YUMA METROPOLITAN PLANNING ORGANIZATION

2022-2045 LONG-RANGE TRANSPORTATION PLAN UPDATE

2022-2026 TRANSPORTATION IMPROVEMENT PROGRAM

Air Quality Conformity

Conformity Documentation

DRAFT FINAL REPORT

July 2021

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1. INTRODUCTION

Air pollution from mobile sources has been identified as an important national health concern. Recognizing this connection, the 1990 Clean Air Act Amendments (CAAA90) and the Arizona Transportation Conformity Rules require transportation improvement plans, programs, and projects to conform to the purpose of the Arizona State Implementation Plan (SIP). Conformity to a SIP means that planned transportation activities will not produce new air quality violations, exacerbate existing violations, or delay timely attainment of the national ambient air quality standards (NAAQS).

The Yuma Metropolitan Planning Organization (YMPO) has the responsibility to ensure that the transportation plans and programs within the YMPO planning boundaries, generally the greater Yuma area, conform to the state and national air quality plans and standards. Specifically, the emissions generated from proposed projects in the YMPO's Transportation Improvement Program (TIP) for 2022-2026 and the Long-Range Transportation Plan (LRTP) for 2022-2045 must be consistent with and conform to the NAAQS.

The YMPO is required to undertake an air quality conformity analysis for two specific reasons:

- To ensure that transportation investments (projects), strategies and programs, taken as a whole, have air quality impacts consistent with and conforming to state and national air quality plans and standards.
- To ensure that neither the transportation system as a whole nor individual transportation projects cause new air quality violations or worsen existing conditions.

The air quality conformity process establishes the connection between transportation planning and emission reductions from transportation sources and is intended to ensure that integrated transportation and air quality planning occurs in areas designated as Nonattainment or Maintenance Areas by the United States Environmental Protection Agency (EPA). A regional emissions analysis must be conducted to assess the impacts that transportation projects will have on emissions within an air quality planning area.

A Nonattainment Area (NAA) is an area that has violated one or more of the NAAQS. Yuma County comprises the southernmost part of the Colorado River Valley. The City of Yuma, the county seat, is located just south of the confluence of the Colorado and Gila Rivers. A portion of the greater Yuma area is currently designated as a Moderate NAA for the 1987 Particulate Matter Standard for particulate matter less than 10 µm in aerodynamic diameter (PM10). Another area is designated as a NAA (Marginal) for the 2015 8-hour Ozone Standard.

PM10 Nonattainment Area

Yuma is a Moderate NAA for PM10 (particulate matter as a mix of solid and liquid droplets 10 micrometers or less in aerodynamic diameter). The Yuma area was designated as Moderate NAA for PM10 on November 6th, 1991 (56 FR 56694) but EPA promulgated a Clean Data Finding for 1998-2001 and subsequent years on March 14, 2006 (71 FR 13021; effective May 16, 2006). A request for redesignation to attainment status and a related Maintenance Plan were submitted to EPA on August 17, 2006 and the EPA did not take formal action on the plan. Unfortunately, the NAA has recorded PM10 that exceed the NAAQS once again. EPA, state representatives, and the YMPO are currently developing plans for future actions.

The PM10 Moderate NAA is geographically located in the far southwest portion of the Lower Colorado River Valley as shown in **Figure 1**. The blue area in Figure 1 represents the YMPO Regional Travel Demand Model Boundary and the hatched area is the NAA. The red hatched area represents the designated PM10 NAA. There is a portion of the PM10 NAA that is outside of the travel demand model boundary. This area is Federal Land and there are no regionally significant roads in the area that should be included in the travel demand model. The PM10 NAA contains a total of 16 full and partial townships comprising approximately 456 square miles or 300,000 acres.

Ozone Nonattainment Area

A small portion of the Yuma area was designated as Marginal NAA for the 2015 8-hour ozone standard on June 4th, 2018 (83 FR 25786). The portion of Yuma that is in nonattainment for ozone is shown in **Figure 2** and is approximately 46,700 acres.

Figure 1. 2022-2045 PM10 Nonattainment Area and YMPO Long-Range Transportation Plan Model Boundary

