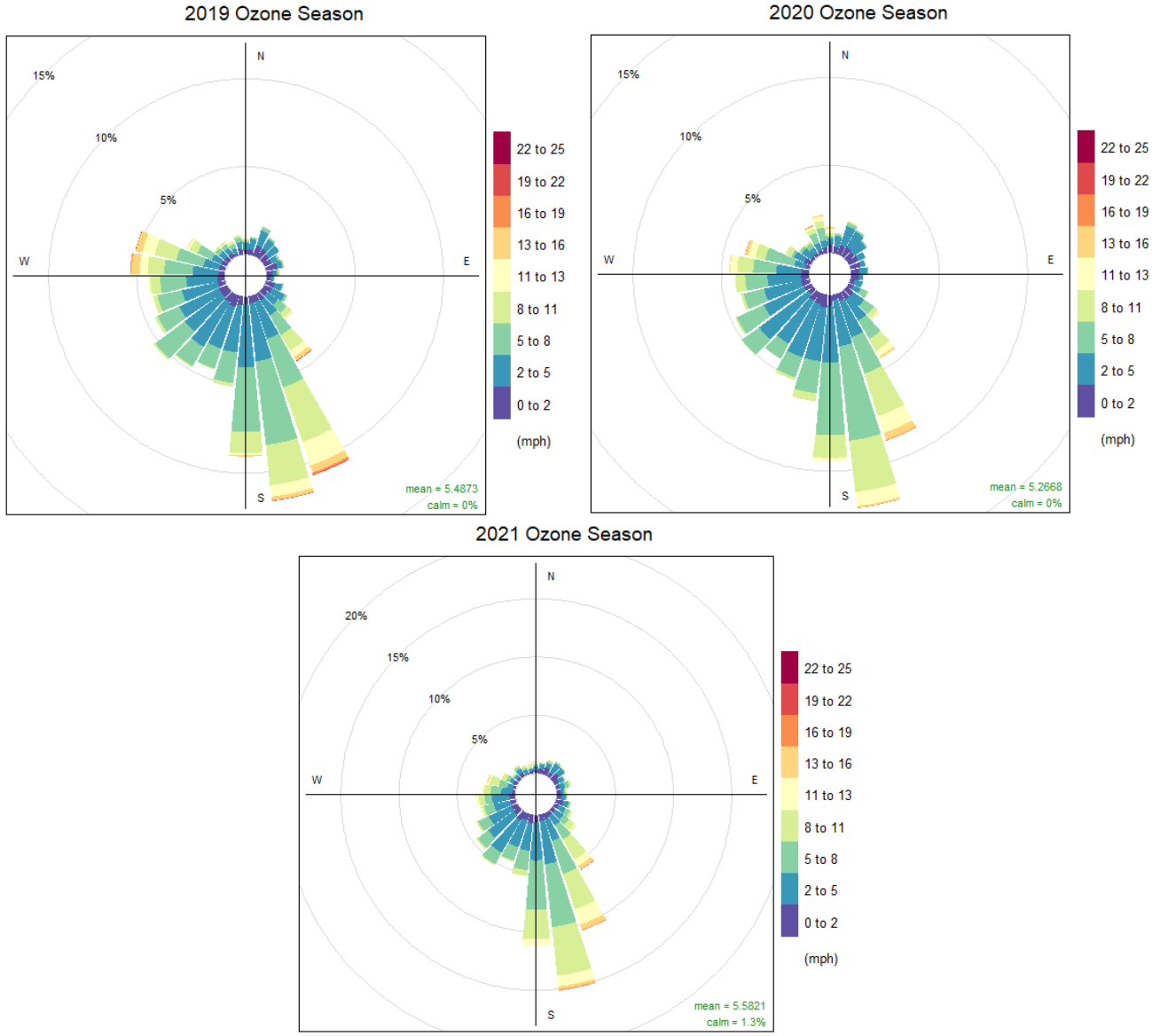


Figure A-8 presents wind roses showing the wind patterns during the ozone season in 2019-2021 at the Yuma Supersite monitor. The wind roses show a strong pattern of south-southeastern winds during the ozone season.

Figure A-8: Wind Patterns at Yuma Monitor During Ozone Season (2019-2021)



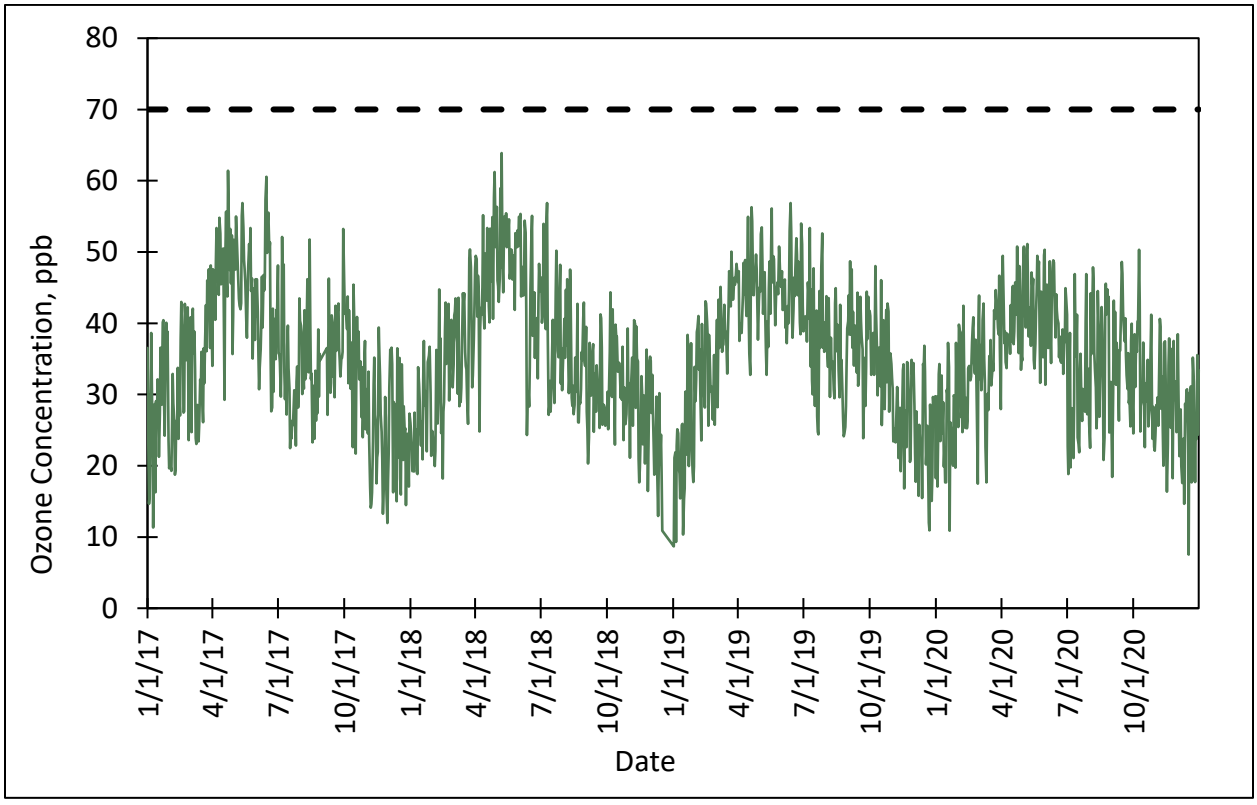
A5 Ambient Ozone Trends

This section examines ambient ozone concentrations in the Yuma area. To examine the ozone concentration trends in the Yuma area, ADEQ looked at daily, diurnal, and seasonal averages from the 2017-2020 ozone data collected at the Yuma Supersite monitor.

A5.1 Daily Average Ozone Concentrations

Figure A-9 presents the daily mean ozone concentrations during 2017-2020 in Yuma. The black dashed line indicates the level of the ozone NAAQS (70 ppb). Based on the recent data, the highest concentrations occur during the spring and summer months.

Figure A-9: Daily Average Ozone Concentration at Yuma Monitor[8]

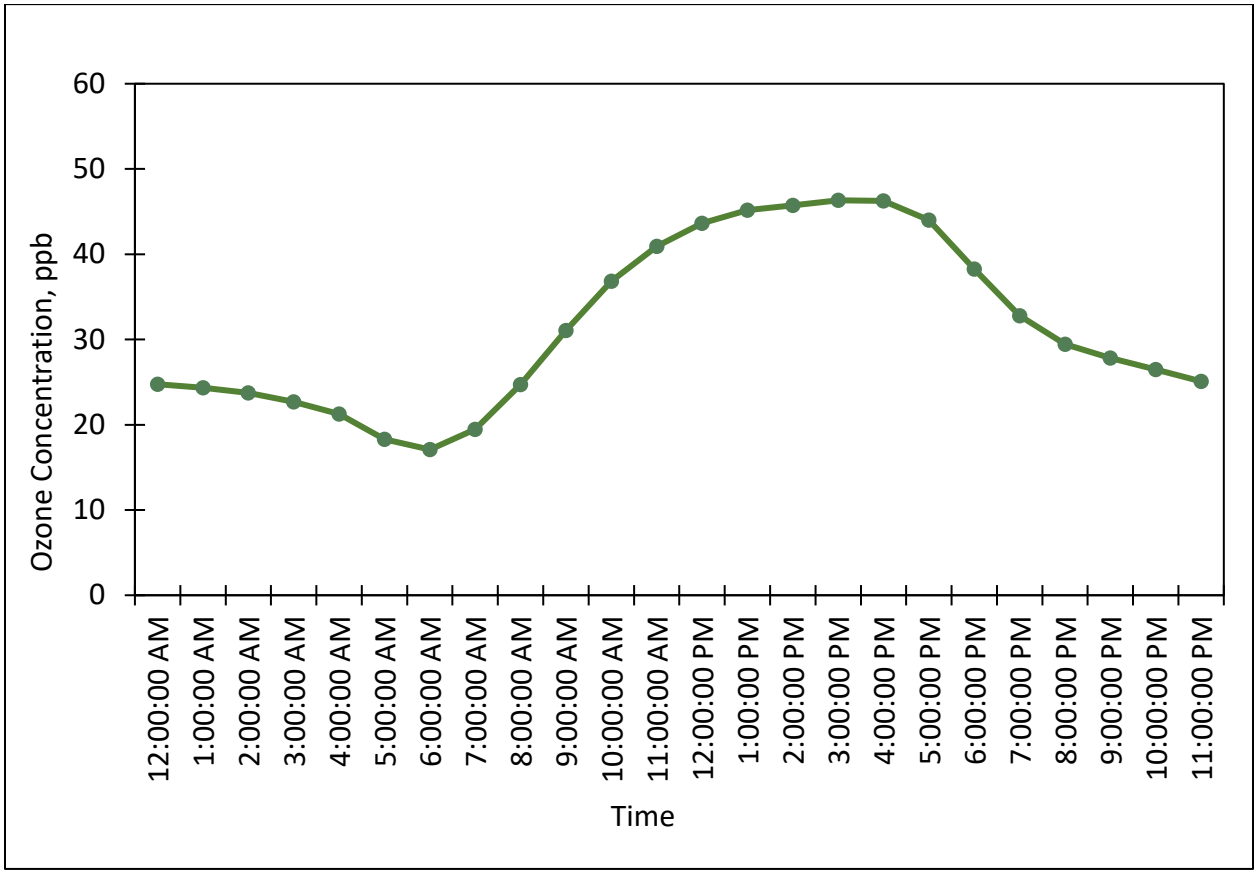


A5.2 Diurnal Ozone Concentrations

Figure A-10 and Table A-6 show the diurnal average ozone concentrations at the Yuma Supersite monitor for 2020.

