

2007 EMISSIONS INVENTORY UPDATE
FOR THE
GILA RIVER INDIAN COMMUNITY

Assistance ID No. A-98920909-0
U.S. Environmental Protection Agency, Region IX

For Submittal To:
Ms. Deborah Jordan
U.S. EPA, Region IX
75 Hawthorne Street, Air 1
San Francisco, California 94105

Submitted By:
Gila River Indian Community
Department of Environmental Quality
P.O. Box 97
Sacaton, Arizona 85247
(520) 562-2234
(520) 562-2245 Fax

Prepared By:
Daniel C. Blair
Compliance and Enforcement Manager

August 2008

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY	1
2 INTRODUCTION	3
2.1. Background.....	3
2.2. Study Area.....	4
3 METHODOLOGIES.....	5
3.1. Point Sources	5
3.2. Area Sources	5
3.3. Mobile Sources.....	6
4 SUMMARY OF RESULTS.....	7
5 POINT SOURCES	8
5.1. Ongoing Sources	8
5.2. New Sources	10
5.3. Discontinued Sources.....	11
5.4. Facilities Below Permitting And Reporting Thresholds.....	11
6 AREA SOURCES	12
7 MOBILE SOURCES	13
7.1. Nonroad.....	13
7.2. Onroad.....	13
7.2.1. Data Collection	14
7.2.2. Calculation Methods	15
8 REFERENCES	17

FIGURES

1	Map of the Gila River Indian Community, Arizona
2	Map of Gila River Indian Community, Maricopa and Pinal Counties, and PM10 Non-Attainment Area
3	Map of Agricultural Areas on the Gila River Indian Community

1 EXECUTIVE SUMMARY

This report contains the 2007 Emissions Inventory (EI) Update (2007 EI) conducted within the exterior boundaries of the Gila River Indian Community (GRIC). An EI is an itemized list of emission estimates for sources of air pollution in a given area for a specified time period.

This 2007 EI is an update to the original EI that was developed and submitted for 1997. Therefore, it should be recognized that emission sources may fluctuate drastically within the 10-year time frame only to return to their original levels when the next 10-year EI update is conducted. Similarly, due to fluctuating market conditions and changes to/implementation of the GRIC Master Plan, emission sources in years preceding and following the EI update may be dramatically different (or absent) from the year the EI update was completed.. Some sources (e.g., construction) did not significantly contribute to the overall emissions during the years in which the EIs were conducted and were, therefore, not included in the 1997 and 2007 EIs.

The 2007 EI includes emissions from point sources, area sources, onroad mobile, nonroad mobile and non-anthropogenic sources of air pollution. The inventory provides emissions estimates for carbon monoxide (CO), nitrogen oxides (NO_x), sulfur oxides (SO_x), volatile organic compounds (VOCs), and particulate matter less than 10 microns in diameter (PM₁₀). Emissions of lead were not calculated since there are no significant sources emitting ambient lead emissions within the Community and leaded gasoline is no longer available in Arizona.

Emissions were calculated using several methods including mass balance, best engineering estimates, AP-42 emissions factors, CARB emissions factors, performance test results, permit applications, Mobile 6 model outputs from the Maricopa Association of Governments (MAG), vehicle traffic counts, Maricopa County emissions factors and the State of Arizona emissions factors. Emissions inventories from several individual facilities were developed by private consultants or in-house environmental personnel, using the above calculation methods, information gathered from site visits, and these were reviewed by GRIC's Compliance and Enforcement Manager (CEM).

Since the Community experiences relatively slow growth when compared with the growth of communities like Metropolitan Phoenix, some of the emission data from the 1997 EI was carried over to this 2007 EI Update. For example, the levels of open burning and residential burning have remained relatively constant and many small stationary sources have also experienced little or no growth since 1997. Also, many of the small stationary sources do not keep accurate production data records because the facilities are below the permitting and reporting thresholds..

The Gila River Tribal Council has recently approved a Tribal Implementation Plan (TIP), which allows for the implementation of an air quality regulatory program, permitting program, and a compliance inspection program. The Community's Air Quality Department

is in the process of developing their first set of Non-Title V air quality permits for several industries located on the Community.