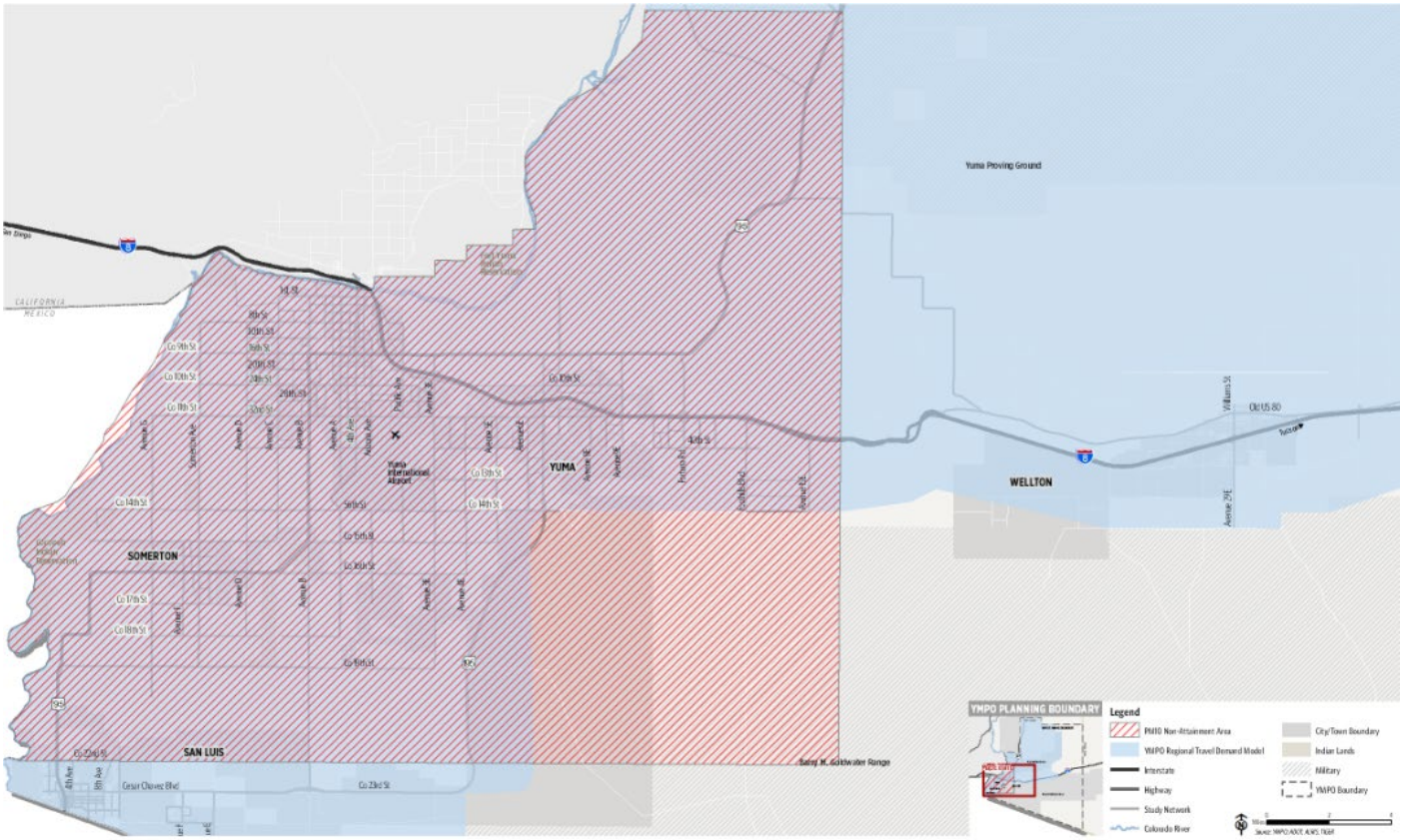
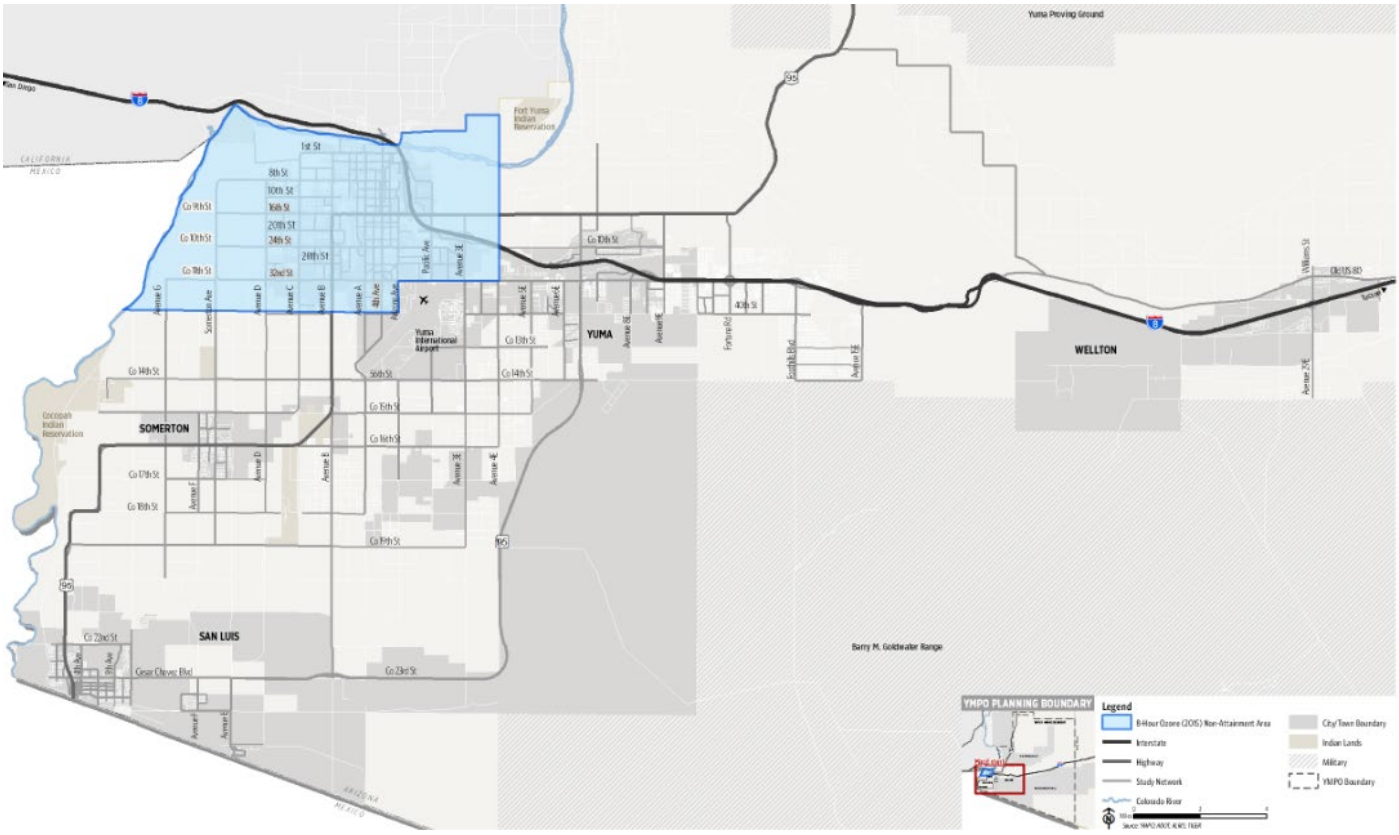