[8] The jump from September 2018 to March 2019 is due to lack of data for that time period

Figure A-10: 2020 Diurnal Average Ozone Concentrations



As shown above, ozone concentrations increase in the morning, peaking in the afternoon (3-4 pm) and decrease in the evening.

Table A-6: 2020 Diurnal Average Ozone Concentration at Yuma Monitor

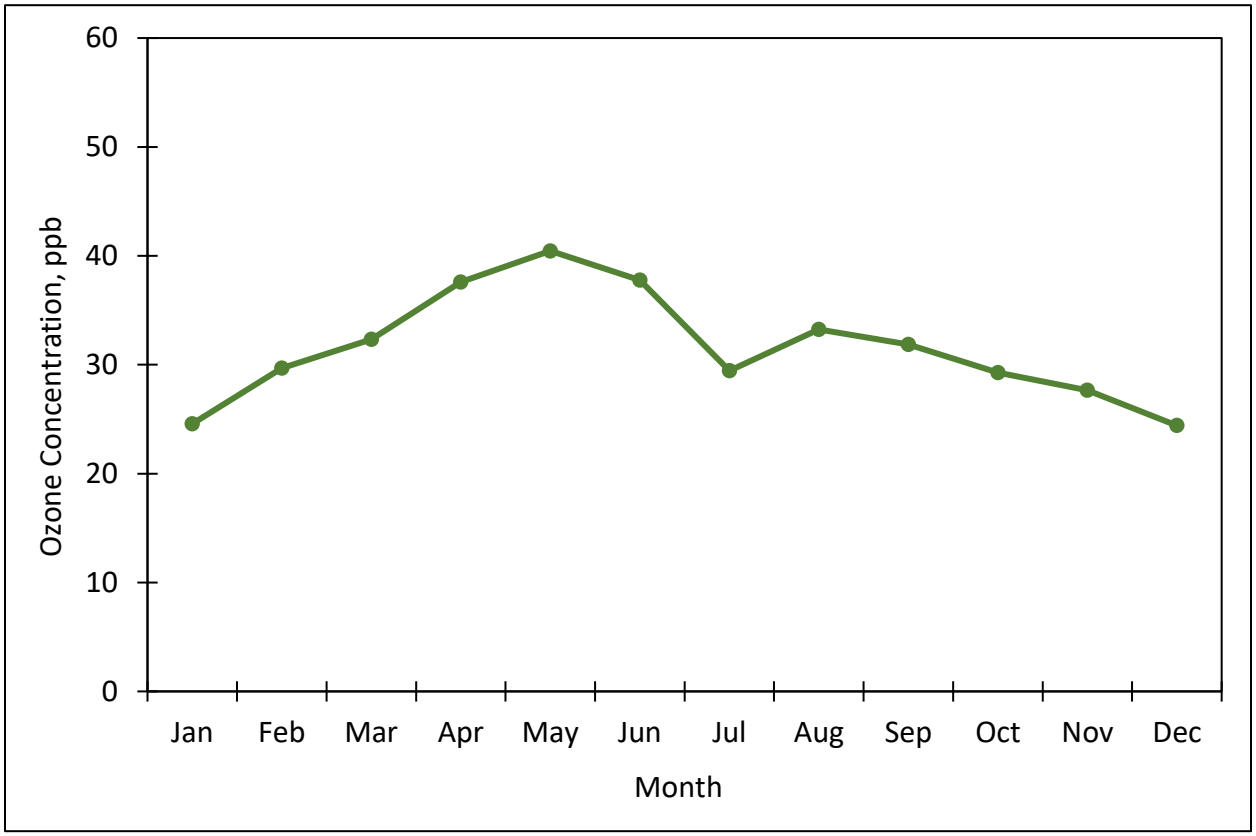
Hour	Ave. Ozone, ppb
12:00:00 AM	24.749
1:00:00 AM	24.352
2:00:00 AM	23.738
3:00:00 AM	22.686
4:00:00 AM	21.257
5:00:00 AM	18.292
6:00:00 AM	17.087
7:00:00 AM	19.459
8:00:00 AM	24.705
9:00:00 AM	31.074
10:00:00 AM	36.836
11:00:00 AM	40.918

Hour	Ave. Ozone, ppb
12:00:00 PM	43.650
1:00:00 PM	45.189
2:00:00 PM	45.751
3:00:00 PM	46.325
4:00:00 PM	46.251
5:00:00 PM	44.000
6:00:00 PM	38.268
7:00:00 PM	32.790
8:00:00 PM	29.445
9:00:00 PM	27.831
10:00:00 PM	26.495
11:00:00 PM	25.104

A5.3 Seasonal Ozone Concentrations

Figure A-11 and Table A-7 show the seasonal average ozone concentrations in Yuma. To calculate the seasonal averages, ozone concentrations were averaged for every month of the year.

Figure A-11: 2020 Seasonal Average Ozone Concentrations in Yuma



As shown in Figure A-11, higher ozone concentrations are measured in spring and summer (April-August).

Table A-7: 2020 Seasonal Average Ozone Concentrations at Yuma Monitor

Month	Ave. Ozone, ppb
Jan	24.579
Feb	29.680
Mar	32.335
Apr	37.579
May	40.456
Jun	37.763
Jul	29.460
Aug	33.254
Sep	31.867
Oct	29.261
Nov	27.647
Dec	24.413

A6 Emission Inventory Methodology

ADEQ utilized a multi-method approach to develop and compile the base year and projected maintenance years inventories. Table A-8*: Emission Inventory Source Category, Approach, and Data Source* provides a summary of the approaches used to estimate emissions in the Yuma O_3 NA. ADEQ employed a bottom up approach to determine point source emissions. To achieve this, ADEQ used local and state-level permit data and annual emission inventory reports for stationary point sources in the Yuma NA. ADEQ used the 2020 National Emissions Inventory (NEI) to derive the applicable non-point emissions, including the biogenic emissions. Mobile emissions, including on-road and non-road emissions, were obtained and projected using the EPA's Motor Vehicle Emissions Simulator (MOVES) 3.1 model. ADEQ allocated the compiled data to the Yuma O_3 NA based on various methodologies explained later in this section.

Table A-8: Emission Inventory Source Category, Approach, and Data Sources

Emission Inventory Source Category	Inventory Estimation Approach	Primary Data Sources
Point	Bottom-Up	Annual Emission Inventory Reports, Permits
Non-Point	Top-Down	2020 NEI
Mobile On-road	Bottom-Up	MOVES3
Mobile Non-road	Top-Down	MOVES3

A6.1 Point Source Emission Methodology

This section provides a summary of the methods and data sources used to develop the Point Source emission inventory. The point sources included in the inventory include general, Class I, and Class II Air Quality permitted facilities. The point sources are within the Yuma O_3 NA boundaries.

A6.1.1 Base Year Point Source EI Methodology

The point source emission inventory for the year 2020 was generated utilizing the actual emissions from annual emission inventory reports. Within the NA, for the year 2020, there are 12 facilities which are permitted to emit VOCs and NOx. Three facilities did not report emissions within the NA and one facility did not operate. Of the remaining eight facilities, three facilities fall under Commercial/Industrial Fuel Combustion SCC codes and are excluded in the point source analysis to reconcile the nonpoint emission inventory. If the 2020 submission of the annual emission inventory report was not completed, a historic high was used as a substitute. A table of the permitted facilities within the NA is provided below.

Table A-9. Point Sources in the Yuma O_3 NA

Place ID	Facility Type	Emissions Reported	Point Source
157415	Rock Crusher/Screener Plant	Zero Emissions	Included
157418	Rock Crusher/Screener Plant	Zero Emissions	Included
157597	Rock Crusher/Screener Plant	Yes	Included in Nonpoint NEI
150088	Vapor Extraction Unit	Yes	Included
186480	Rock Crusher/Screener Plant	Zero Emissions	Included
2251	Medical Facility	Historic High	Included in Nonpoint NEI
492	Electricity Generating Plant	Yes	Included
204398	Rock Crusher/Screener Plant	Yes	Included in Nonpoint NEI
2221	Paper Mill	Historic High	Included
9955	Electricity Generating Plant	Yes	Included
23369	Gas Filling Station - Commercial	Did Not Operate	Included
142851	Vapor Extraction Unit	Yes	Included

The reported facilities annual emissions in tons were summed for the total annual point source emissions.

Equation A-1. Summation of Annual Emissions

$$E_{Point\ Source}\left(\frac{tons}{year}\right) = \sum E_1 + E_2 + \cdots$$

Where:

$E_{Point\ Source}$ *= Annual point source emissions*

$E_{1\ldots}$ *= Annual point source emissions for each facility*

All facilities reported operations throughout the year without a seasonal operation schedule, therefore OSD emissions are calculated equally throughout the year. To calculate OSD emissions, ADEQ used the following equation for each facility.

Equation A-2. OSD Emissions without Seasonal Variation

$$OSD\left(\frac{lb}{day}\right) = E_{Point\ Source}\left(\frac{ton}{year}\right) * \frac{year}{365\ day} * \frac{2{,}000\ lb}{ton}$$

Where:

OSD = Ozone Season Day rate of emissions in pounds per day

$E_{Point\ Source}$ *= Annual point source emissions*

A6.1.2 Projected Years Point Source Potential to Emit

With the exception of the APS Yucca Power Plant, which is covered in Section A8.1, The facilities' emissions within the boundaries of the Yuma O_3 NA were projected by utilizing the permitted potential to emit (PTE) emissions. As there is no available data regarding operating hours, the OSD emissions are estimated by using Equation A-2. OSD Emissions without Seasonal Variation.

A6.2 Nonpoint Emission Methodology

Section A6.2 and its subsections provides summaries of the methods and data sources utilized to develop the 2020 base year nonpoint emission inventory and the necessary nonpoint emission allocation factors. Further, they explain how these allocation factors were applied to certain sections of the Yuma County portion of the 2020 NEI to complete the 2020 base year nonpoint inventory. Since 2020 is the base year, additional projections were not necessary to create the base year emissions inventory.

A6.2.1 Base Year Nonpoint Emission Allocation Factors

The EPA's NEI database contains nationwide data on the emissions and sources of emissions of the criteria air pollutants, hazardous air pollutants, and greenhouse gases. The NEI includes estimates of annual air pollutants from all point, nonpoint, mobile and event sources in the United States and its territories. The NEI is a collaborative effort between the states, tribal nations and federal agencies that provide a snapshot of emissions from the county and tribal scale to a national scale.

ADEQ used the March 2023 version of the 2020 NEI as the basis for the nonpoint base year emissions inventory. The specific source categories inventoried from the Yuma county portion of the NEI were allocated to the NA based on the allocation methods presented in Table A-10: Nonpoint Inventory Emission Sectors. The methodologies utilized to obtain these allocation factors are described in the subsequent sections. The emission estimation approach for all nonpoint emissions sourced from the NEI are top-down estimations.

