ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

Douglas A. Ducey
Governor

Misael Cabrera
Director

August 30, 2016

The Honorable Douglas A. Ducey
Governor of Arizona
1700 W. Washington St.
Phoenix, Arizona 85007

Re: 2015 Ozone Boundary Recommendations

Dear Governor Ducey:

In October 2015, the U.S. Environmental Protection Agency (EPA) established new 8-hour National Ambient Air Quality Standards (NAAQS) for ozone. Under Clean Air Act section 107(d), states must submit initial designations to EPA for areas that do not meet or that contribute to ambient air in areas that do not meet the NAAQS (nonattainment), areas that meet the NAAQS (attainment), and areas that cannot be classified (unclassifiable). These initial designations must be submitted to the EPA by the governor of each state by October 1, 2016.

Enclosed is Arizona Department of Environmental Quality's (ADEQ) 2015 Ozone NAAQS Boundary Recommendations, pursuant to Arizona Revised Statutes § 49-405(C)(4).

Based on 2013-2015 data, ADEQ recommends that the Governor designate portions of Maricopa, Pinal, and Gila Counties in one nonattainment area, along with three other suggested data-contingent alternatives for the Phoenix area. ADEQ also recommends a portion of Yuma County as nonattainment. ADEQ recommends the rest of the state as attainment/unclassifiable. Enclosed please find (1) ADEQ's recommendations, (2) a comment responsiveness summary, and (3) copies of the formal comments that ADEQ received.

Sincerely,

Misael Cabrera
Director

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Enclosure 1
ADEQ's 2015 Ozone NAAQS Boundary Recommendations
and
Technical Support Document

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ADEQ
Arizona Department of Environmental Quality

2015 Ozone NAAQS Boundary Recommendations

Air Quality Division
August 30, 2016 Final Recommendations

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1 Executive Summary and Official Recommendations

In accordance with the Clean Air Act ("CAA") section 107(d)(1) and Arizona Revised Statutes ("A.R.S.") 49-405, this report documents and explains Arizona Department of Environmental Quality's ("ADEQ") recommendations to the governor of Arizona to initially designate areas of the state in response to new 2015 Ozone National Ambient Air Quality Standards of 70 parts per billion.

After consideration of currently available data within the context of available guidance, and after consultation with stakeholders, ADEQ recommends that the Governor designate portions of Maricopa, Pinal, and Gila Counties as one nonattainment area, a portion of Yuma County as another nonattainment area, and the rest of the state as attainment/unclassifiable areas. ADEQ also suggests future data contingent Phoenix area alternatives for EPA's consideration. Depending on future design values, ADEQ may revise these recommendations.

The recommendations are conveyed in terms of township, range, and section below and the remainder of the report provides supporting data for the recommendations. All recommendations exclude Indian Country as defined by federal law, 18 U.S.C. 1151.

1.1 Maricopa-Pinal-Gila Nonattainment Area

Based on current 2015 ozone design values, Arizona recommends that the 2008 Phoenix-Mesa Ozone Nonattainment Area boundary be expanded by a small section of Gila County to include the Tonto National Monument monitor, and by an additional section of Pinal County to include the Queen Valley monitor and San Tan Valley (excluding Indian Country as defined by federal law, 18 U.S.C. 1151).

Table 1-1 Township and Range Description for Maricopa-Pinal-Gila Nonattainment Area

Designated Area[1]	Designation Type
Phoenix Area:	
Gila County (part).....	Nonattainment
T2N, R12E (except that portion in Maricopa County)	
T3N, R12E (except that portion in Maricopa County)	
T4N, R12E (Sections 25 through 29 (except those portions in Maricopa County) and 33 through 36 (except those potions in Maricopa County)	Nonattainment

[1] All Arizona recommended areas exclude Indian Country.