Figure 2. 2015 Ozone Nonattainment Area Boundary



2. CONFORMITY OVERVIEW

The purpose of this conformity analysis is to demonstrate that the Yuma nonattainment area supports the implementation of the financially constrained YMPO Long-Range Transportation Plan (LRTP) 2022-2045 by contributing to improved air quality and will therefore not jeopardize the Yuma region's attainment of the annual PM10 and 2015 8- hour Ozone NAAQS. The conformity determination has been performed according to procedures prescribed by the following federal, state and local regulations: 69 FR 40004, 40 CFR Parts 51 and 93 (i.e. Transportation Conformity Rule Requirements); Arizona transportation conformity rules; and Metropolitan Planning Organization (MPO) Planning Regulations (23 CFR 450) implementing FAST Act and MAP-21 requirements. Results of this conformity determination are included in this report. Conformance of the long-range transportation plan requires the YMPO and ADOT to demonstrate that the applicable criteria and procedures have been satisfied (section §93.109-a). The following criteria for nonattainment areas are found to be applicable and are described as:

1. The TIP and LRTP must pass an emissions budget test with a budget that has been found to be adequate by EPA for transportation conformity purposes, or an emission reduction test.
2. The conformity determinations must be based upon the most recent planning assumptions.
3. The conformity determinations must be based upon the latest emission estimation model available.
4. MPOs and state departments of transportation must provide reasonable opportunity for consultation with state air agencies, local air quality and transportation agencies, DOT, and the EPA.
5. Timely implementation of Transportation Control Measures (TCMs) in the applicable State Implementation Plan (SIP) must be provided for.
6. The conformity determination must comply with FAST Act, MAP-21, and MPO Planning Regulations.

This report documents the process used by the Yuma MPO for the Conformity Determination for the YMPO LRTP 2022-2045. EPA's MOVES3.0.1 model was used to estimate emissions as required by the EPA[1,2]. This conformity determination serves as an update to the YMPO's most recent conformity finding in November 2019. The MOVES input files were created and modified as discussed in the interagency consultation process, with general assumptions and methodology outlined in this chapter. The modeled emissions are based on a number of inputs including temperature, relative humidity, no inspection and maintenance program, vehicle source type mix, vehicle age distribution, average daily vehicle miles traveled (VMT), source type populations, hourly distribution, road type distribution, and average speed distributions.

Latest Planning Assumptions

The 2022 - 2045 LRTP provides the appropriate level of detail required by 40 CFR 93.106 of the conformity regulations. The highway projects in the 2022 - 2045 LRTP are financially constrained for the entire plan and for each horizon year in terms of capital, operations, and maintenance costs (See LRTP Chapter 9). The conformity analysis is based on assumptions derived from estimates of current and future population, employment, travel, and congestion. As part of the 2022 - 2045 LRTP conformity determination, past assumptions have been discussed with various local, state, and federal agencies for their continued validity and updated whenever necessary. The greatest change has been the use of MOVES3.0.1 and detailed travel demand modeling. Other planning assumptions are presented in this document.

Latest Emissions Estimation Model

Mobile source emissions estimate for an average day (assumed for this analysis to occur in the month of April for PM10 and July for Ozone) are used to represent annual conditions. Emission estimates were developed using EPA's Motor Vehicle Emission Simulator, MOVES3.0.1 (March, 2021Technical Update), and travel estimates using the Yuma MPO Travel Demand Model. The same assumptions for vehicle mix, and traffic distributions were

[1] Policy Guidance on the Use of MOVES3 for State Implementation Plan Development, Transportation Conformity, and Other Purposes, November 2020, EPA-420-B-20-044.
[2] MOVES3 Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity, November 2020, EPA-420-B-20-052.

used as in the previous modeling. This was based on information from the Yuma MPO, the Arizona Department of Transportation (ADOT), Arizona Department of Environmental Quality (ADEQ), and the Federal Highway Administration (FHWA). The EPA's AP-42 guidance (https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-compilation-air-emission-factors) as well as the region's previous conformity finding were referenced to calculate road dust emissions.

Travel Demand Modeling

The YMPO Travel Demand Model is the most recent and approved regional travel demand model for the study area. The travel demand model boundary was previously shown in **Figure 1**. Although model approval is a joint process between the MPO and the appropriate state review agencies, the ADOT is the primary agency responsible for approval of the travel demand model for use in developing the Long-Range Transportation Plan (LRTP) and other planning activities of the Yuma MPO.