2 INTRODUCTION

2.1. Background

The Gila River Indian Community (GRIC), a federally-recognized tribe, is a rural community located on approximately 374,000 acres in south-central Arizona, adjacent to the southern border of Phoenix, Chandler and Gilbert, with an on-reservation population of approximately 12,000 people (Figures 1 & 2). The reservation was established in 1859 by Executive Order with Congressional approval. Members of the Gila River Indian Community are Akimel O'odham (Pima) and Pee Posh (Maricopa) and form the fourth most populous Indian Reservation in the United States. On the northern boundary, the Community is adjacent to the rapidly growing Phoenix metropolitan area. A portion of the Community (92,000 acres) lies within Maricopa County. This portion of the GRIC is located within the Federal Non-Attainment Area for particulate matter less than 10 microns (PM10), which has been classified as "serious" by EPA (Figure 2). It is currently undetermined to what extent air pollution from the Phoenix metropolitan area affects air quality within GRIC boundaries.

The Community has three (3) industrial parks containing approximately 50 industrial plants along with several industrial facilities located in out-lying areas. The Lone Butte Industrial Park, the largest of the three industrial parks, lies within the Maricopa County non-attainment area and includes one Federally-regulated major source (Pimalco). The remaining two industrial parks are much smaller and contain only minor sources of air pollution.

Agricultural production throughout the Community has not changed significantly since 1997. There are currently approximately 35,000 acres in agricultural production throughout the Community. Approximately 6,700 agricultural acres are located within the Maricopa County non-attainment area.

The largest source of air pollution within the Community is vehicle emissions. Interstate 10 is the single largest source of pollution with approximately 1,400,000 vehicle miles traveled (VMT) daily. GRIC has approximately 160 miles of unpaved roads that are very rarely traveled and consist mainly of farm roads and roads accessing very remote areas.

The Maricopa County PM10 non-attainment area was designated in 1974 to include the urbanized portions of Maricopa County but also included the northern portion of GRIC (Figure 2). The boundary was arbitrarily developed based on the Maricopa Association of Governments (MAG) operational area and did not include any scientific information from GRIC to support the non-attainment designation. GRIC was not allowed to comment during the designation process nor was scientific evidence from GRIC used to determine the boundaries of the nonattainment areas. No evidence has ever indicated that any portion of GRIC is in non-attainment or even contributes to the non-attainment status within Maricopa County. GRIC plans to conduct additional monitoring in the future to support this position.

The Community is facing several issues arising from the non-attainment status of the northern portion of the Community, including NSR and Title 5 permitting requirements for new industrial facilities planning to locate within the Community. The Gila River Tribal Council has recently approved an Air Quality Management Plan (AQMP), which allows for the implementation of an air quality regulatory program, permitting program, and a compliance inspection program. The Community's Air Quality Department is in the process of developing their first set of Non-Title V air quality permits for several industries located on the Community.

2.2. Study Area

The Gila River Indian Community extends from the towns of Phoenix and Chandler on the north, south to almost Casa Grande, to the Estrella Mountains on the west to Coolidge on the east (Figure 2). The Gila River Indian Community lies in Sonoran Desert terrain that is primarily light scrub and cactus with an elevation of approximately 1,200 to 1,400 feet above sea level. The temperature varies from approximately 20°F in the winter to >115°F in the summer. Annual precipitation is light with approximately 36 days per year with >0.01 inches. Wind speed and direction can vary, but generally the wind blows from the southwest to the northeast in the morning and reverses direction in the afternoon. Wind speed can vary from a slight breeze to 70 mile per hour winds during the monsoon season.

3 METHODOLOGIES

To update the 1997 EI, the Gila River Department of Environmental Quality (DEQ) assessed both stationary and mobile source emissions.

3.1. Point Sources

For the purposes of this EI, point sources are defined as stationary facilities (with point and/or area sources) within the boundaries of the Community. The point sources listed in 1997 EI were divided into the following five categories for this update:

1. Discontinued (not operating in 2006);
2. New (operating in 2006 but not in 1997);
3. Ongoing (since 1997);
4. Ongoing with changed names (since 1997); and
5. Below the permitting and reporting thresholds.