Table A-10: Nonpoint Inventory Emission Sectors

Area Sources	Source Description	VOC	NOx	Allocation Method
Industrial Processes	Food and kindred products	X		Population
Industrial Processes	Bakery Allocation	X		Population
Miscellaneous Area Sources	Agricultural Production - Crops	X	X	Permits
Miscellaneous Area Sources	Other Combustion (Cremation, Residential Grilling)	X	X	Population
Miscellaneous Area Sources	Other Combustion (Forest Wildfires)	X	X	Forest Fire
Mobile Sources	Railroad Equipment	X	X	Rail Line Length
Natural Sources	Biogenic - Vegetation	X		Land Area
Natural Sources	Biogenic – Vegetation/Agriculture		X	Crop Land
Solvent Use	Degreasing	X		Employment
Solvent Use	Dry cleaning	X		Dry Cleaning
Solvent Use	Graphic Arts	X		Employment
Solvent Use	Miscellaneous Non-industrial: Commercial (Cutback Asphalt, Emulsified Asphalt, Asphalt Paving: Hot and Warm Mix)	X		Employment
Solvent Use	Miscellaneous Non-industrial: Commercial (Pesticide Application: Agricultural)	X		Crop Land
Solvent Use	Miscellaneous Non-industrial: Consumer and Commercial	X		Population
Solvent Use	Surface Coating	X		Employment

Area Sources	Source Description	VOC	NOx	Allocation Method
Stationary Source Fuel Combustion	Commercial/Institutional	X	X	Population
Stationary Source Fuel Combustion	Industrial	X	X	Population
Stationary Source Fuel Combustion	Residential	X	X	Population
Storage and Transport	Petroleum and Petroleum Product Storage	X		Population
Storage and Transport	Petroleum and Petroleum Product Transport	X		Population
Waste Disposal, Treatment, and Recovery	Open Burning	X	X	Permits
Waste Disposal, Treatment, and Recovery	Wastewater Treatment	X		Population

A6.2.1.1 Nonpoint NEI Omissions

Based on the location of the Yuma O_3 planning area boundaries, there are specific categories of the NEI that are omitted from this emission inventory. Concentrated animal feeding operations (CAFOs), airport, storage and transport airports, and prescribed burns were omitted from the nonpoint EI.

Although there are three CAFOs operating within Yuma county, all three operations are outside of the NA boundaries.

The Yuma International Airport borders the NA boundaries, but no airport operations are within the boundaries, therefore airport and storage and transport of petroleum products for airport aviation gasoline emissions were omitted.

Composting is excluded from the projected nonpoint emission inventories due to the confirmation of non-activity at the composting facility within the NA boundaries. ADEQ verified that there are no composting operations permitted within the NA by utilizing ArcGIS Pro and relevant ADEQ permit shapefiles (last updated September 2023).

Lastly, although prescribed burns occurred throughout Yuma county during 2020, all were located outside of the planning boundaries. As a result, prescribed burns were omitted from the nonpoint EI for 2020.

A6.2.1.2 Population Allocation Factor

ADEQ calculated a population allocation factor by using ArcGIS Pro to estimate the NA population and population estimates for Yuma county obtained from the Arizona Office of Economic Opportunity (AOEO)[9]. Within ArcGIS Pro, ADEQ used 2020 Census Block and O_3 shapefiles. The 2020 Census Block shapefile contains all of the census blocks within Arizona. Therefore, ADEQ pared down the 2020 Census Block shapefile to only contain the census blocks within the NA. The O_3 shapefile contains all of the O_3 NAs in Arizona, therefore the O_3 shapefile was pared down to only contain the Yuma O_3 NA. When paring down the census block shapefile to the NA, ArcGIS

[9] https://www.azcommerce.com/oeo/population/population-estimates/

Pro automatically allocates the data for census blocks that are partially within the user's selection to more accurately represent data within the selected area. In this way, ADEQ was able to get a more accurate representation of the population within the NA in 2020. Once the two shapefiles were pared down, ADEQ was able to aggregate the census block population data within the NA.

To calculate the base year population allocation factor, ADEQ took the ratio of the NA population to the county level population. This factor allows for the allocation of county level emissions that are directly related to population to be allocated to the NA.

Equation A-3: Yuma County Population Allocation Factor

$$If\ \frac{P_{MA}}{P_C} = AF_{pop}, then\ \frac{85{,}390}{203{,}843} = \mathbf{0.4189}$$

Where:

P_{MA} *= 2020 Yuma NA population estimate*

P_C *= 2020 Yuma county population estimate*

AF_{pop} *= Population allocation factor*

Using this method, ADEQ was able to develop a population allocation factor of **0.4189** for Yuma county. In other words, in 2020 **41.89%** of the population in Yuma county resided within the Yuma NA. This allocation factor was then multiplied by county-level source category specific emission estimates for which population is assumed to drive emissions.

A6.2.1.3 Land Area Allocation Factor

ADEQ calculated a land area allocation factor by using ArcGIS Pro to estimate the land area of Yuma county, as well as, the land area of the NA. Within ArcGIS Pro, ADEQ used county, 2020 Census Block, and O_3 shapefiles. The county and the 2020 Census Block shapefiles contain all of the counties and census blocks, respectively, within Arizona. Therefore, ADEQ cropped the county shapefile to only contain Yuma county and pared down the 2020 Census Block shapefile to only contain the census blocks within Yuma county. The O_3 shapefile contains all of the O_3 MAs in Arizona, therefore the O_3 shapefile was lessened to only contain the Yuma O_3 NA. Additionally, the 2020 Census Block shapefile was also cropped to only contain the census blocks within the NA. When paring down the census block shapefile to the county, as well as, the NA, ArcGIS Pro automatically allocates the data for census blocks that are partially within the user's selection to more accurately represent data within the selected area. In this way, ADEQ was able to generate a more accurate representation of the land area within the NA in 2020. ADEQ summed the census block land area data within the NA.

Equation A-4: Yuma County Land Area Allocation Factor

$$If\ \frac{LA_{MA}}{LA_C} = AF_{LA}, then\ \frac{51.9}{5{,}520.7} = \mathbf{0.0094}$$

Where:

LA_{MA} = *Yuma NA land area estimate*

LA_C = *Yuma county land area estimate*

AF_{LA} = *Land area allocation factor*

Using this method, ADEQ was able to develop a land-area allocation factor of **0.94%** of the land area in Yuma county. This allocation factor was then multiplied by county-level source category specific emission estimates for which land area is assumed to drive emissions.

A6.2.1.4 Cropland Allocation Factor

ADEQ utilized data from Cropscape to calculate the cropland allocation factor. Cropland data was obtained for the NA, as well as for Yuma county. Cropscape data also includes non-cropland categories, for this analysis, these sections were excluded. Using the Cropscape data, ADEQ was able to get a total number of acres of cropland for both the NA and Yuma county.

Equation A-5: Yuma County Cropland Allocation Factor

$$If\ \frac{CL_{MA}}{CL_C} = AF_{CL}, then\ \frac{17{,}283}{204{,}213} = \mathbf{0.0846}$$

Where:

CL_{MA} = *Yuma NA cropland estimate*

CL_C = *Yuma county cropland estimate*

AF_{CL} = *Cropland allocation factor*

A6.2.1.5 Burn Permit Allocation Factors

ADEQ calculated burn permit allocation factors for agricultural, commercial, and residential burns by utilizing permits issued within Yuma county from the Rural Metro and Yuma fire districts. The addresses of the issued permits were used to confirm whether a particular burn occurred within the NA. By taking the ratio of the number of burns in the NA to the total number of burns in that category that took place within Yuma county, ADEQ calculated an allocation for each of the three categories.

Equation A-6: Yuma County Agricultural Burn Allocation Factor

$$If\ \frac{AB_{MA}}{AB_C} = AF_{AB}, then\ \frac{14}{55} = \mathbf{0.2545}$$

Where:

AB_{MA} = *Agricultural Burns within NA*

AB_C = *Agricultural Burns within Yuma county*

AF_{AB} = *Agricultural Burn allocation factor*

Equation A-7: Yuma County Commercial Burn Allocation Factor

$$If\ \frac{CB_{MA}}{CB_C} = AF_{CB}, then\ \frac{8}{32} = \mathbf{0.25}$$

Where:

CB_{MA} = *Commercial Burns within NA*

CB_C = *Commercial Burns within Yuma county*

AF_{CB} = *Commercial Burn allocation factor*

Equation A-8: Yuma County Residential Burn Allocation Factor

$$If\ \frac{RB_{MA}}{RB_C} * UBF = AF_{RB}, then\ \frac{65}{491} * 26.1 = \mathbf{3.46}$$

Where:

RB_{MA} = *Residential Burns within NA*

RB_C = *Residential Burns within Yuma county*

AF_{RB} = *Residential Burn allocation factor*

UBF = Maricopa's 2020 Unpermitted Burn Factor

Open burning of residential household waste activity includes yard waste burning, land clearing burns, and household waste burns. Emissions estimates from permitted burn activity were multiplied by a factor of 26.1 to account for unpermitted outdoor burning as calculated by Maricopa County 2020 Periodic Emissions Inventory[10].

Using this method, ADEQ was able to develop agricultural, commercial, and residential allocation factors for Yuma county of **0.2545**, **0.25**, and **3.46** respectively. These allocation factors were then multiplied by county-level source category specific emission estimates for which burn permits is assumed to drive emissions.

A6.2.1.6 Wild Land Fire Allocation Factor

ADEQ was able to calculate a wild land fire allocation factor by utilizing data from the 2020 NEI supporting data events file, 2020FireLoc_Arizona[11], maintained by EPA. In 2020, 24 wild land fires occurred in Yuma county, and of those 24 fires only one took place in the NA. Therefore, ADEQ

[10] Maricopa County 2020 Periodic Emissions Inventory for Ozone Precursors
[11] 2020 NEI Supporting Data - Events

took the ratio of the number of wild land fires in the NA to the number of wild land fires within Yuma county to calculation the wild land fire allocation factor.

Equation A-9: Yuma County Wild Fire Allocation Factor by Events

$$If\ \frac{WF_{MA}}{WF_C} = AF_{WF}, then\ \frac{1}{24} = \mathbf{0.0417}$$

Where:

WF_{MA} *= Wild Fires within NA*

WF_C *= Wild Fires within Yuma county*

AF_{WF} *= Wild Fire allocation factor*

Using this method, ADEQ was able to develop the wild land fires allocation factor for Yuma county of **0.0417**. The allocation factor was then multiplied by county-level source category specific emission estimates for which wild land fires is assumed to drive emissions.

A6.2.1.7 Rail Allocation Factor

ADEQ allocated locomotive emissions based on rail length within the Yuma O_3 NA as a ratio of total rail length within Yuma county. This ratio was held constant from the previous SIP, as there was no change in rail length within Yuma county.

Equation A-10: Yuma County Rail Allocation Factor

$$If\ \frac{RL_{MA}}{RL_C} = AF_{RL}, then\ \frac{488.868}{2{,}718.748} = \mathbf{0.1798}$$

Where:

RL_{MA} *= Railroad length in miles within NA*

RL_C *= Railroad length in miles within Yuma county*

AF_{RL} *= Railroad length allocation factor*

Therefore, **17.98%** of the total rail length within Yuma county is within the bounds of the Yuma O_3 NA. ADEQ multiplied this factor by county level locomotive emissions to estimate locomotive emissions within the Yuma O_3 NA.

A6.2.1.8 Dry Cleaning Allocation Factor

ADEQ calculated the dry-cleaning allocation factor by using ADEQ's AllPlaces file. This file is a record of all the places and facilities registered with ADEQ. This file was then filtered to only show

active dry-cleaners within Yuma county. Of the four dry-cleaners in Yuma county, only three of them are within the NA. Therefore, the dry-cleaning allocation factor is the ratio of the number of dry-cleaners in the NA to the total number of dry-cleaners in Yuma county.

Equation A-11: Yuma County Dry Cleaning Allocation Factor

$$If\ \frac{DC_{MA}}{DC_C} = AF_{DC}, then\ \frac{3}{4} = \mathbf{0.75}$$

Where:

DC_{MA} *= Operating Dry Cleaners within NA*

DC_C *= Operating Dry Cleaners within Yuma county*

AF_{DC} *= Dry Cleaning allocation factor*

Therefore, **75%** of the dry-cleaners within Yuma county are within the bounds of the Yuma O_3 NA. ADEQ multiplied this factor by county level dry-cleaning emissions to estimate their emissions within the Yuma O_3 NA.