The YMPO Travel Demand Model is a traditional four-step model. Trip generation, trip distribution, mode choice, and trip assignment components are included in the model. The base year of the travel demand model is 2019. Traffic count data provided by Arizona Department of Transportation from their Transportation Data Management System for the year 2019 and YMPO 2019 counts were used to validate the travel demand model. Trip making characteristics, such as trip generation, average trip lengths, and travel mode were obtained from the 2001 National Household Travel Survey. A transit trip matrix estimated from the Yuma County Intergovernmental Public Transportation Agency (YCAT) in 2012 was used in the mode choice component of the travel demand model. These travel surveys appear to remain adequate based on comparison of available travel data in the region. Appendix E of the current LRTP contains the assumptions and methodology used to develop the travel demand model.

Interagency Consultation and Public Participation

Interagency consultation is the central coordinating mechanism for public agency involvement and input to the conformity determination. The conformity determination must be made according to 40 CFR §93.105-(a)(2) and (e) and the requirements of 23 CFR 450 (40 CFR §93.112, Criteria and Procedures). The Yuma MPO coordinated its activities for this conformity determination with numerous stakeholders and review agencies, including ADOT, ADEQ, FHWA, EPA, and other necessary agencies. The Yuma MPO has held teleconference calls and email correspondence to discuss the issues pertinent to the YMPO Conformity Demonstration, such as use of the latest planning assumptions.

The Yuma MPO's Public Participation Plan, adopted in 2017, specifies procedures to ensure public involvement in the planning process. All Executive Board meetings are open to the public for comments on any item. The public was notified of the opportunities to comment on this conformity demonstration. Comments received from the public, committee members, and review agencies were addressed appropriately. Specific information related to the public participation process for development of the LRTP is provided in Chapter 7 of the LRTP document.

Exempt Projects

The YMPO's Plan and Program include the following exempt projects by category: Safety Improvements; Traffic Control Devices; Pavement Preservation; Sweeping Paved Surfaces; Watering Canal Maintenance/service Roads; Lighting Improvements; Purchase of Federal Transit Administration (FTA) Section 5310 paratransit vans, Section 5307 public transportation vehicles; Bicycle and Pedestrian Facilities; and Planning, Engineering, and Environmental studies. All projects in the YMPO area are from a conforming Plan and conforming Program, as determined by YMPO in the LRTP. There are no projects with PM10 construction impacts and, at the same time, where the Yuma PM10 SIP also identifies construction-related fugitive PM10 as a contributor to nonattainment.

Conformity Test

The conformity tests specified in the federal transportation conformity rule are: (1) the emissions budget test, and (2) the interim emissions test. For the emissions budget test, predicted emissions for the TIP/LRTP must be less than or equal to the motor vehicle emissions budget (MVEB) specified in the approved air quality implementation plan or the emissions budget found to be adequate for transportation conformity purposes. If there is no approved air quality plan for a pollutant for which the region is in nonattainment or no emission

budget has been found to be adequate for transportation conformity purposes, the emissions reduction test applies.

The Build/No Build Test was applied to transportation projects in the Yuma PM10 nonattainment area until 2007. EPA found that the MVEB for PM10 in the 2006 Yuma PM10 Maintenance Plan is adequate for transportation conformity purposes, effective June 27, 2007 (72 FR 32295). As a result of EPA's adequacy finding, the applicable emissions budget for the YMPO nonattainment conformity determinations are 10,803 tons per year (tpy) for 2006 and all years thereafter.

No budgets are currently established for the Yuma 2015 ozone nonattainment area. Since a budget has not been set for ozone, the baseline year test was used to demonstrate conformity. 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.

3. METHODOLOGY

The emissions inventory development and emissions projection discussion below identify procedures used by the Yuma MPO to obtain emissions for the PM10 and ozone nonattainment area. Protocol was maintained from previous reporting with the exception being the use of the latest MOVES model, MOVES3.0.1. Modeling was discussed during the interagency consultation coordination outlining the model assumptions and data sources. The protocol report outlines the approach taken for data sources for the conformity demonstration.

Mobile Source Emissions

Tables 1 and **2** summarize the settings used in the MOVES run specification file for the analysis of PM10 and ozone, respectively.

Table 1. PM10 MOVES Runspec Parameters

RUNSPEC PARAMETER	*DETAILS*
MOVES3.0.1 Version	Latest MOVES model, downloaded July, 2021. Includes the MOVES3 data base and patch installed in March, 2021 (MOVES3.0.1)
Scale	County, Inventory
Time Span	Years 2022, 2025, 2035, 2045 Time aggregation: Hour - 1 month representing average annual conditions (April) All hours of the day selected Weekdays only
Geographic Bounds	Arizona- Yuma County
Vehicles/Equipment	All available fuel types All available source types
Road Type	All road types including off-network
Pollutants and Processes	PM_{10}: Primary Exhaust Brake wear, Tire wear $PM_{2.5}$: Primary Exhaust, Species, Brake wear, Tire wear Total Gaseous Hydrocarbons (required for model run) All Processes
General Output	Units: grams, joules, miles Activity: Distance Traveled, Population
Output Emissions	Time = hour, location = county
Advanced Features	none

Table 2. Ozone MOVES Runspec Parameters

RUNSPEC PARAMETER	DETAILS
MOVES3.0.1 Version	Latest MOVES model, downloaded July, 2021. Includes the MOVES3 data base and patch installed in March, 2021 (MOVES3.0.1)
Time Span	Years 2022, 2025, 2035, 2045. Time aggregation: Hour - 1 month representing average annual conditions (July) All hours of the day selected Weekdays only
Geographic Bounds	Arizona- Yuma County
Vehicles/Equipment	All available fuel types All available source types
Road Type	All road types including off-network
Pollutants and Processes	Oxides of Nitrogen (NOx), Volatile Organic Compounds (VOCs), Total Gaseous Hydrocarbons, All Processes
General Output	Units: grams, joules, miles Activity: Distance Traveled, Population
Output Emissions	Time = hour, location = county
Advanced Features	none