Emissions for the new point sources were developed using information supplied by the source or obtained during site visits pertaining to the type of processes employed, the types of materials/chemicals used, quantities of materials input to processes and type of pollution control equipment operated. After collecting this data, emissions were estimated using AP-42 emissions factors, mass balance equations, source test information, and best engineering estimates.

Several of the new sources were in operation for only a short period of time in 2007 or did not have readily available production data. Therefore, these sources were included under a category with facility emissions below the permitting and reporting threshold. Emissions from these sources will be included in the next GRIC EI, provided the emissions from these facilities exceed the permitting and reporting threshold. The Community's Air Quality Department is in the process of developing their first set of Non-Title V air quality permits for several industries located on the Community. This process will continue until all sources required to have a permit within the community are permitted. All permitted sources will be required to submit an annual EI to the GRIC DEQ as a condition of their operating permit.

3.2. Area Sources

Area source emissions include open burning emissions, agricultural emissions from tillage and harvesting, and construction emissions. There has been little or no net change in the quantities of open burning and construction emissions since 1997; therefore, the 2007 area source emissions were assumed to be identical to 1997 area source emissions for these sources. Agricultural-related emissions were adjusted for a slight increase in the amount of land under agricultural production between 1997 and 2007.

3.3. Mobile Sources

EPA's Mobile 6 model was used to estimate emissions from onroad mobile sources (vehicle traffic). Emissions of PM10 from dirt roads and from paved roads were estimated using formulas provided in AP-42. Vehicle counts and road mileages were obtained for the most recent year available from the Arizona Department of Transportation (2006), GRIC Department of Transportation (2003, 2004), Maricopa County Department of Transportation (2005), and MAG (2005).

4 SUMMARY OF RESULTS

Annual emissions estimates were developed for the five criteria pollutants – PM₁₀, CO, NO_x, SO_x and VOCs. A summary of the 2007 criteria pollutant emissions from each of the three sources categories is shown in Table 4.1.

TABLE 4.1 Summary of Source Emissions (tons/yr)

Source	PM₁₀	CO	NO_x	VOC	SO_x
Point	1,048	161	175	142	31
Mobile	384	10,588	2,055	929	37
Area	678	63	48	56	0
TOTAL	2,109	10,810	2,275	1,126	68

5 POINT SOURCES

For the purpose of this inventory, point sources are defined as stationary facilities within the boundaries of the Community. The point sources from the 1997 EI were divided into the following five categories:

1. Discontinued (operating in 1997 but not in 2006);
2. New (operating in 2006 but not in 1997);
3. Ongoing (since 1997);
4. Ongoing with changed names (since 1997); and
5. Exempt (De minimus).

A summary of the emissions from the new and ongoing point sources is presented in Table 5.1 below.

TABLE 5.1 Point Source Emissions (tons/yr)

Source	PM ₁₀	CO	NO _x	VOC	SO _x
New Sources	888.63	0.17	0.79	0.06	1.35
Ongoing Sources	159.064	-	-	0.15	-
TOTAL	1,047.69	0.17	0.79	0.21	1.35

"-" = zero value or not applicable

5.1. Ongoing Sources

Ongoing point sources on the Community are those sources that were operating in 1997 and 2006. Several ongoing facilities also underwent a name change since 1997.

Available emissions data is limited for these ongoing sources because most of the sources do not currently have an air quality permit. Also, most of these sources have not changed significantly since 1997. Therefore, with the exception of two facilities (Rinker's Maricopa and Santan plants), the 1997 EI emissions data was used for the 2007 EI Update.

A summary of the ongoing sources (without a name change) and their associated emissions is presented in Table 5.2.

TABLE 5.2 Ongoing³ Point Source Emissions (tons/yr)

Source	PM ₁₀	CO	NO _x	VOC	SO _x
Alexco	0.02	0.05	0.24	2	-
Arizona Box	-	-	-	0.17	-
BMC West	0.2	-	-	-	-

TABLE 5.2 Ongoing³ Point Source Emissions (tons/yr)