Designated Area[1]	Designation Type
Maricopa County (part).....	
T1N, R1E (except that portion in Indian Country)	
T1N, R2E	
T1N, R3E	
T1N, R4E (except that portion in Indian Country)	
T1N, R5E (except that portion in Indian Country)	
T1N, R6E	
T1N, R7E	
T1N, R1W	
T1N, R2W	
T1N, R3W	
T1N, R4W	
T1N, R5W	
T1N, R6W	
T1N, R7W	
T1N, R8W	
T2N, R1E	
T2N, R2E	
T2N, R3E	
T2N, R4E	
T2N, R6E (except that portion in Indian Country)	
T2N, R7E (except that portion in Indian Country)	
T2N, R8E	
T2N, R9E	
T2N, R10E	
T2N, R11E	
T2N, R12E (except that portion in Gila County)	
T2N, R13E (except that portion in Gila County)	
T2N, R1W	
T2N, R2W	
T2N, R3W	
T2N, R4W	
T2N, R5W	
T2N, R6W	
T2N, R7W	
T2N, R8W	
T3N, R1E	
T3N, R2E	
T3N, R3E	
T3N, R4E	
T3N, R5E (except that portion in Indian Country)	
T3N, R6E (except that portion in Indian Country)	

Designated Area[1]	Designation Type
T3N, R7E (except that portion in Indian Country)	
T3N, R8E	
T3N, R9E	
T3N, R10E (except that portion in Gila County)	
T3N, R11E (except that portion in Gila County)	
T3N, R12E (except that portion in Gila County)	
T3N, R1W	
T3N, R2W	
T3N, R3W	
T3N, R4W	
T3N, R5W	
T3N, R6W	
T4N, R1E	
T4N, R2E	
T4N, R3E	
T4N, R4E	
T4N, R5E	
T4N, R6E (except that portion in Indian Country)	
T4N, R7E (except that portion in Indian Country)	
T4N, R8E	
T4N, R9E	
T4N, R10E (except that portion in Gila County)	
T4N, R11E (except that portion in Gila County)	
T4N, R12E (except that portion in Gila County)	
T4N, R1W	
T4N, R2W	
T4N, R3W	
T4N, R4W	
T4N, R5W	
T4N, R6W	
T5N, R1E	
T5N, R2E	
T5N, R3E	
T5N, R4E	
T5N, R5E	
T5N, R6E	
T5N, R7E	
T5N, R8E	
T5N, R9E (except that portion in Gila County)	
T5N, R10E (except that portion in Gila County)	
T5N, R1W	
T5N, R2W	
T5N, R3W	

Designated Area[1]	Designation Type
T5N, R4W T5N, R5W T6N, R1E (except that portion in Yavapai County) T6N, R2E T6N, R3E T6N, R4E T6N, R5E T6N, R6E T6N, R7E T6N, R8E T6N, R9E (except that portion in Gila County) T6N, R10E (except that portion in Gila County) T6N, R1W (except that portion in Yavapai County) T6N, R2W T6N, R3W T6N, R4W T6N, R5W T7N, R1E (except that portion in Yavapai County) T7N, R2E (except that portion in Yavapai County) T7N, R3E T7N, R4E T7N, R5E T7N, R6E T7N, R7E T7N, R8E T7N, R9E (except that portion in Gila County) T7N, R1W (except that portion in Yavapai County) T7N, R2W (except that portion in Yavapai County) T8N, R2E (except that portion in Yavapai County) T8N, R3E (except that portion in Yavapai County) T8N, R4E (except that portion in Yavapai County) T8N, R5E (except that portion in Yavapai County) T8N, R6E (except that portion in Yavapai County) T8N, R7E (except that portion in Yavapai County) T8N, R8E (except that portion in Yavapai and Gila Counties) T8N, R9E (except that portion in Yavapai and Gila Counties) T1S, R1E (except that portion in Indian Country) T1S, R2E (except that portion in Pinal County and in Indian Country) T1S, R3E T1S, R4E	

Designated Area[1]	Designation Type
T1S, R5E T1S, R6E T1S, R7E T1S, R1W T1S, R2W T1S, R3W T1S, R4W T1S, R5W T1S, R6W T2S, R1E (except that portion in Indian Country) T2S, R5E T2S, R6E T2S, R7E T2S, R1W T2S, R2W T2S, R3W T2S, R4W T2S, R5W T3S, R1E T3S, R1W T3S, R2W T3S, R3W T3S, R4W T3S, R5W T4S, R1E T4S, R1W T4S, R2W T4S, R3W T4S, R4W T4S, R5W T5S, R4W (Sections 1 through 22 and 27 through 34) Pinal County (part) T1N, R8E T1N, R9E T1N, R10E T1S, R8E T1S, R9E T1S, R10E	Nonattainment