A6.2.1.9 Solvent Utilization Employment Allocation Factor

ADEQ calculated four solvent utilization allocation factors by using ArcGIS Pro to estimate the number of people utilizing solvents within their profession within Yuma county, as well as, the NA. The four employment categories included were construction, manufacturing, utilities, and entertainment and recreation due to the potential for solvent use in the supplies of their respective industries. Employment data organized by census tracts for Yuma county was sourced from the U.S. Census Bureau. Using ArcGIS Pro, ADEQ was able to pare down the Yuma county employment data to just include the employment data for the NA. Then, the ratio of the NA employment data to the county level employment data was calculated for each employment category.

Equation A-12:Yuma Count Solvent Utilization Allocation Factor

$$If\ \frac{CSU_{MA} + MSU_{MA} + USU_{MA} + ERSU_{MA}}{CSU_C + MSU_C + USU_C + ERSU_C} = AF_{SU}, then\ \frac{4{,}148}{10{,}473} = \mathbf{0.396}$$

Where:

CSU_{MA} *= Construction Solvent Utilization within NA*

MSU_{MA} *= Manufacturing Solvent Utilization within NA*

USU_{MA} *= Utilities Solvent Utilization within NA*

$ERSU_{MA}$ *= Entertainment and Recreation Solvent Utilization within NA*

CSU_C *= Construction Solvent Utilization within Yuma county*

MSU_C = *Manufacturing Solvent Utilization within Yuma county*

USU_C = *Utilities Solvent Utilization within Yuma county*

$ERSU_C$ = *Entertainment and Recreation Solvent Utilization within Yuma county*

AF_{SU} = *Construction Solvent Utilization allocation factor*

The total percentage was used as a fair and balanced distribution between the most likely categories.

A6.2.1.10 Bakery VOC Emission Methodology

There was no emission information for Yuma County bakeries in 2020 NEI. ADEQ reviewed the emission estimation methodology used in Maricopa County's 2020 periodic emission inventory report[12] and estimated the per capita VOC emissions based on the Maricopa County's annual emissions and population in 2020. The calculated emissions factor (lb/capita-yr) was then multiplied by the population in the Yuma ozone NA to calculate the annual emissions in the NA.

This sector's activity is assumed to occur uniformly throughout the year. Therefore, average season-day emissions can be developed by dividing the annual emissions by 365 (i.e., ozone season-day emissions are the same as average season-day emissions). Table A-11 shows the VOC emissions estimates for this sector.

Table A-11: Bakery VOC Estimation

Item	Value	Units
Maricopa County's Annual Emissions	71.3	ton/yr
Maricopa Resident Population in 2020	4,436,908	persons
Maricopa VOC Emissions per capita	0.0321	lbs/capita-yr
Yuma Ozone NA Population in 2020	85,390	persons
Yuma Ozone NA Annual Emissions	1.37	ton/yr
Yuma Ozone NA OSD Emissions	7.51	lb/day

Table A-12: Allocation Factor Summary

Area Sources	Source Description	VOC	NOx	Allocation Method	Allocation Factor
Industrial Processes	Food and kindred products	X		Population	41.89%
Industrial Processes	Bakery Allocation	X		Population	41.89%
Miscellaneous Area Sources	Agricultural Production - Crops	X	X	Permits	24.45%
Miscellaneous Area Sources	Other Combustion (Cremation, Residential Grilling)	X	X	Population	41.89%
Miscellaneous Area Sources	Other Combustion (Forest Wildfires)	X	X	Forest Fire	4.17%
Mobile Sources	Railroad Equipment	X	X	Rail Line Length	17.98%
Natural Sources	Biogenic - Vegetation	X	X	Land Area	0.94%

[12] Maricopa County's 2020 Periodic Emission Inventory Report

Area Sources	Source Description	VOC	NOx	Allocation Method	Allocation Factor
Natural Sources	Biogenic – Vegetation/Agriculture		X	Crop Land	8.46%
Solvent Use	Degreasing	X		Employment	39.61%
Solvent Use	Dry cleaning	X		Dry Cleaning	75%
Solvent Use	Graphic Arts	X		Employment	39.61%
Solvent Use	Miscellaneous Non-industrial: Commercial (Cutback Asphalt, Emulsified Asphalt, Asphalt Paving: Hot and Warm Mix)	X		Employment	39.61%
Solvent Use	Miscellaneous Non-industrial: Commercial (Pesticide Application: Agricultural)	X		Crop Land	8.46%
Solvent Use	Miscellaneous Non-industrial: Consumer and Commercial	X		Population	41.89%
Solvent Use	Surface Coating	X		Employment	39.61%
Stationary Source Fuel Combustion	Commercial/Institutional	X	X	Population	41.89%
Stationary Source Fuel Combustion	Industrial	X	X	Population	41.89%
Stationary Source Fuel Combustion	Residential	X	X	Population	41.89%
Storage and Transport	Petroleum and Petroleum Product Storage	X		Population	41.89%
Storage and Transport	Petroleum and Petroleum Product Transport	X		Population	41.89%
Waste Disposal, Treatment, and Recovery	Open Burning – Land Clearing Debris, Yard Waste	X	X	Permits	25%
Waste Disposal, Treatment, and Recovery	Open Burning – Household Waste	X	X	Permits	345.52%
Waste Disposal, Treatment, and Recovery	Wastewater Treatment	X		Population	41.89%

A6.2.2 Nonpoint Ozone Season Day Methodology

The OSD rate of emissions is calculated using Equation A-2. OSD Emissions without Seasonal Variation when seasonal variation does not need to be accounted for. In some instances, seasonal variation does need to be accounted for, such as reduced operational days per week or seasonal variation factors. For seasonal variations, Equation A-13 is used and the seasonal variation factors are discussed in further sections.

Equation A-13. OSD Emissions with Seasonal Variation

$$\boldsymbol{OSD}\left(\frac{\boldsymbol{lb}}{\boldsymbol{day}}\right) = \boldsymbol{E}_{\boldsymbol{Annual}}\left(\frac{\boldsymbol{ton}}{\boldsymbol{year}}\right) * \frac{\boldsymbol{year}}{\boldsymbol{SVF}} * \frac{\boldsymbol{2{,}000\ lb}}{\boldsymbol{ton}}$$

Where:

OSD = Ozone Season Day rate of emissions in pounds per day

E_{Annual} *= Annual nonpoint emissions*

SVF = Seasonal Variation Factor

A6.2.2.1 Biogenic Emissions

Biogenic emissions are emissions that come from natural sources such as vegetation and soils and are significant contributors to background air chemistry. Due to the lack of more localized information on biogenic emissions in the ozone NAA, ADEQ utilized 2020 NEI Yuma county data for biogenic emissions. ADEQ estimated annual emissions in the ozone NAA for biogenic emissions strictly from vegetation by multiplying the land area allocation factor by the Yuma county biogenic – vegetation emissions. ADEQ also estimated annual emissions in the ozone NAA for biogenic emissions that encompassed vegetation and agricultural biogenic emissions by multiplying the crop land allocation factor by the Yuma county biogenic – vegetation/agricultural emissions.

The activity is assumed to occur uniformly throughout the year, thus the season day emissions are estimated by the annual emissions divided by 365.

A6.2.2.2 Open Burn & Agricultural Burn

One important notation for burns permitted for residential, commercial, and agricultural burns, is that the OSD emissions are calculated without seasonal variation of operation details due to analysis of the days of which permits were granted. Permits were granted on all days of the week and for a month at a time. Therefore, seasonal variation was not used.

A6.2.2.3 Commercial/Industrial Fuel Combustion

Annual emissions from commercial fuel combustion were derived from the county-level estimates prepared by US EPA for use in the 2020 NEI. Emissions within the 8-hour ozone NA were calculated by multiplying county totals by the ratio of the total population in the NA to the total population in the county.

It is assumed that commercial and industrial combustion occurs six days per week, and is relatively uniform throughout the year. Thus, annual emissions can be divided by 312 (6 days/week × 52 weeks/year) to derive emissions for an OSD in the NA.

Equation A-14. Commercial & Industrial Fuel Combustion Seasonal Variation Factor

$$SVF_{Commerical\ \&\ Industrial\ \ Fuel\ Combustion} = \frac{6\ day}{week} * \frac{52\ week}{year} = 312\ \frac{days}{year}$$

A6.2.2.4 Residential Fuel Combustion

In estimating residential fuel combustion ozone season day emissions, it is assumed these are proportional to heating degree days (HDDs) from a base of 65°F. The HDDs for 2020 were sourced from the Yuma Marine Corps Air Station (YMCAS), station ID KNYL. Ozone season day emissions were calculated by multiplying annual emissions by the fraction of total annual HDDs that occurred during the ozone season. Historical weather data from YMCAS shows a total of 116 HDDs in 2020 and 7 HDDs of which occurred during the ozone season. The total ozone season

emissions were then divided by the number of days in the ozone season (214 days) to obtain ozone season day emissions.

Equation A-15.Ozone Season Heating Degree Day Factor

$$\boldsymbol{HDDF_{Residential\ Fuel\ Combustion}} = \frac{\boldsymbol{7\ HDD\ OS}}{\boldsymbol{116\ HDD\ year}} = \boldsymbol{6.03\%}$$

Equation A-16. Residential Fuel Combustion Seasonal Variation Factor

$$\boldsymbol{SVF_{Residential\ Fuel\ Combustion}} = \frac{\boldsymbol{1\ year}}{\boldsymbol{214\ OS\ Days}} = \boldsymbol{0.0047}$$

A6.2.2.5 Architectural Surface Coating Seasonal Apportioning

Ozone season-day emissions were developed using default assumptions from Emission Inventory Improvement Program (EIIP), Volume III: Chapter 3[13]. The seasonal factor for ozone season architectural coating activity is assumed to be 28 percent of annual activity. Assuming that coating use may take place 7 activity days a week during the ozone season, season-day emissions will be calculated by multiplying annual VOC emissions by the seasonal factor (28%) and then dividing the results by the number of days per ozone season (214).

Equation A-17. Architectural Surface Coating OS Apportionment

$$\boldsymbol{SVF_{Archetectural\ Surface\ Coating}} = \frac{\boldsymbol{1}}{\boldsymbol{214\ Days}} = \boldsymbol{0.0047}$$

A6.2.2.6 Traffic Marking Seasonal Apportioning

The seasonal activity factor for the ozone season is assumed to be 33% of the annual activity. Also, the activity typically takes place 5 days a week during the active season[14]. Therefore, ozone season day for the NA was calculated by multiplying the annual emissions by 0.33 and then dividing by the number of activity days during the ozone season. The ozone season is 30.6 weeks per ozone season. Assuming 5 days per week of activity or weekdays, there is 153 weekdays per the ozone season.

Equation A-18. Traffic Marking Seasonal Apportioning

$$SVF_{Traffic\ Marking} = \frac{5\ days}{week} * \frac{30.6\ OS\ week}{year} = \boldsymbol{153\ \frac{days}{year}}$$

[13] https://www.epa.gov/sites/production/files/2015-08/documents/archsfc.pdf
[14] EIIP, Volume III, Chapter 14: https://www.epa.gov/sites/production/files/2015-08/documents/iii14.pdf

A6.2.3 Projected Years Nonpoint Emission Projections

The following projected years of 2030 and 2037 utilize the 2020 emission inventory multiplied by a projection factor. Detailed projection factors are described below. All sectors are grown by population except the following sectors which will be held constant within Table A-13.