Source	PM ₁₀	CO	NO _x	VOC	SO _x
Bondurant	-	19	4	2.57	-
Casa Blanca MKT	-	-	-	3.1	-
Classy Closets	0.3	-	-	-	-
DBCI	-	-	-	-	-
Fertizona San Tan	0.67	-	-	0.22	-
Firebird Raceway	-	-	-	-	-
Gila River Farms Gin	6.7	1.7	13	0.75	-
Gila River Gas Station	-	-	-	10	-
Komate gas station (53 Ave & Pecos Rd)	-	-	-	5.1	-
KT Fabrication	-	-	-	-	-
Pacific Scientific	-	-	-	0.03	-
Pimalco	6.86	30.95	17.72	66.29	0.09
Pima Valve	-	-	-	0.28	-
Rock Solid	9.5	-	-	-	-
Romic	-	-	-	3.3	-
Therm-O-Rock West	48.7	1.8	7.4	0.2	0.03
Triangle Truss	0.4	-	-	0.1	-
Wilbur Ellis	-	-	-	-	-
TOTAL	73.35	53.5	42.36	94.11	0.12

"-" = zero value or not applicable

3 = Operating in 1997 and 2006

A summary of the ongoing sources with a name change, their former name, and their associated emissions is presented in Table 5.3.

TABLE 5.3 Ongoing Changed Name⁴ Point Source Emissions (tons/yr)

Source	1997 Name	PM ₁₀	CO	NO _x	VOC	SO _x
Animal Nutrition	Dairy Nutrition	2	-	-	-	-
Honeywell	Allied Signal	2.8	11.3	3.6	8	3.2
Kaiser Aluminum	Plymouth Tube	0.11	0.19	0.93	9.9	-
MTD	Ryobi	0.024	8.4	0.006	3	0.003
Rinker (Maricopa plant)	United Metro #41	22.45	35.83	28.27	8.73	14.75
Rinker (San Tan plant)	United Metro #48	22.73	51.68	98.27	16.64	11.18
Monsanto	Stoneville Seed	34	0.1	0.4	-	-
Triumph Thermal Processing	AMTI	-	0.05	0.26	1.2	0.03
Waste Management Inc.	Sanifil	1.6	-	-	-	-
TOTAL		85.71	107.55	131.74	47.47	29.16

"-" = zero value or not applicable

4 = Sources with a name change between 1997 and 2006

Rinker submitted Non-Title V permit applications for their two facilities (Maricopa and San Tan plants) to satisfy the requirements of GRIC's Non-Title V permitting process. The information and emission data supplied in their permit applications was used for this 2007 EI update.

5.2. New Sources

New point sources on the Community are those sources that were not operating in 1997 but were operating in 2006. A summary of the new sources and their associated emissions is presented in Table 5.4.

TABLE 5.4 New² Point Source Emissions (tons/yr)

Source	PM ₁₀	CO	NO _x	VOC	SO _x
Cemex	12.4	-	-	-	-
Champion Homes Redman Homes	-	-	-	-	-
Gila River Sand & Gravel - Maricopa	429.89	0.04	0.21	0.02	0.01
Gila River Sand & Gravel - Santan	441.8	0.04	0.21	0.02	0.01
Hanson	3.5	0.09	0.37	0.02	1.33
Love's Travel Center	-	-	-	-	-
Maricopa Ready Mix	1.04	-	-	-	-
Superlite Block	-	-	-	-	-
Triumph Engines	-	-	-	-	-
Triumph Precision Castings	-	-	-	-	-
TOTAL	888.63	0.17	0.79	0.06	1.35

"-" = zero value or not applicable

2 = Operating in 2006, but not in 1997

Five of the new sources listed in Table 5.4 submitted production data and/or emission data to satisfy the requirements of GRIC's permitting process. Additional information was collected by the CEM while conducting on-site visits and various methodologies were applied to derive the estimated emissions. The remaining five sources were only operating for a short period of time toward the end of 2007 or have limited production or emission factor data available.

Emissions from the point sources were calculated using mass balance, material usage estimates and AP-42 emission factors. Several of the above-listed sources hired consultants or used in-house environmental personnel to develop their individual permit application with emission estimates. The permit applications were reviewed by the GRIC CEM for reasonableness, completeness and correct emission factors before including the emissions data in the permit applications into the 2007 EI. Emission estimates for other sources were prepared by GRIC consultants using the information supplied in the permit applications.

5.3. Discontinued Sources

A list of the discontinued sources and their associated emissions is presented in Table 5.5.