Once the base parameters were established for a given MOVES Runspec (the compiled input file) the County Data Manager was used to enter locally specific data. Input provided in Excel spreadsheet format can be referenced using this tool, which converts the data to MySQL format and incorporates it into the MOVES analysis. For this analysis, locally specific data consisted of data used for the entire region, statewide, or county-level data. **Table 3** lists the assumptions used in the MOVES County Data Manager. Default data refers to data extracted from the most up to date available MOVES program (MOVES3.0.1) for each scenario being modeled. **Table 4** summarizes the Daily VMT for PM10 and ozone.

Table 3. MOVES County Data Manager Parameters

COUNTY DATA MANAGER INPUT	DATA SOURCE
Age Distribution	For continuity, previous age distributions based on the July 2019 vehicle registration data for the Yuma area were used. This data was previously obtained from the Motor Vehicle Data (MVD) reports and furnished by ADOT. This was formatted for use in a spreadsheet required by MOVES3 as an input. The same age distribution was used for all analysis years.
Source Type Population	Again, continuity was a desirable outcome and the source type population data was linearly interpolated from the previous year that used the Yuma area from MVD reports furnished by ADOT. This was based on the year 2017 and future growth years rates as determined by the YMPO Travel Demand Model. This information was formatted into spreadsheets as required for the MOVES3 input.
Meteorology Data	Each year and specific months were determined using the MOVES3 default approach.
I/M Program	No I/M program information was applied.
Vehicle Type VMT (HPMS)	Daily VMT is from the YMPO Travel Demand Model. The base year was 2019 and used for validation. The HPMS data are specific to each NAA and are unique for the ozone and PM_{10} NAA.
Hourly VMT Fraction	Based again on previous analysis to allow consistency, hourly VMT fractions were based on the December 2017approved air quality analysis as obtained from ADOT. The fractions were maintained for all analysis years.
Fuels	Each year and specific months were determined using the MOVES3 default approach for Yuma County.
Road Type Distribution	Again, for consistency, previous modeling protocols were followed and the December 2017 approved air quality analysis from ADOT was used for all analysis years.
Average Speed Distribution	Default information was used and was consistent with previous analyses.

Table 4. Source Population and Daily VMT by Analysis Year and Nonattainment Area

	Analysis Year			
	2022	**2025**	**2035**	**2045**
Daily VMT PM_{10}	3,099,370	3,220,932	3,594,860	3,969,811
Daily VMT Ozone	1,369,511	1,401,465	1,499,972	1,598,740

4. PM_{10} ANALYSIS

The following sections outline the analysis components and results of the PM_{10} conformity demonstration.

Paved and Unpaved Road Dust

The primary contributor to PM_{10} emissions in the Yuma PM_{10} NAA is road dust from paved and unpaved roads. Emissions for road dust are calculated using the method provided in AP-42[3], *Compilation of Air Pollutant Emission Factors.* The method provide has used since 1972 as the preferred method. AP-42, currently in its fifth edition, contains guidance on how to determine PM_{10} road dust emissions from both paved and unpaved roads in Chapter 13, Sections 13.2.1 (updated January 2011) and 13.2.2 (updated November 2006) respectively.

The methodology promulgated in AP-42 for paved road dust is shown in **Equation 1**:

$$E = k\,(sL)^{0.91} \times (W)^{1.02} \qquad [1]$$

Where:
E = particulate emission factor (gVMT);
k = particle size multiplier for particle size range and units of interest;
sL = road surface silt loading (grams per square meter) (g/m2); and,
W = average weight (tons) of the vehicles traveling the road (determined by referencing the average value used by MAG in their most recent conformity finding).

Equation 2 shows the defined method for unpaved roads for vehicles traveling on publicly accessible roads as defined in AP-42[4], dominated by light duty vehicles:

$$E = [(k(s/12)^{a}S/30)^{d}) \,/\, (M/0.5)^{c}) - C \qquad [2]$$

Where:
E = size-specific emission factor (lb/VMT)
k, a, b, c and d are empirical constants
s = surface material silt content (%)
W = mean vehicle weight (tons)
M = surface material moisture content (%)
S = mean vehicle speed (mph)
C = emission factor for 1980's vehicle fleet exhaust, brake, and tire wear

However, on the EPA Air Quality Transportation Conformity website[5] another method is provided as shown in **Equation 3**. In this report, a different equation was recommended:

$$E = [k(S/12)^{a}(W/3)^{b}] * [(365-P)/365] \qquad [3]$$

Where:
E = Emission factor (lb/VMT)
S = Road silt content (%)
W = Average vehicle weight (tons)
P = Number of days in a year with at least 0.01 of precipitation
k, a, b = Constants

Equation 3 was the methodology used in the last reporting. As such, this same method was used for consistency in reporting.