Table A-13. NEI Sectors Held Constant

SCC Level-1	SCC Level-2	SCC Level-3	SCC Level-4
Miscellaneous Area Sources	Agriculture Production - Crops	Agricultural Field Burning - whole field set on fire	Fallow
			Field Crop is Corn: Burning Techniques Not Important
			Field Crop is Cotton: Burning Techniques Not Important
			Field Crop is Wheat: Backfire Burning
			Unspecified crop type and Burn Method
	Other Combustion	Forest Wildfires	Flaming
			Smoldering
	Other Combustion - as Event	Prescribed Forest Burning	Flaming
Waste Disposal, Treatment, and Recovery	Open Burning	All Categories	Land Clearing Debris

A6.2.3.1 Population Growth Factors

The population in the Yuma NA boundaries is expected to grow based on the AOEO population projections. To obtain the population growth from 2020 to both 2030 and 2037, ADEQ utilized the change of population between the future year(s) compared to the base year population.

Equation A-19. 2030 Population Growth Factor

$$PGF_{2030} = \left(\frac{Pop_{2030} - Pop_{2020}}{Pop_{2020}}\right) * 100\%$$

Where:

PFG_{2030} = Population Growth Factor for 2030

Pop_{2030} = AOEO Projected Population in 2030

Pop_{2020} = AOEO Projected Population in 2020

Equation A-20. 2037 Population Growth Factor

$$PGF_{2037} = \left(\frac{Pop_{2037} - Pop_{2020}}{Pop_{2020}}\right) * 100\%$$

Where:

PFG_{2037} = Population Growth Factor for 2037

Pop_{2037} = AOEO Projected Population in 2037

Pop_{2020} = AOEO Projected Population in 2020

The resulted population growth factors are shown in

Table A-14. Population Projection Factors

Year	AOEO Projected Population	Population Change	Population Growth Factor
2020	231,781		
2030	263,782	32,001	13.8%
2037	286,561	54,780	23.6%

The expected population growth factors were applied to the 2020 Yuma County and Yuma NA population estimates from the Census Bureau.

A6.3 Mobile Source Emission Methodology

The mobile source emissions include both on-road and non-road emissions. The latest MOVES3.1 model was used for base year and projected year modelling.

A6.3.1 On-road Emissions Modeling

ADEQ ran MOVES in county scale mode to determine the O_3 precursors VOC and NO_x for on-road emissions. In order to run MOVES in this configuration, the modeler must provide inputs in the county data manager (CDM). To source these CDM inputs, ADEQ coordinated with the Yuma Metropolitan Planning Organization (YMPO), who conducts travel demand modeling in the NA.

In July of 2021 YMPO published its Long-Range Transportation Plan (LRTP)[15], which included an Air Quality Conformity Analysis (AQCA)[16]. For this conformity analysis, YMPO's modeling contractors performed MOVES modeling to quantify NO_x and VOC emissions in the nonattainment area for years 2017 (baseline year[17]), 2022, 2025, 2035, and 2045. In order for ADEQ's onroad mobile inventory, and subsequent motor vehicle emissions budget (MVEB), to be consistent with YMPO's current Long-Range Transportation Plan, ADEQ sourced all possible MOVES inputs from YMPO's 2021 AQCA.

Given the years in YMPO's 2021 AQCA do not align with the inventory years of ADEQ's Yuma O_3 redesignation request, ADEQ staff applied interpolation techniques to YMPO's vehicle miles traveled (VMT) and source type population MOVES inputs. The original inputs supplied by YMPO, which included additional years not found in the final 2021 conformity analysis report, and the interpolated values used in the onroad modeling are given in Table A-15 - Table A-18.

Table A-15: YMPO Air Quality Conformity Analysis Vehicle Miles Traveled

Year	HPMS Vehicle Type Daily VMT				
	10	25	40	50	60
2017	7,761	1,111,978	6,205	38,460	113,559
2022	8,317	1,191,635	6,649	41,215	121,694
2025	8,511	1,219,439	6,804	42,177	124,534
2035	9,109	1,305,152	7,283	45,142	133,287
2045	9,709	1,391,091	7,762	48,114	142,064

Table A-16:Onroad Modeling Vehicle Miles Traveled

Year	HPMS Vehicle Type Daily VMT				
	10	25	40	50	60
2020	8,095	1,159,772	6,471	40,113	118,440
2030	8,834	1,265,778	7,063	43,780	129,266
2037	9,229	1,322,294	7,378	45,735	135,038

[15] https://ympo.org/docs/YMPO_2022-2045_Final_LRTP.pdf
[16] https://ympo.org/docs/YMPO_AirQualityConformityReportFinal.pdf
[17] The baseline year is defined as the most recent year for which EPA's Air Emissions Reporting Rule requires submission of on-road mobile source emissions inventories as of the effective date of designation, which is 2017 for the 2015 8-hour ozone NAAQS.

Table A-17: YMPO Air Quality Conformity Analysis MOVES Source Type Population

Year	MOVES Source Type Population												
	11	21	31	32	41	42	43	51	52	53	54	61	62
2017	5,966	74,197	50,099	12,666	29	108	972	1,060	34,961	1,482	8,820	1,814	2,044
2025	7,129	91,197	61,545	15,621	35	129	1,153	1,322	43,289	1,842	10,941	2,687	3,157
2035	8,690	111,169	75,024	19,042	42	157	1,405	1,612	52,768	2,246	13,337	3,275	3,848
2045	10,440	133,554	90,130	22,876	51	188	1,688	1,937	63,394	2,698	16,022	3,934	4,623

Table A-18: Onroad Modeling MOVES Source Type Population

Year	MOVES Source Type Population												
	11	21	31	32	41	42	43	51	52	53	54	61	62
2020	6,402	80,572	54,392	13,774	31	116	1,040	1,158	38,084	1,617	9,615	2,141	2,461
2030	7,909	101,183	68,284	17,331	38	143	1,279	1,467	48,029	2,044	12,139	2,981	3,502
2037	9,040	115,646	78,045	19,809	44	163	1,462	1,677	54,894	2,336	13,874	3,407	4,003

In addition to vehicle population and vehicle miles traveled, ADEQ also utilized YMPO's "HourVMTFraction" inputs, which allocate the VMTs in Tables 2 and 3 to each hour in the run. The remaining MOVES inputs were sourced from EPA's 2020 NEI Yuma County data manager inputs, MOVES defaults, or developed using EPA tools. A summary of each MOVES input is provided in Table A-19 below.

Table A-19: MOVES Input Summary

MOVES Input Table	Source
HPMSVtypeDay	Interpolated YMPO Input
SourceTypeYear	Interpolated YMPO Input
HourVMTFraction	YMPO Input
RoadTypeDistribution	2020 NEI
SourceTypeAgeDistribution	2020 NEI and projected to future years using EPA's age distribution projection tool
AverageSpeedDistribution	2020 NEI
ZoneMonthHour (Meteorology)	2020 NEI
FuelSupply	MOVES Defaults
FuelFormulation	MOVES Defaults
FuelUsageFraction	MOVES Defaults
AVFT	MOVES Defaults

Further, Table A-20 summarizes the processes selected within MOVES for the model runs, and

Table A-22 provides the runspec settings utilized in MOVES for all inventory year runs.

Table A-20: Selected Processes for MOVES Runs

Process	VOC	NO_x
Running Exhaust	X	X
Crankcase Running Exhaust	X	X
Brakewear		
Tirewear		
Start Exhaust	X	X
Crankcase Start Exhaust	X	X
Extended Idle Exhaust	X	X
Crankcase Extended Idle Exhaust	X	X
Auxiliary Power Exhaust	X	X
Evap Permeation	X	
Evap Fuel Vapor Venting	X	
Evap Fuel Leaks	X	
Refueling Displacement Vapor Loss	X	
Refueling Spillage Loss	X	

The vehicle age distributions used in the modeling were sourced from EPA's 2020 NEI. ADEQ considered utilizing Arizona Department of Transportation (ADOT) vehicle registration data and MOVES defaults for this input. However, ADOT was unable to provide official registration data for the needed time period, and MOVES defaults appeared to not reflect the impact of COVID-19 on model year 2020 vehicle sales.

Table A-21 provides a comparison of the 2020 NEI and MOVES default inputs for vehicle age distributions. In short, the model applies the percentages in the age distribution table to the total vehicle population, passenger cars in the case of Table A-21, to determine how many vehicles of a given model year are within the modeling domain. For the year 2020, the MOVES default input assumes six percent of the total vehicle population is of model year 2020. However, the 2020 NEI for Yuma County assumed 1.1%. ADEQ believes the 2020 NEI is a more realistic representation of conditions in Yuma County because the NEI was constructed in a way to specifically consider the impact of COVID-19. Additionally, according to the United States International Trade Commission, COVID-19 disrupted vehicles sales by roughly 15% from 2019 to 2020. With the major disruption being attributed to the closure of automotive facilities and the shortage of semiconductor chips throughout the automotive supply chain.[18]

Table A-21 gives the passenger car age distribution, however, this same trend was observed in passenger trucks as well. These two vehicle types make up 64% of total vehicles in the model, which makes these underlying assumptions significant in terms of emissions results.

Table A-21: Passenger Car Age Distribution Comparison

Vehicle Model Year	2020 NEI	MOVES Defaults
2020	1.1%	6.0%
2019	2.9%	6.0%
2018	4.0%	6.0%
2017	4.3%	5.2%
2016	5.0%	5.8%
2015	5.3%	6.3%

[18] https://www.usitc.gov/publications/332/working_papers/final_the_roadblocks_of_the_covid-19_pandemic_in_the_automotive_industry.pdf

Table A-22: MOVES Runspec Parameters

Runspec Parameter	Details
Scale	On road, County, Inventory
Time Span	Years: 2020, 2030, 2037 Months: July Hours: 00:00 – 00:59, 23:00 – 23:59 Days: Weekdays
Geographic Bounds	Arizona – Yuma County
Vehicles/Equipment	All fuel types All source types
Road Type	All road types including off-network
Pollutants and Processes	NO_x, VOCs, Non-Methane Hydrocarbons, Total Gaseous Hydrocarbons
General Output	Grams, Joules, Miles
Output Emissions	24-Hour Day, County, Source Type
Advanced Features	None

The time span settings selected for the MOVES runs, specifically July weekdays, is a result of the transportation modeling methodology YMPO implemented when creating its most recent LRTP and AQCA. This approach assumes the July weekday VMT represents conditions during an OSD in the NA. In order for ADEQ's onroad inventory, and subsequent MVEB, to be comparable for transportation planning purposes, ADEQ made the same assumption that July weekday VMTs are representative of an OSD.

A6.3.2 On-road Emissions Projected Years

The projected onroad emissions utilized the 2020 CDM inputs with three changes. The inputs that were altered were the HPMSVtypeDay, SourceTypeYear, and the SourceTypeAgeDistribution. The future year (2030 and 2037) HPMSVtypeDay and SourceTypeYear inputs were sourced from the interpolated YMPO inputs.

The HPMSVtypeDay and SourceTypeYear inputs for 2030 and 2037 were sourced from YMPO's AQCA. As previously mentioned, because the years in YMPO's AQCA don't align with ADEQ's MVEB years, ADEQ applied interpolation techniques to YMPO's HPMSVtypeDay and SourceTypeYear inputs to arrive at the inputs used for 2030 and 2037. The interpolation results are found in Table A-16 and Table A-18. Additionally, the SourceTypeAgeDistribution age fraction was projected by utilizing the EPA's Age Distribution Projection Tool for MOVES. The completed projected inputs were run in MOVES under the same runspec settings as the base year model.

Table A-23 on the following page provides a summary of the sources of data ADEQ utilized for the base and projected onroad mobile emissions.