TABLE 5.5 Discontinued¹ Point Source Emissions (tons/yr)

Source	PM ₁₀	CO	NO _x	VOC	SO _x
Arizona Processing	35	0.16	0.94	0.01	-
Fertizona Coolidge	0.76	-	-	0.15	-
Image of Wicker	-	-	-	-	-
Phillips Services	5.5	-	-	-	-
Solkatronic / Air Products	-	-	-	0.32	-
TOTAL	41.26	0.16	0.94	0.48	-

"-" = zero value or not applicable

1 = Operating in 1997 but not in 2006

5.4. Facilities Below Permitting And Reporting Thresholds

Several facilities are below the permitting thresholds or have equipment that is exempt from permitting. The permitting thresholds are identified in the AQMP and include, but are not limited to, facilities that emit one ton per year or less of any single regulated air pollutant; 1,000 pounds per year or less of any single HAP or one ton of any combination of HAPs; or 300 pounds per year or less of any single ultra-HAP or combination of ultra-HAPs. These facilities are listed in Table 5.6.

TABLE 5.6 Facilities Below Permitting And Reporting Thresholds¹

Source	Source
A & A Precast	Gila River Utility Authority
Allison LLC (sublease to Lumber Products)	Iron City Rentals
Access Recovery	Lone Butte Trade Center
Acker Stone	Lumber Products
ADESA	McNeil Brothers
Beaudry RV	Monty Brother's Landscaping
Environmental Stoneworks	Peterson Transportation
Factory Expo Home Center	Robert Ewing General Contractor
Ferrell Gas	Rock N Roll Trucking
Fillmore Partnership	San Carlos Irrigation Project
Freightliner Sterling Western Star of Arizona	Verizon Wireless
Gila River Telecomm	

1 = One ton per year or less of any single regulated air pollutant; 1,000 pounds per year or less of any single HAP or one ton of any combination of HAPs; or 300 pounds per year or less of any single ultra-HAP or combination of ultra-HAPs.

6 AREA SOURCES

For the purpose of this EI update, area emission sources include open burning, agricultural tillage and harvesting, residential fuel combustion, agricultural wind blown dust (non-anthropogenic) and agricultural nitrogen fertilizer usage (non-anthropogenic). Emissions from wildfires have not been calculated since wildfires rarely occur in the GRIC Sonoran Desert environment.

Except for agricultural-related sources (e.g., tilling, harvesting, windblown dust, and fertilizer usage), the area sources have not changed significantly since 1997. Therefore, for non-agricultural sources, the 1997 EI emissions data was used for this 2007 EI Update.

For agricultural sources, the 1997 EI indicates that 32,196 acres were in agricultural production. In 2006, the most recent year with available data, there were 35,065 acres in production (see Figure 3, attached). For both EI timeframes (1997 and 2006), the major crops produced on the Gila River Indian Community included alfalfa, cotton, wheat/barley, citrus, and vegetables. These crop types were used to estimate the emissions for the agricultural sources in both the 1997 and 2007 EIs. Therefore, the 8.9% increase in agricultural production from 1997 to 2006 was applied to the 1997 emissions for tilling & harvesting (448.11 tpy PM₁₀), windblown dust (241 tpy PM₁₀), and fertilizer usage (45 tpy NO_x) to estimate the emissions for this EI. A summary of the area source emissions for the 2007 EI is presented in Table 6.1 below.

TABLE 6.1 Area Source Emissions (tons/yr)

Source	PM₁₀	CO	NO_x	VOC	SO_x
Open Burning	0.12	1.2	-	-	-
Agricultural Tilling & Harvesting	487.99	-	-	-	-
Residential Fuel (gas) Combustion	0.027	0.33	1.97	0.026	0.002
Residential Wood Combustion	8.4	61.4	0.6	55.9	0.1
Agricultural Windblown Dust	262.45	-	-	-	-
Nitrogen Fertilizer Usage	-	-	49	-	-
TOTAL	758.987	62.93	51.57	55.926	0.102

"-" = zero value or not applicable

7 MOBILE SOURCES

Mobile emission sources include nonroad vehicles and onroad vehicles.

7.1. Nonroad

Emissions from nonroad mobile sources result from combustion of fuels from mobile equipment other than onroad motor vehicles. These sources include recreational vehicles, construction equipment, lawn and garden equipment, farm equipment, marine vessels and locomotives. The majority of sources listed in this category will not be addressed in this section due to the lack of these activities within the boundaries of the Community.