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[3] https://www.epa.gov/sites/default/files/2020-10/documents/13.2.1_paved_roads.pdf
[4] AP42, Section 13.2.2 Unpaved Roads - Updated November 2006 (epa.gov)
[5] https://www.fhwa.dot.gov/ENVIRONMENT/air_quality/conformity/research/mpe_benefits/mpe07.cfm

As shown in this equation, the resulting factor (E) is multiplied by Vehicle Miles Traveled (VMT) to determine grams/time. The YMPO Travel Demand Model was obtained for the model functional classes. VMT for off-network links had to be estimated to determine the local paved and unpaved values. Local streets and roadways are not represented in the Yuma MPO Travel Demand Model (TDM). To estimate (VMT) on these roadways, the 2019-2045 Regional Transportation Plan's air quality conformity analysis utilized the methodology described in the Arizona Department of Environmental Quality's (AzDEQ) Yuma PM10 Maintenance Plan (August 2006). The VMT for each local link in an individual traffic analysis zone (TAZ) or group of TAZ's was estimated based on its length and the number of trip ends generated in the TAZ. **Equation 4** was used to estimate VMT for local paved and unpaved roadways:

$$VMT_{i,n} = (T_n/\Sigma L) \times (L_{i,n})^2 \qquad [4]$$

where:

$VMT_{i,n}$ = daily vehicle miles traveled for link i within TAZ n
T_n = total number of trip ends generated in TAZ n
L = total length of all links in TAZ n in miles
$L_{i,n}$ = length of link i within TAZ n in miles

Daily VMT and the number of trip ends generated in each TAZ and groups of TAZ's were obtained for the base year from the travel demand model. The lengths of paved and unpaved local roads in the NAA were obtained from Yuma County, the City of Yuma, and the City of Somerton.

To ensure consistency in assumptions between the previous and current LRTP, the VMT for local roads for the current LRTP was estimated for off-model local roads using **Equation 5**, based on the increase in the number of dwelling units for future years compared to the base year in the previous RTP. The methodology is the same as the one from the AzDEQ Yuma PM_{10} Maintenance Plan (August 2006).

$$VMT_f = (DU_f - DU_p) \times 1.22 + VMT_p \qquad [5]$$

where:

VMT_p = present year daily vehicle miles traveled
VMT_f = future year daily vehicle miles traveled
DU_p = present year dwelling units
DU_f = future year dwelling units

For this analysis, the increase in VMT was applied to local paved roadways as the increase in the number of dwelling units would likely occur along roadways paved for the development and not on unpaved roadways. Silt loading factors for paved roadways contained in the previous conformity determination were also carried forward, as were emission factors for unpaved roads.

These methodologies were applied to paved and un-paved road types to estimate the associated PM_{10} emissions. A similar methodology is used for unpaved roads.

Total PM_{10} Emissions

After performing the analyses described above, emissions from all processes (AP-42 and MOVES3.0.1) were combined to determine the overall impact of on-road mobile sources on PM_{10} levels in the Yuma NAA. **Table 5** through **8** show these emissions for all analysis years, along with the values used to calculate road dust emissions.

Table 5. Yuma 2022 Particulate Matter (PM_{10}) Conformity Analysis

Facility Type	Particle Size Multiplier	Silt Loading Factor	Average Vehicle Weight	Emission Factor	Vehicle Miles Traveled	Emissions
	k (g/VMT)	sL (g/m2)	W (tons)	E (g/VMT)	VMT	kg/day
Interstate	1	0.04	3.18	0.174	529,063	92.1
Expressway	1	0.04	3.18	0.174	113,003	19.7
Principal Arterials	1	0.3	3.18	1.088	858,083	933.6
Minor Arterials	1	0.3	3.18	1.088	655,211	712.9
Rural Major Collectors	1	0.7	3.18	2.352	416,223	979.0
Rural Minor Collectors	1	0.7	3.18	2.352	114,920	270.3
Urban Collectors	1	0.24	3.18	0.888	340,448	302.3
Local Roads	1	0.85	3.18	2.807	36,487	102.4
Interstate Ramps	1	0.04	3.18	0.174	35,932	6.3
Local paved	1	0.85	3.18	2.807	2,138,162	6,001.8
Local unpaved				107.611	112,887	12,147.9
MOVES Emissions						199.20
					PM_{10} Emissions (kg/day)	**21,767.3**
					PM_{10} Emissions (tons/day)	**24.0**
					PM_{10} Emissions (tons/year)	**8,757.9**

Table 6. Yuma 2025 Particulate Matter (PM_{10}) Conformity Analysis

Facility Type	Particle Size Multiplier	Silt Loading Factor	Average Vehicle Weight	Emission Factor	Vehicle Miles Traveled	Emissions
	k (g/VMT)	sL (g/m2)	W (tons)	E (g/VMT)	VMT	kg/day
Interstate	1	0.04	3.18	0.174	533,871	92.9
Expressway	1	0.04	3.18	0.174	122,649	21.3
Principal Arterials	1	0.3	3.18	1.088	899,632	978.8
Minor Arterials	1	0.3	3.18	1.088	671,704	730.8
Rural Major Collectors	1	0.7	3.18	2.352	434,321	1,021.5
Rural Minor Collectors	1	0.7	3.18	2.352	120,100	282.5
Urban Collectors	1	0.24	3.18	0.888	366,032	325.0
Local Roads	1	0.85	3.18	2.807	37,887	106.3
Interstate Ramps	1	0.04	3.18	0.174	34,736	6.0
Local paved	1	0.85	3.18	2.807	2,141,438	6,011.0
Local unpaved				107.611	112,887	12,147.9
MOVES Emissions						174.1
					PM_{10} Emissions (kg/day)	**21,898.3**
					PM_{10} Emissions (tons/day)	**24.1**
					PM_{10} Emissions (tons/year)	**8,810.6**