Table A-23: 2020, 2030, & 2037 Onroad Mobile Source Data

MOVES Source Data											
Year	**HPMS V Type Day**	**Hour VMT Fraction**	**Road Type Distribution**	**Source Type Year**	**Source Type Age Distribution**	**Average Speed Distribution**	**Fuel Supply**	**Fuel Formulation**	**Fuel Usage Fraction**	**AVFT**	**Zone Month Hour**
2020	YMPO Local Interpolated	YMPO Local	2020 NEI	YMPO Local Interpolated	2020 NEI	2020 NEI	MOVES Defaults	MOVES Defaults	MOVES Defaults	MOVES Defaults	2020 NEI
2030	YMPO Local Interpolated	YMPO Local	2020 NEI	YMPO Local Interpolated	EPA Projection Tool	2020 NEI	MOVES Defaults	MOVES Defaults	MOVES Defaults	MOVES Defaults	2020 NEI
2037	YMPO Local Interpolated	YMPO Local	2020 NEI	YMPO Local Interpolated	EPA Projection Tool	2020 NEI	MOVES Defaults	MOVES Defaults	MOVES Defaults	MOVES Defaults	2020 NEI

A6.3.3 Non-road Emissions Modeling

ADEQ ran the MOVES model in non-road mode to determine the non-road portion of the mobile inventory. Due to lack of local data, ADEQ conducted this modeling using EPA's defaults for Yuma County. The population allocation factor ($AF_{pop\ 2020}$) was applied to the resulted non-road emissions to achieve the NA specific emissions, as calculated in Equation A-3. The sections included in the non-road emission inventory are as follows: agriculture, commercial, construction, industrial, lawn/garden, pleasure craft, railroad, and recreational. The sector of airport support is excluded due to the Yuma International Airport being outside of the maintenance area boundaries. Logging and mining sectors were also excluded from non-road emissions. ADEQ verified that there are no logging or mining operations within the NA by utilizing ArcGIS Pro and relevant ADEQ permit shapefiles (last updated September 2023). The subsequent calculations to achieve Total Annual Emissions, Total Ozone Season Emissions, and OSD Emissions for weekday rates are shown below.

The emission quantities are reported in annual tons per year (tpy) and OSD pounds per day (lb/day). To achieve the proper representation of emissions, the following equations are used.

Equation A-21. MOVES Result Conversion to Pounds

$$E_{Day\ Type\ \&\ Month}(lb) = E_{Day\ Type\ \&\ Month}(g) * \frac{1\ lb}{453.592\ g}$$

Where:

$E_{Day\ Type\ \&\ Month}$ *(lb)= Emissions in pounds for each day type and month*

$E_{Day\ Type\ \&\ Month}$ *(g)= Emission results from MOVES for each day type and month*

Equation A-22. MOVES Result Conversion to Tons

$$E_{Day\ Type\ \&\ Month}(ton) = E_{Day\ Type\ \&\ Month}(lb) * \frac{1\ ton}{2{,}000\ lb}$$

Where:

$E_{Day\ Type\ \&\ Month}$ *(ton)= Emission in tons for each day type and month*

$E_{Day\ Type\ \&\ Month}$ *(lb)= Emissions in pounds for each day type and month*

Total Annual Emission Calculation

A total annual emission inventory will include the entire calendar year emissions and the total annual Ozone Season will include the total of emissions from April to October.

Equation A-23. Total Annual Emissions (tpy) Calculation

$$E_{Total\ Annual}(tpy) = \sum_{January}^{December} (E_{Total,\ Weekday\ \&\ Month} + E_{Total,\ Weekend\ \&\ Month})$$

Where:

$E_{Total\ Annual}$ = *Total summation of emissions for both day types and full calendar year*

$E_{Total,\ Weekday\ \&\ Month}$ = *Total emissions for weekdays and each month*

$E_{Total,\ Weekend\ \&\ Month}$ = *Total emissions for weekends and each month*

Equation A-24. Total Ozone Season (tpy) Calculation

$$E_{Total\ Ozone\ Season}(tpy) = \sum_{April}^{October} (E_{Total,\ Weekday} + E_{Total,\ Weekend})_{Month}$$

Where:

$E_{Total\ Ozone\ Season}$ = *Total summation of emissions for both day types and Ozone Season months*

$E_{Total,\ Weekday\ \&\ Month}$ = *Total emissions for weekdays and each month*

$E_{Total,\ Weekend\ \&\ Month}$ = *Total emissions for weekends and each month*

Ozone Season Day Calculation

The requirement for Ozone Season Day emissions from 40 CFR 51.1300(g) assumes the work weekday emission activity is expected to be higher than then weekend emissions. Therefore, the OSD emissions is calculated by the following

Equation A-25. Ozone Season Day Emission Rate

$$OSD_{Weekday}\left(\frac{lb}{day}\right) = \sum_{April}^{October} E_{Weekday} \Big/ \sum_{April}^{October} Days_{Weekday}$$

Where:

$OSD_{Weekday}$ = *Ozone Season Day rate in pounds per day, specifically weekdays*

$E_{Total,\ Weekday}$ = *Total emissions for weekdays within ozone season months*

$E_{Total,\ Weekend}$ = *Total emissions for weekdays within ozone season months*

A6.3.4 Non-road Emissions Projected Years

ADEQ utilized the data within MOVES to project the non-road emissions for 2030 and 2037. The subsequent calculations to achieve Total Annual Emissions, Total Ozone Season Emissions, and OSD Emissions for weekday rates follow the same methodology as in the preceding section.

A7 Base Year Emission Inventory

A7.1 2020 Point Source Emission Inventory Summary

ADEQ used the Annual Emissions Inventory reports as the basis for the point source emission analysis. The included facilities in the table below depicts the facilities which are permitted in the NA and a summary of their associated 2020 emissions. The BLT Companies – Yuma Concrete Plant #1 and the GCE Recycle Yard reported zero emissions and Circle K #2708475 submitted a Did Not Operate (DNO) status for 2020. The 2020 point source VOC emissions account for 0.65% of the total emissions and NO_x emissions account for 17.1% of the total emissions.

Table A-24. 2020 Point Source Emission Summary

Place ID	Point Source	Latitude	Longitude	OSD Emissions (lb/day)	
				VOC	NOx
157415	BLT Companies-Yuma-Concrete Plant #1	32.6847861	-114.570606	-	-
157418	BLT Companies-Yuma-Concrete Plant #1	32.6847861	-114.570606	-	-
150088	Encore - Paragon ET250	32.6697895	-114.598998	2.22	1.57
186480	GCE Recycle Yard	32.701183	-114.615711	-	-
492	Yuma Cogeneration Associates	32.7285539	-114.654402	6.91	257.51
2221	International Paper	32.6809083	-114.587858	33.07	29.29
9955	APS - Yucca Power Plant	32.7213	-114.7107	61.18	1,372.00
23369	Circle K #2708475	32.7128176	-114.650803	DNO	DNO
142851	Encore Consulting SVEU #2	32.7248056	-114.624083	0.40	1.34
Total Point Source Emissions				**103.78**	**1,661.71**

A7.2 2020 Nonpoint Emission Inventory Summary

ADEQ based the Yuma O_3 NA nonpoint EI on data from the 2020 NEI by source type. Table A-25 provides the emission estimates for each nonpoint source category. The nonpoint VOC emissions account for 36.2% of total emissions and 14.5% of total NO_x total emissions.

Table A-25. 2020 Nonpoint Emission Summary

Source Type	OSD Emissions (lb/day)	
	VOC	NOx
Industrial Processes	39.09	-
Miscellaneous Area Sources	487.35	92.67

Source Type	OSD Emissions (lb/day)	
	VOC	NOx
Railroad Equipment	34.14	831.93
Natural Sources - Biogenic	474.96	264.81
Solvent Utilization	3,541.45	-
Stationary Source Fuel Combustion	28.00	96.93
Storage and Transport	877.04	-
Waste Disposal, Treatment, and Recovery	272.15	123.43
Total	**5,754.19**	**1,409.77**

A7.3 2020 Mobile Emission Inventory Summary

The mobile source category consists of both on-road and non-road mobile sources. The VOC and NO_x emissions are a significant portion of the base year emission inventory. The emission results from the MOVES model are provided below.

Table A-26. 2020 On-road Mobile Emission Summary

Source	OSD Emissions (lb/day)	
	VOC	NOx
Combination Long-haul Truck	58.71	1140.9
Combination Short-haul Truck	17.64	334.27
Light Commercial Truck	394.2	274.07
Motor Home	766.98	70.68
Motorcycle	276.19	11.89
Other Buses	0.90	14.69
Passenger Car	3079.06	712.69
Passenger Truck	2558.07	1300.35
Refuse Truck	8.42	29.72
School Bus	15.86	77.43
Single Unit Long-haul Truck	14.31	11.39
Single Unit Short-haul Truck	932.1	916.03
Transit Bus	3.28	25.77
Total	**8,125.72**	**4919.88**

The on-road VOC emissions consist of 51.8% of the total emissions and NO_x emissions consist of 51.7% of the total emissions. The non-road results are as follows. The non-road VOC emissions consist of 11.3% of the total emissions and NO_x emissions consist of 16.7% of the total emissions.

Table A-27. 2020 Non-road Mobile Emission Summary

Source	OSD Emissions (lb/day)	
	VOC	NOx
Agriculture	70.37	660.34
Commercial	99.59	53.61
Construction	153.43	696.51
Industrial	7.91	63.12
Lawn/Garden	629.57	82.93
Pleasure Craft	113.95	19.86
Railroad	2.90	11.88
Recreational	714.26	31.64
Total Non-road Emissions	**1,791.98**	**1,619.88**

A7.4 2020 Base Year Emission Summary

The total emissions for 2020 are provided in Table A-28 below. The calculation methodology used to obtain these values are located in the Emission Inventory Methodology section. The most significant source of VOCs comes from nonpoint, solvent utilization and mobile, passenger cars and trucks. The most significant NO_x emissions are contributed by mobile emissions.

Table A-28. 2020 Base Year Emission Summary

Source Type	OSD Emissions (lb/day)	
	VOC	NOx
Point	103.78	1,661.71
Nonpoint	5,754.19	1,409.77
Mobile - Non-road	1,792.98	1,619.88
Mobile - On-road	8,125.72	4,919.88
Total	**15,777**	**9,611**

A8 Interim Year Emission Inventory

The following series of tables contain ADEQ's projections of VOC and NO_x emissions within the NA for the interim year of 2030. The emissions presented in this section follow the methodologies presented in section A6 marked as projected year methodologies.

A8.1 2030 Point Source Emission Inventory Summary

The point source category within the Yuma NA is projected to be conservative by using the PTE of each source.

The APS Yucca Power Plant facility PTE for VOC is 30 tons per year and for NO_x is 11,470 tons per year; however, the maximum actual annual emissions from the facility for the last 15 years is in 2018. In 2018, APS Yucca reported actual emissions of 377.88 tons of NO_x and 13.02 tons of VOC. The permitted PTE is calculated by assuming the facility would burn fuel oil at maximum capacity. However, the facility runs primarily on natural gas and burns little fuel oil each year. For the year 2018, APS Yucca utilized 99.3% of natural gas and 0.7% of fuel oil. To operate at the PTE conditions, the facility would need to change its current operation practices of running during peak power demand hours to operating at capacity, year-round, and on fuel oil. In this regard, it is necessary to accurately depict the point source emissions using the historical high actual emissions for APS Yucca.

This use of historical high actual emissions aligns with EPA's September 1992 memorandum *Procedures for Processing Requests to Redesignate Areas to Attainment.* This memorandum states "The analysis should assume that sources are operating at permitted levels (or historic peak levels) unless evidence is presented that such an assumption is unrealistic"[19]. ADEQ believes the evidence presented in this TSD supports the assumption that the use of PTE for APS Yucca is unrealistic.

The PTE for projected years, except for APS Yucca's actual emissions, are presented below for the year 2030. As a note, the 2020 point source inventory included a source titled Encore Paragon ET250. This source was a soil vapor extraction unit (SVEU) that stopped operating in September of 2020. ADEQ has confirmed that a permit no longer exists for this source. Therefore, this SVEU is not a part of the projected inventories.