Emissions from marine vessels, recreational vehicles, lawn and garden equipment and construction activities are not addressed in this inventory due to the lack of these activities during the 2006 calendar year. Emissions from locomotives are considered insignificant since only small rail sidings are present within the Community and rail traffic is almost nonexistent.

Emissions from farm equipment are the only significant source of nonroad emissions within the Community. The ratio of 2007 to 1997 agricultural acreage was used to adjust the 1997 EI data for the 2007 EI Update (i.e. an increase of 8.9%). The nonroad emissions for the 2007 EI Update is presented in Table 7.1 below.

TABLE 7.1 Nonroad Mobile Source Emissions (tons/yr)

Source	PM ₁₀	CO	NO _x	VOC	SO _x
Agricultural Tractor Operation	-	22	28	5	-

"-" = zero value or not applicable

7.2. Onroad

This section explains the development of onroad motor vehicle emissions estimates from vehicle traffic within the boundaries of GRIC. Vehicle traffic through the Community by far represents the most predominant source of air pollution within the Community. The majority of the vehicle traffic can be attributed to Interstate 10 running between Phoenix and Tucson bisecting the GRIC.

A summary of the onroad emissions for the 2007 EI Update is presented in Table 7.2.

TABLE 7.2 Onroad Mobile Source Emissions (tons/yr)

Source	PM ₁₀	CO	NOx	VOC	SOx
Vehicle Emissions	50.9	10,566.3	2,027.0	923.6	36.9
Paved Road Dust	332.9	-	-	-	-
Unpaved Road Dust	2.2	-	-	-	-
TOTAL	386.0	10,566.3	2,027.0	923.6	36.9

"-" = zero value or not applicable

7.2.1. Data Collection

Vehicle counts for roads maintained by the State of Arizona were supplied by the Arizona Department of Transportation (ADOT). MAG supplied a map listing vehicle counts over stretches of road maintained by the Maricopa County Department of Transportation (MCDOT). The GRIC Department of Transportation supplied information documenting the total mileage of paved and dirt/gravel roads within the Community. A portion of these roads are maintained by the Bureau of Indian Affairs and vehicle counts are not available. The total mileage of roads maintained by the State and County was subtracted from the total roads within the Community to reveal those roads without vehicle counts. Estimates of daily vehicle traffic were made for the portion of roads without vehicle counts. Daily Vehicle Miles Traveled (VMT) were calculated by multiplying the numbers of vehicles per day (vpd) by mileage information supplied by the State, County and GRIC. A summary of the daily VMT for the five major road types is presented in Table 7.3 below.

TABLE 7.3 Onroad Mobile Source VMT

Road Type	County	VMT
Urban Interstate	Maricopa	401,061
Urban Principle Arterial Other	Maricopa	213,780
Rural Interstate	Pinal	1,005,529
Rural Principle Arterial Other	Pinal	777,189
Rural Local	Pinal	55,420
TOTAL		2,452,979

VMT = Vehicle Miles Traveled per day

Emission factors were obtained from EPA's Mobile 6 model. MAG supplied GRIC with the 2005 Mobile 6.2.03 input and output files used to calculate emissions factors for their 2006 EI. One set of output emissions factors included credit for implementation of the Area A (roughly Maricopa County) IM-240 vehicle emissions testing program. These factors were applied to the daily VMT within Maricopa County. Another set of emissions factors was

generated for vehicles not required to pass the Maricopa County emissions testing program (IM-240) and these factors were applied to the daily VMT within Pinal County.

7.2.2. Calculation Methods

Criteria pollutant emissions for each vehicle classification traveling within each road type were calculated according to the following equation:

$$E_x = EF_x \times VMT_y \times VCP \times \left(\frac{365 \text{ days}}{\text{yr}} \right) \times \left(\frac{\text{lb}}{453.6 \text{ g}} \right) \times \left(\frac{\text{ton}}{2000 \text{ lb}} \right)$$

- Where:
- E_x = Criteria pollutant X emissions (i.e., PM10, CO, etc.) for a specific vehicle class
 - EF_x = Emission factor for criteria pollutant X from Mobile 6
 - VMT = Daily vehicle miles traveled for road type Y (i.e., urban interstate, etc.)
 - VCP = Vehicle class percentage of total vehicles

The resulting emissions for each vehicle classification were totaled to generate the total PM₁₀, CO, NO_x, VOC and SO_x emissions for each road type.