Table 7. Yuma 2035 Particulate Matter (PM_{10}) Conformity Analysis

Facility Type	Particle Size Multiplier	Silt Loading Factor	Average Vehicle Weight	Emission Factor	Vehicle Miles Traveled	Emissions
	k (g/VMT)	sL (g/m2)	W (tons)	E (g/VMT)	VMT	kg/day
Interstate	1	0.04	3.18	0.174	570,098	99.2
Expressway	1	0.04	3.18	0.174	150,233	26.1
Principal Arterials	1	0.3	3.18	1.088	942,889	1,025.9
Minor Arterials	1	0.3	3.18	1.088	749,815	815.8
Rural Major Collectors	1	0.7	3.18	2.352	501,772	1,180.2
Rural Minor Collectors	1	0.7	3.18	2.352	157,975	371.6
Urban Collectors	1	0.24	3.18	0.888	441,655	392.2
Local Roads	1	0.85	3.18	2.807	42,295	118.7
Interstate Ramps	1	0.04	3.18	0.174	38,128	6.6
Local paved	1	0.85	3.18	2.807	2,152,356	6,041.7
Local unpaved				107.611	112,887	12,147.9
MOVES Emissions						194.0
					PM_{10} Emissions (kg/day)	**22,419.8**
					PM_{10} Emissions (tons/day)	**24.7**
					PM_{10} Emissions (tons/year)	**9,020.5**

Table 8. Yuma 2045 Particulate Matter (PM_{10}) Conformity Analysis

Facility Type	Particle Size Multiplier	Silt Loading Factor	Average Vehicle Weight	Emission Factor	Vehicle Miles Traveled	Emissions
	k (g/VMT)	sL (g/m2)	W (tons)	E (g/VMT)	VMT	kg/day
Interstate	1	0.04	3.18	0.174	667,623	116.2
Expressway	1	0.04	3.18	0.174	147,728	25.7
Principal Arterials	1	0.3	3.18	1.088	993,682	1,081.1
Minor Arterials	1	0.3	3.18	1.088	794,926	864.9
Rural Major Collectors	1	0.7	3.18	2.352	586,940	1,380.5
Rural Minor Collectors	1	0.7	3.18	2.352	180,228	423.9
Urban Collectors	1	0.24	3.18	0.888	499,248	443.3
Local Roads	1	0.85	3.18	2.807	44,388	124.6
Interstate Ramps	1	0.04	3.18	0.174	55,048	9.6
Local paved	1	0.85	3.18	2.807	2,163,274	6,072.3
Local unpaved				107.611	112,887	12,147.9
MOVES Emissions						211.3
					PM_{10} Emissions (kg/day)	**22,901.3**
					PM_{10} Emissions (tons/day)	**25.2**
					PM_{10} Emissions (tons/year)	**9,214.2**

Control Measures

In 1992, Transportation Control Measures (TCMs) were established for the Yuma NAA. These TCMs were transportation improvements planned and implemented for the purpose of reducing pollutant emissions and improving air quality. Reasonable Available Control Measures (RACMs) were included as a control measure in a State Implementation Plan (SIP) proposed by Arizona Department of Environmental Quality's (ADEQ) for the PM_{10} NAA. To date, EPA has not taken any formal action on SIP controls for the Yuma area.

Local governments have adopted and implemented control measures to address PM_{10} emissions. Some of the control measures implemented included:

- Paving, stabilizing, and/or reducing travel on unpaved streets, roads, and unpaved areas.
- Watering unpaved streets, alleys, shoulders, and canal and levee roads.
- Sweeping paved streets.
- Reducing travel on canal roads.
- Constructing improvements such as parking lots and landscaped areas to minimize the amount of undeveloped desert in developed areas that was exposed to the elements.

Recent control measures implemented by jurisdictions within the Yuma nonattainment area were inventoried for this conformity determination. Updated mileage data was gathered from these jurisdictions and emissions were calculated as shown in **Table 9**. The length in centerline miles was provided from the jurisdictions along with the number of days of operation. The number of days of operation refers to the number of days throughout the year that the control measure was conducted. The vehicle per day (veh/day) estimation was obtained from local paved road traffic counts and adjusted by taking 10% for paved control measures and 10% of the paved veh/day for the unpaved control measures. This assumption was made to provide a conservative estimation that could be applied to all jurisdictions. Road silt content was determined to be 4.3% from EPA documentation[6] . Two control measures were evaluated: watering and sweeping. Of note is that paving of unpaved roads was previously included in estimations and not included here to avoid double counting.

Watering

The effectiveness of watering was determined by computing the difference between emissions using only the days with 0.01 inches of precipitation (baseline) and days with watering controls (applied control measure). These values are shown in **Table 9**.

Sweeping

The emission factor for PM_{10} for an efficient street sweeper is 0.6871 g/VMT[5]. Using this factor for the applied control measure case, the difference between uncontrolled (baseline) and emissions with sweeper were computed. Results are shown in **Table 9**.