[19] https://www.epa.gov/sites/default/files/2016-03/documents/calcagni_memo_-_procedures_for_processing_requests_to_redesignate_areas_to_attainment_090492.pdf

Table A-29. 2030 Point Source Emission Summary

Place ID	Point Source	OSD Emissions (lb/day)	
		VOC	NOx
157415	BLT Companies-Yuma-Concrete Plant #1	18.21	599.53
157418	BLT Companies-Yuma-Concrete Plant #1	493.15	0.02
186480	GCE Recycle Yard	32.34	1,303.83
492	Yuma Cogeneration Associates	18.21	599.53
2221	International Paper	256.88	53.32
9955	Aps - Yucca Power Plant	71.35	2,070.56
23369	Circle K #2708475	493.15	0.05
142851	Encore Consulting SVEU #2	0.40	1.34
Total Point Source Emissions		**1,383.69**	**4,628.18**

A8.2 2030 Nonpoint Emission Inventory Summary

The nonpoint emissions are projected from 2020 to 2030 generally using the population projection factor. Some sources are held constant. The summary of the 2030 nonpoint emissions are displayed in Table A-30.

Table A-30. 2030 Nonpoint Source Emission Summary

Source Type	OSD Emissions (lb/day)	
	VOC	NOx
Industrial Processes	44.49	-
Miscellaneous Area Sources	497.80	94.05
Mobile Sources	38.86	946.79
Natural Sources	474.96	264.81
Solvent Utilization	4,030.40	-
Stationary Source Fuel Combustion	31.86	110.32
Storage and Transport	998.13	-
Waste Disposal, Treatment, and Recovery	164.39	140.47
Total	**6,280.89**	**1,556.44**

A8.3 2030 Mobile Emission Inventory Summary

The projected mobile emissions follow the projection methodology described in sections A6.3.2 and A6.3.4. ADEQ expects the emissions to decrease due to federally enforceable emission reduction programs.

Table A-31. 2030 On-road Mobile Emission Summary

Source	OSD Emissions (lb/day)	
	VOC	NOx
Combination Long-haul Truck	28.09	614.28
Combination Short-haul Truck	11.13	227.89
Light Commercial Truck	237.29	103.01
Motor Home	245.54	48.74
Motorcycle	345.63	12.71
Other Buses	0.73	4.69
Passenger Car	1956.72	240.61
Passenger Truck	1173.0	372.39
Refuse Truck	1.1	21.22
School Bus	4.1	32.65
Single Unit Long-haul Truck	7.39	6.86
Single Unit Short-haul Truck	448.97	802.95
Transit Bus	2.47	9.38
Total	**4,462.16**	**2,497.38**

Table A-32. 2030 Non-road Mobile Emission Summary

Source	OSD Emissions (lb/day)	
	VOC	NOx
Agriculture	34.74	317.16
Commercial	136.43	51.04
Construction	107.83	326.74
Industrial	11.35	96.66
Lawn/Garden	670.97	77.22
Pleasure Craft	70.36	18.53
Railroad	1.91	5.80
Recreational	686.80	30.16
Total	**1,720.39**	**923.31**

A8.4 2030 Interim Year Emission Summary

The cumulation of the interim year emissions inventory is presented in Table A-33.

Table A-33. 2030 Interim Year Emission Summary

Source Type	OSD Emissions (lb/day)	
	VOC	NOx
Point	1,383.69	4,628.18
Nonpoint	6,280.89	1,556.44
Mobile – Non-road	1,720.39	923.31
Mobile – On-road	4,462.16	2,497.38
Total	**13,847**	**9,605**

A9 Final Maintenance Year Emission Inventory

The final maintenance year is presented in the following summary sections. The methodology for projected years remains the same as the interim year, with a larger population projection factor and projected VMT and vehicle population inputs for the mobile on-road source sector.

A9.1 2037 Point Source Emission Inventory Summary

The 2037 point source emission inventory remains the same as the interim year's point source emissions due to the use of PTE emissions.

Table A-34. 2037 Point Source Emissions Summary

Place ID	Point Source	OSD Emissions (lb/day)	
		VOC	NOx
157415	BLT Companies-Yuma-Concrete Plant #1	18.21	599.53
157418	BLT Companies-Yuma-Concrete Plant #1	493.15	0.02
186480	GCE Recycle Yard	32.34	1,303.83
492	Yuma Cogeneration Associates	18.21	599.53
2221	International Paper	256.88	53.32
9955	Aps - Yucca Power Plant	71.35	2,070.56
23369	Circle K #2708475	493.15	0.05
142851	Encore Consulting SVEU #2	0.40	1.34
Total Point Source Emissions		**1,383.69**	**4,628.18**

A9.2 2037 Nonpoint Emission Inventory Summary

Table A-35 depicts the nonpoint emission inventory summary for the Yuma O_3 NA. The areas which are held constant in the interim year are also held constant in the final maintenance year.

Table A-35. 2037 Nonpoint Source Emissions Summary

Source Type	OSD Emissions lb/day	
	VOC	NOx
Industrial Processes	48.333	-
Miscellaneous Area Sources	498.551	94.302
Mobile Sources	42.214	1,028.549
Natural Sources	474.955	264.809
Solvent Utilization	4,378.448	-
Stationary Source Fuel Combustion	34.616	119.841
Storage and Transport	1,084.323	-

Source Type	OSD Emissions lb/day	
	VOC	NOx
Waste Disposal, Treatment, and Recovery	176.614	152.604
Total	6,738.055	1,660.104

A9.3 2037 Mobile Emission Inventory Summary

The mobile emission inventory for the final maintenance year are presented in Table A-36 and Table A-37.

Table A-36. 2037 On-road Mobile Emission Summary

Source	OSD Emissions (lb/day)	
	VOC	NOx
Combination Long-haul Truck	23.23	550.88
Combination Short-haul Truck	10.37	225.2
Light Commercial Truck	217.13	64.94
Motor Home	189.4	46.17
Motorcycle	363.39	13.16
Other Buses	0.61	2.76
Passenger Car	1643.01	136.36
Passenger Truck	931.39	193.16
Refuse Truck	1.11	22.65
School Bus	2.52	25.33
Single Unit Long-haul Truck	6.54	6.21
Single Unit Short-haul Truck	447.13	877.92
Transit Bus	2.52	8.92
Total	**3,838.35**	**2,173.66**

Table A-37. 2037 Non-road Mobile Emission Summary

Source	OSD Emissions (lb/day)	
	VOC	NOx
Agriculture	21.46	179.22
Commercial	171.93	57.23
Construction	101.69	281.98
Industrial	16.02	136.89
Lawn/Garden	681.68	75.31
Pleasure Craft	63.12	18.60

Source	OSD Emissions (lb/day)	
	VOC	NOx
Railroad	1.57	3.46
Recreational	696.11	29.39
Total	**1,753.58**	**782.09**

A9.4 2037 Final Maintenance Emission Inventory Summary

The cumulation of the interim year emissions inventory is presented in Table A-38.

Table A-38. 2037 Final Maintenance Emission Inventory Summary

Source Type	OSD Emissions (lb/day)	
	VOC	NOx
Point	1,383.69	4,628.18
Nonpoint	6,738.06	1,660.1
Mobile – Non-road	1,753.58	782.09
Mobile – On-road	3,838.35	2,173.66
Total	**13,714**	**9,244**

A10 Emission Inventory Conclusion

Based on EPA's September 1992 memorandum *Procedures for Processing Requests to Redesignate Areas to Attainment,* for O_3 nonattainment areas, the inventory should be based on actual "typical summer day" emissions of O_3 precursors during the attainment year[20]. To align with this EPA guidance document, ADEQ has constructed the inventories discussed throughout this TSD based on an OSD in the NA. This section summarizes the results and trends in these OSD emissions.

A10.1 Ozone Season Day Comparison

Table A-39 and Table A-40 below provide NO_x and VOC OSD totals by both source category and inventory year. OSD VOC and NO_x emissions experience a reduction of 13.5% and 4% between the attainment and final maintenance years, respectively. Given the 2020 ozone DV was below the NAAQS, and the final maintenance year emissions are less than the 2020 attainment year emissions, ADEQ is projecting that the Yuma NA will show maintenance in the final maintenance year of the first maintenance period.

Table A-39. Ozone Season Day VOC Emissions Inventory Summary

Source Type	OSD VOC Emissions (lb/d)		
	2020	2030	2037
Point	103.78	1,383.69	1,383.69
Nonpoint	5,754.19	6,280.89	6,738.06
Mobile – Non-road	1,791.98	1,720.39	1,753.58
Mobile – On-road	8,125.72	4,462.16	3,838.35
Total	**15,777**	**13,847**	**13,714**

Table A-40. Ozone Season Day NO_x Emissions Inventory Summary

Source Type	OSD NO_x Emissions (lb/d)		
	2020	2030	2037
Point	1,661.71	4,628.18	4,628.18
Nonpoint	1,409.77	1,556.44	1,660.1
Mobile – Non-road	1,619.88	923.31	782.09
Mobile – On-road	4,919.88	2,497.38	2,173.66
Total	**9,611**	**9,605**	**9,244**

[20] https://www.epa.gov/sites/default/files/2016-03/documents/calcagni_memo_-_procedures_for_processing_requests_to_redesignate_areas_to_attainment_090492.pdf

A10.1.1 Motor Vehicle Emissions Budget

A10.1.1.1 Overview

A MVEB is the portion of the total allowable emissions in the SIP that is allocated to onroad mobile sources, such as cars, trucks, and buses. It is the level of onroad emissions that the area can have and still meet the SIP's goals. Budgets are established in the applicable SIP as part of the air quality planning process.

In order to demonstrate transportation conformity, projected emissions from highway and public transportation use must be less than or equal to the approved budgets. In other words, the budget acts as a ceiling on emissions from the onroad transportation sector. Transportation conformity must be demonstrated regularly as a part of the approval of a region's Transportation Improvement Program and Regional Transportation Plan. The MVEB cannot be exceeded, so care must be taken to develop an adequate MVEB for an area.[21]

A10.1.1.2 Methodology

The basis of the MVEB is the onroad EI developed using the methodology discussed in Section A6.3. For more detailed information on ADEQ's methodology, please review this section. In summary, ADEQ coordinated with YMPO to use as many local inputs as possible, which originated from YMPO's most recent travel demand modeling, to develop the attainment, interim, and final maintenance year onroad mobile emissions. The specific, and most influential in the model, local inputs ADEQ used in its MOVES modeling were daily VMT and vehicle population.

A10.1.1.3 Motor Vehicle Emission Budgets

To address the uncertainty of projecting future emissions, the MVEB was developed by adding a safety margin to the onroad inventory projections. EPA has indicated that safety margins are allowed, if maintenance can be modeled with the increased emissions. Since maintenance can be demonstrated with the increased onroad mobile source emissions, the 2030 and 2037 MVEBs incorporate a safety margin.

Similar to the approach that the Maricopa Association of Governments (MAG) utilized for their 8-hour Ozone Redesignation Request and Maintenance Plan MVEB[22], an additional ten percent of the projected onroad emissions from 2030 was added to the 2030 MVEB. This safety margin will account for potential changes to the modeled transportation network, the evolution of regional policy and economic conditions over time, as well as, any uncertainty associated with the MOVES model itself. The same methodology was applied to the 2037 MVEB.

[21] Washington State Department of Ecology, Appendix C. Motor Vehicle Emissions Budget Methodology
[22] Maricopa Association of Governments, MAG Eight-Hour Ozone Redesignation Request and Maintenance Plan for The Maricopa Nonattainment Area

Table A-41 and Table A-42 summarize the MVEBs for 2030 and 2037 for VOC and NO_x. These values represent the maximum pounds per day of emissions that will be allowed from onroad mobile sources.