PM10 emissions from road dust generated by vehicle traffic on paved roads were calculated using the equation for paved roads listed in AP-42 Section 13.2.1 (Equation 1) and silt loading values from Maricopa County's 2005 EI. Daily VMT were broken down to three categories with three different silt loading (sL) values:

- Interstates (sL = 0.02 g/m²);
- Roads with <5,000 VMT/day (sL = 0.067 g/m²); and
- Roads with >5,000 VMT/day (sL = 0.23 g/m²).

The AP-42 equation for vehicles traveling on paved public roads is:

$$EF = \left(k \times \left(\frac{sL}{2} \right)^{0.65} \times \left(\frac{W}{3} \right)^{1.5} \right) - C$$

- Where:
- EF = Particulate emissions factor (lbs/VMT)
 - k = Particle size multiplier for particulate size range of interest (0.016 lb/VMT for PM10, AP-42 Table 13.2.1-1)
 - sL = Road surface silt loading (g/m², Maricopa County 2005 EI)
 - W = Weight of vehicle (3 tons, Maricopa County 2005 EI)
 - C = Emission factor for 1980's vehicle exhaust, break & tire wear (0.00047 lb/VMT, AP-42 Table 13.2.1-2)

PM10 emissions from road dust generated by vehicle traffic on unpaved roads were calculated using the equation for unpaved roads listed in AP-42 Section 13.2.2 (Equations 1b and 2), a silt loading value from Maricopa County's 2005 EI, and daily VMT generated using best available engineering estimates. Since vehicle traffic on unpaved roads is very limited within the Community, it was assumed that two vehicles per day traveled on each unpaved segment. The rural portion of the Community has remained relatively unchanged since 1997; therefore, the length of unpaved roads from the 1997 EI was used for the 2007 EI Update (162.8 miles).

The AP-42 equation for vehicles traveling on unpaved public roads is:

$$EF = \left[\left(\frac{k \times \left(\frac{s}{12}\right)^a \times \left(\frac{S}{30}\right)^d}{\left(\frac{M}{0.5}\right)^c} \right) - C \right] \times \left[\frac{365 - p}{365} \right]$$

- Where:
- EF = Emission factor (lbs/VMT)
 - k = Particle size multiplier (1.8 for PM10, AP-42 Table 13.2.2-2)
 - s = Silt content of road surface (11.9%, Maricopa County 2005 EI)
 - S = Mean vehicle speed (25 mph, Maricopa County 2005 EI)
 - M = Surface material moisture content (0.5%, Maricopa County 2005 EI)
 - C = Emission factor for 1980's vehicle exhaust, break & tire wear (0.00047 lb/VMT, AP-42 Table 13.2.2-4)
 - p = # of days/yr with rainfall of at least 0.01 in. (31 days, Western Regional Climate Center, Sacaton, AZ)
 - a = for PM10 (1, AP-42 Table 13.2.2-4)
 - c = for PM10 (0.2, AP-42 Table 13.2.2-4)
 - d = for PM10 (0.5, AP-42 Table 13.2.2-4)

8 REFERENCES

Arizona Department of Transportation Website. Vehicle Counts for Arizona Roads 2003 – 2006.

Compilation of Air Pollution Emissions Factors AP-42, Fifth Edition, Volume I

Gila River Indian Community. 1997 Emissions Inventory for the Gila River Indian Community, dated October 1998.

Gila River Indian Community Department of Transportation. List of Unpaved / Paved Roads by District – for Air Quality Program (memorandum dated March 4, 2005).

Gila River Indian Community Department of Transportation. Traffic Count Data (memorandum dated April 7, 2004).

Maricopa Association of Governments. Mobile 6 input and output files for 2005.

Maricopa County Air Quality Department. 2005 Periodic Emissions Inventory for PM10 for the Maricopa County, Arizona, Nonattainment Area, dated May 2007.

Maricopa County Department of Transportation Website. Traffic Counts for 1999 – 2005.

FIGURES