[6] AP-42 13.2.2 Background report Unpaved Roads (epa.gov)

Table 9. Control Measures Emission Reductions

Entity	Category	Length in Lane Miles	Veh/Day	Today Days of Operation	Emission Factor lb/VMT	Affected VMT	Emission Reductions (Tons/year)
City of Yuma	*Watering/Stabilizing*	4.20	10	208	0.45	17472.00	3.92
	Sweeping	33.65	90	208	0.0002	3028.50	0.673
Yuma County	*Watering/Stabilizing*	4.49	10	208	0.41	18678.40	3.85
	Sweeping	4.28	90	208	0.0002	385.20	0.086
City of Somerton	*Watering/Stabilizing*	0.20	10	208	0.41	832.00	0.17
	Sweeping	0.96	90	208	0.0002	86.40	0.019
City of San Luis	*Watering/Stabilizing*	0.04	10	208	0.41	166.40	0.03
	Sweeping	1.92	90	208	0.0002	172.80	0.038
						TOTAL	**8.79**

PM_{10} Results and Conclusions

Results from this analysis are summarized in **Table 10** and compared with the established motor vehicle emission budgets (MVEBs)[7]. Estimated emissions are representative of the combination of MOVES3.0.1 and AP-42 results. The annual reductions are from the control measures and the newly paved roads. The difference in the estimated emissions and reduction provides the total adjusted PM_{10} levels in the YMPO nonattainment area for the maintenance plan budget years 2022, 2025, 2035, and 2045.

Table 10. Motor Vehicle Emissions Budget Comparison for PM_{10}

Budget Year	PM_{10} Tons per Year (tpy)	Maintenance Plan Budget (tpy)[8]	Annual Reduction (tpy)	Total Adjusted PM_{10} (tpy)
2022	8,557.9	10,803	8.79	8,549.1
2025	8,810.6	10,803	8.79	8,801.8
2035	9,020.5	10,803	8.79	9,011.7
2045	9,214.2	10,803	8.79	9,205.4

On June 12, 2007 EPA found the MVEB to be adequate for transportation conformity purposes (75 FR 32295; effective June 27, 2007). EPA did not take formal action on the Yuma PM_{10} Maintenance Plan that was submitted on August 17, 2006. The MVEB for all analysis years is 10,803 tons per year (tpy). The modeled emissions total each analysis year is shown in **Table 10**. The analysis indicates that the projected PM_{10} emissions for each analysis year are less than the MVEB established for PM_{10}.

[7] Motor Vehicle Emissions Budgets were found adequate for use in conformity (75 FR 32295, effective June 27, 2007)

[8] Motor Vehicle Emissions Budget as per 75FR32295, effective June 27, 2007.

5. OZONE ANALYSIS

On August 3, 2018 the United States Environmental Protection Agency designated a portion of Yuma as a 2015 8-hour ozone marginal NAA (83 FR 25776). Since a budget has not been previously set for ozone, the baseline year test was used to demonstrate conformity. 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. The results for the year 2022, 2025, 2035 and 2045 were compared to the results of 2017. Ozone is modeled for its precursors; NOx and VOC. **Tables 11** and **12** show the mobile source emissions results for the baseline year 2017 and analysis years for NOx and VOC, respectively.

Table 11. Mobile Source Results for Oxides of Nitrogen (NOx)

Source Type	Source Type ID	2022	2025	2035	2045
Motorcycle	11	5,636	5,688	5,990	6,394
Passenger Car	21	268,109	186,086	75,911	63,678
Passenger Truck	31	378,859	282,995	104,337	87,017
Light Commercial Truck	32	135,916	100,852	38,213	27,956
Other Buses	41	4,372	3,618	1,738	1,538
Transit Bus	42	16,657	13,570	6,072	5,305
School Bus	43	33,031	27,954	15,602	13,936
Refuse Truck	51	11,961	10,988	10,385	11,670
Single Unit Short-haul Truck	52	407,861	390,272	395,982	460,875
Single Unit Long-haul Truck	53	4,889	4,083	3,035	3,061
Motor Home	54	26,427	24,765	22,736	25,830
Combination Short-haul Truck	61	137,961	124,762	114,262	119,188
Combination Long-haul Truck	62	412,570	351,956	278,637	279,992
Total (grams/day)		1,844,250	1,527,588	1,072,901	1,106,439
Total (Tons)		2.033	1.684	1.183	1.220

Table 12. Mobile Source Results for Volatile Organic Compounds (VOC)

Source Type	Source Type ID	2022	2025	2035	2045
Motorcycle	11	145,810	150,588	161,430	187,727
Passenger Car	21	1,326,372	1,220,745	879,475	858,513
Passenger Truck	31	873,930	776,006	502,613	466,678
Light Commercial Truck	32	214,957	187,169	119,453	112,773
Other Buses	41	474	477	388	375
Transit Bus	42	2,072	2,014	1,508	1,438
School Bus	43	5,247	5,037	1,440	742
Refuse Truck	51	2,291	922	536	566
Single Unit Short-haul Truck	52	354,579	311,160	221,045	246,069
Single Unit Long-haul Truck	53	6,292	8,638	3,604	3,677
Motor Home	54	208,236	194,073	92,592	106,800
Combination Short-haul Truck	61	7,039	6,174	5,121	5,118
Combination Long-haul Truck	62	20,499	16,817	11,272	10,662
Total (grams/day)		3,167,798	2,879,821	2,000,476	2,001,138
Total (Tons)		3.492	3.174	2.205	2.206

6. CONCLUSION

The air quality analysis performed demonstrates conformity between the 2022-2026 Transportation Improvement Program, the 2022 - 2045 Long-Range Transportation Plan, and the State Implementation Plan. The analysis indicates that the projected emissions levels based on projects contained in the *YMPO LRTP Update 2022-2045* meet the applicable conformity tests. Therefore, it is the determination of this analysis that this plan conforms under the 1987 PM_{10} and the 2015 8-hour ozone National Ambient Air Quality Standards.