Table A-41: 2030 Onroad Motor Vehicle Emission Budget (Pounds per Ozone Season Day)

Item	VOC (lb/d)	NO_x (lb/d)
Onroad Emission Inventory	4,462	2,497
MVEB 10% Safety Margin	446	250
2030 MVEB	**4,908**	**2,747**

Table A-42: 2037 Onroad NO_x Motor Vehicle Emission Budgets (Pounds per Ozone Season Day)

Item	VOC (lb/d)	NO_x (lb/d)
Onroad Emission Inventory	3,838	2,173
MVEB 10% Safety Margin	384	217
2037 MVEB	**4,222**	**2,390**

A11 Closing Remarks

To recap, Yuma was designated as a marginal nonattainment area for the 2015 ozone NAAQS by the EPA effective August 3, 2018[23]. Given this, ADEQ has prepared a SIP revision demonstrating maintenance of the 2015 ozone NAAQS. ADEQ developed this TSD as a supplement to the SIP to inform stakeholders about the following:

- The local geography in the Yuma Ozone NA
- The meteorological conditions in the Yuma Ozone NA
- The ambient air quality issues in the Yuma Ozone NA
- The effect meteorology has on ambient air quality
- The major sources of ozone precursors in the Yuma Ozone NA
- ADEQ's projection of ozone precursors in the interim and the final year of the maintenance period.
- ADEQ's Ozone Season Day Inventory for the Yuma Ozone NA

[23] Federal Register, Vol. 83, No. 107, June 4, 2018

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ADEQ Arizona Department of Environmental Quality

Memorandum

Date: October 12, 2023
To: Yuma MVEB Stakeholder Group
From: Kamran Khan, Environmental Engineering Specialist
Subject: Yuma Ozone Motor Vehicle Emission Budget

Overview

A motor vehicle emissions budget (MVEB) is the portion of the total allowable emissions in the SIP that is allocated to onroad mobile sources, such as cars, trucks, and buses. It is the level of onroad emissions that the area can have and still meet the SIP's goals. Budgets are established in the applicable SIP as part of the air quality planning process.

In order to demonstrate transportation conformity, projected emissions from highway and public transportation use must be less than or equal to the approved budgets. In other words, the budget acts as a ceiling on emissions from the onroad transportation sector. Transportation conformity must be demonstrated regularly as a part of the approval of a region's Transportation Improvement Program and Regional Transportation Plan. The MVEB cannot be exceeded, so care must be taken to develop an adequate MVEB for an area.[1]

Onroad Base Year Emissions Inventory

The emissions inventory was developed using MOVES3.1 (MOVES) in county scale mode to determine the O_3 precursor emissions, volatile organic compounds (VOC) and nitrogen oxides (NO_x), for onroad emissions. Table 1 on the following page presents the MOVES runspec parameters utilized for the MVEB development. In order to run MOVES in this configuration, the modeler must provide local inputs. To source these local inputs the Arizona Department of Environmental Quality (ADEQ) coordinated with the Yuma Metropolitan Planning Organization (YMPO).

In July of 2021 YMPO published its Long-Range Transportation Plan[2], which included an Air Quality Conformity Analysis[3]. For this conformity analysis, YMPO's modeling contractors performed MOVES modeling to quantify NO_x and VOC emissions in the nonattainment area for years 2017 (baseline year[4]), 2022, 2025, 2035, and 2045. In order for the MVEB to be consistent with YMPO's current Long-Range Transportation Plan, ADEQ sourced the MOVES local inputs from YMPO's 2021 conformity analysis.

[1] Washington State Department of Ecology, Appendix C. Motor Vehicle Emissions Budget Methodology

[2] https://ympo.org/docs/YMPO_2022-2045_Final_LRTP.pdf

[3] https://ympo.org/docs/YMPO_AirQualityConformityReportFinal.pdf

[4] The baseline year is defined as the most recent year for which EPA's Air Emissions Reporting Rule requires submission of on-road mobile source emissions inventories as of the effective date of designation, which is 2017 for the 2015 8-hour ozone NAAQS.

Given the years in YMPO's 2021 conformity analysis do not align with the inventory years of ADEQ's Yuma O_3 redesignation request (2020, 2030, and 2037), ADEQ staff applied interpolation techniques to YMPO's vehicle miles traveled (VMT) and source type population MOVES inputs. The original inputs supplied by YMPO, which included additional years not found in the final 2021 conformity analysis report, and the interpolated values used in the MVEB modeling are given in Tables 2 - 5.

Table 1: MVEB MOVES Runspec Parameters

Runspec Parameter	Details
Scale	On road, County, Inventory
Time Span	Years: 2020, 2030, 2037 Months: July Hours: 00:00 – 00:59, 23:00 – 23:59 Days: Weekdays
Geographic Bounds	Arizona – Yuma County
Vehicles/Equipment	All fuel types All source types
Road Type	All road types including off-network
Pollutants and Processes	NO_x, VOCs, Non-Methane Hydrocarbons, Total Gaseous Hydrocarbons
General Output	Grams, Joules, Miles
Output Emissions	24-Hour Day, County
Advanced Features	None

Table 2: YMPO Air Quality Conformity Analysis Vehicle Miles Traveled

Year	HPMS Vehicle Type Daily VMT				
	10	25	40	50	60
2017	7,761	1,111,978	6,205	38,460	113,559
2022	8,317	1,191,635	6,649	41,215	121,694
2025	8,511	1,219,439	6,804	42,177	124,534
2035	9,109	1,305,152	7,283	45,142	133,287
2045	9,709	1,391,091	7,762	48,114	142,064

Table 3: MVEB Vehicle Miles Traveled

Year	HPMS Vehicle Type Daily VMT				
	10	25	40	50	60
2020	8,095	1,159,772	6,471	40,113	118,440
2030	8,834	1,265,778	7,063	43,780	129,266
2037	9,229	1,322,294	7,378	45,735	135,038

Table 4: YMPO Air Quality Conformity Analysis MOVES Source Type Population

Year	MOVES Source Type Population												
	11	21	31	32	41	42	43	51	52	53	54	61	62
2017	5,966	74,197	50,099	12,666	29	108	972	1,060	34,961	1,482	8,820	1,814	2,044
2025	7,129	91,197	61,545	15,621	35	129	1,153	1,322	43,289	1,842	10,941	2,687	3,157
2035	8,690	111,169	75,024	19,042	42	157	1,405	1,612	52,768	2,246	13,337	3,275	3,848
2045	10,440	133,554	90,130	22,876	51	188	1,688	1,937	63,394	2,698	16,022	3,934	4,623

Table 5: MVEB MOVES Source Type Population

Year	MOVES Source Type Population												
	11	21	31	32	41	42	43	51	52	53	54	61	62
2020	6,402	80,572	54,392	13,774	31	116	1,040	1,158	38,084	1,617	9,615	2,141	2,461
2030	7,909	101,183	68,284	17,331	38	143	1,279	1,467	48,029	2,044	12,139	2,981	3,502
2037	9,040	115,646	78,045	19,809	44	163	1,462	1,677	54,894	2,336	13,874	3,407	4,003

In addition to vehicle population and vehicle miles traveled, ADEQ also utilized YMPO's "HourVMTFraction" inputs, which allocate the VMTs in Tables 2 and 3 to each hour in the run. The remaining MOVES inputs were sourced from EPA's 2020 NEI Yuma County data manager inputs, MOVES defaults, or developed using EPA tools. A summary of each MOVES input is provided in Table 6 below.

Table 6: MOVES Input Summary

MOVES Input Table	Source
HPMSVtypeDay	Interpolated YMPO Input
SourceTypeYear	Interpolated YMPO Input
HourVMTFraction	YMPO Input
RoadTypeDistribution	2020 NEI
SourceTypeAgeDistribution	2020 NEI and projected to future years using EPA's age distribution projection tool
AverageSpeedDistribution	2020 NEI
ZoneMonthHour (Meteorology)	2020 NEI
FuelSupply	MOVES Defaults
FuelFormulation	MOVES Defaults
FuelUsageFraction	MOVES Defaults
AVFT	MOVES Defaults

Further, Table 7 summarizes the processes selected within MOVES for the model runs. The emission totals found in Tables 8 and 9 are a summation of emissions produced by the processes shown on the following page.

Table 7: Selected Processes for MOVES Runs

Process	VOC	NO_x
Running Exhaust	X	X
Crankcase Running Exhaust	X	X
Brakewear		
Tirewear		
Start Exhaust	X	X
Crankcase Start Exhaust	X	X
Extended Idle Exhaust	X	X
Crankcase Extended Idle Exhaust	X	X
Auxiliary Power Exhaust	X	X
Evap Permeation	X	
Evap Fuel Vapor Venting	X	
Evap Fuel Leaks	X	
Refueling Displacement Vapor Loss	X	
Refueling Spillage Loss	X	

Onroad Projected Years Emission Inventory

The projected onroad emissions, below in Table 8 and Table 9, utilized the 2020 CDM inputs with three changes. The inputs that were altered were the HPMSVtypeDay, SourceTypeYear, and the SourceTypeAgeDistribution. The future year (2030 and 2037) HPMSVtypeDay and SourceTypeYear inputs were sourced from the interpolated YMPO inputs.

Additionally, the SourceTypeAgeDistribution age fraction is projected by utilizing the EPA's Age Distribution Projection Tool for MOVES. The completed projected inputs are run in MOVES under the same runspec settings as base year model.

Motor Vehicle Emission Budgets

To address the uncertainty of projecting future emissions, the MVEB was developed by adding a safety margin to the onroad inventory projections. EPA has indicated that safety margins are allowed, if maintenance can be modeled with the increased emissions. Since maintenance can be demonstrated with the increased onroad mobile source emissions, the 2030 and 2037 MVEBs incorporate a safety margin.

Similar to the approach that the Maricopa Association of Governments (MAG) utilized for their 8-hour Ozone Redesignation Request and Maintenance Plan MVEB[5], an additional ten percent of the projected onroad emissions from 2030 was added to the 2030 MVEB. This safety margin will account for potential changes to the modeled transportation network, the evolution of regional

[5] Maricopa Association of Governments, MAG Eight-Hour Ozone Redesignation Request and Maintenance Plan for The Maricopa Nonattainment Area

policy and economic conditions over time, as well as, any uncertainty associated with the MOVES model itself. The same methodology was applied to the 2037 MVEB.

Table 8 and Table 9 summarize the MVEBs for 2030 and 2037 for VOC and NO_x. These values represent the maximum pounds per day of emissions that will be allowed from onroad mobile sources.

Table 8: 2030 Onroad Motor Vehicle Emission Budget (Pounds per Ozone Season Day)

Item	VOC	NO_x
Onroad Emission Inventory	4,462	2,497
MVEB 10% Safety Margin	446	250
2030 MVEB	**4,908**	**2,747**

Table 9: 2037 Onroad NO_x Motor Vehicle Emission Budgets (Pounds per Ozone Season Day)

Item	VOC	NO_x
Onroad Emission Inventory	3,838	2,173
MVEB 10% Safety Margin	384	217
2037 MVEB	**4,222**	**2,390**

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Appendix B: Procedural Requirements and Authority – SIP

Exhibit B-I: Delegation of Authority

Exhibit B-II: Authorizing Statutes

Exhibit B-III: Public Notice and Affidavit of Publication

Exhibit B-IV: Public Hearing Agenda

Exhibit B-V: Public Hearing Sign-in Sheet

Exhibit B-VI: Public Hearing Officer Certification

Exhibit B-VII: Public Hearing Transcript

Exhibit B-VIII: Compilation of Comments and State Responses

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