Designated Area[1]	Designation Type
T2S, R8E (Sections 1 through 10, 15 through 22, and 27 through 34) T2S, R9E (Sections 1 through 6) T2S, R10E (Sections 1 through 6) T3S, R7E (Sections 1 through 6, 11 through 14, 23 through 26, and 35 through 36) T3S, R8E (Sections 3 through 10, 15 through 22, and 27 through 34)	

1.2 Yuma Nonattainment Area

Table 1-2 Township and Range Description of Yuma Nonattainment Area

Designated Area[2]	Designation Type
Yuma County (part)[3] ..... 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

[2] All Arizona recommended areas exclude Indian Country.

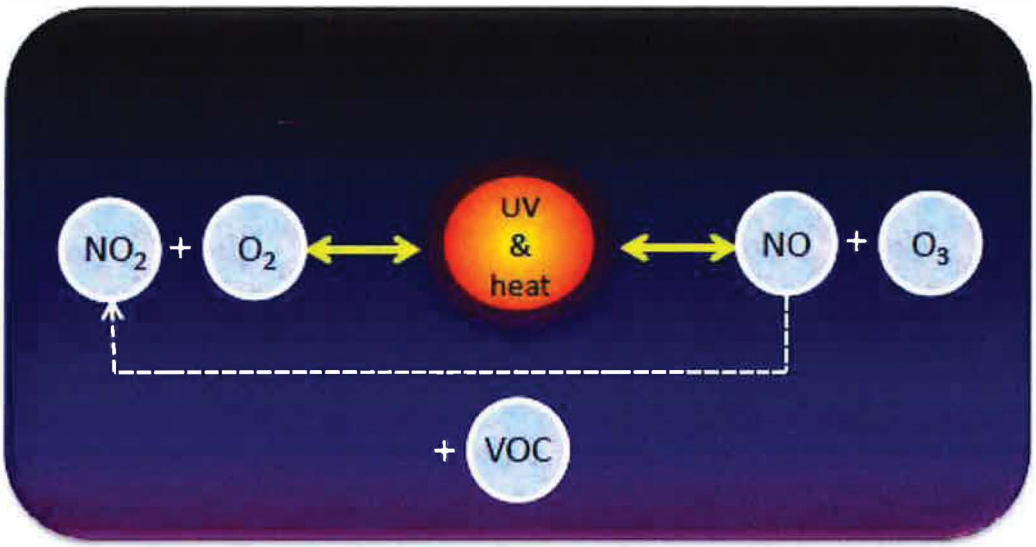
[3] There are conflicting township section grid lines near the state line in this portion of Yuma County. For this reason, ADEQ utilized a different method to describe the Yuma area boundary in this recommendation.

2 Introduction and Background

2.1 Ozone Formation

Ozone is not released directly by any source but is rather a secondary pollutant formed from a complicated process involving precursor pollutants and sunlight. Nitrogen oxides (NOx) and volatile organic compounds (VOCs) are generally known as the main precursor pollutants to ozone, although other molecules are often involved in formation. Ozone forms naturally in the earth's troposphere[4] as shown in simplified form in Figure 2-1. Nitrogen dioxide (NO_2) and oxygen (O_2) react (i.e. photolyze) under the sun's heat and ultra violet rays to form nitrogen monoxide (NO) and ozone (O_3), and vice versa.[5] In a separate reaction, VOCs can oxidize and the resulting free radicals can convert nitrogen monoxide to nitrogen dioxide. This natural VOC reaction disrupts the equal balance of the photocatalytic reaction and allows for a slight accumulation of ozone.[6]

Figure 2-1 Ozone Formation



NO_x and VOCs are both naturally emitted compounds (e.g. NOx is emitted from soils, lightning, wildfires, and stratospheric intrusions[7] and VOCs are emitted from live plants, such as pine trees,

[4] 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.

[5] *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).

[6] *See generally id.*

[7] 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.

as byproducts of photosynthesis[8]). However, NO_x and VOCs are also produced by human activity (anthropogenically). Anthropogenically emitted NO_x sources include fossil fuel combustion sources such as car engines and industrial boilers (such as those found at electric generating stations). Anthropogenic VOCs originate from sources such as paints, coatings, and fossil fuels (e.g. gasoline). The addition of more NOx and VOCs into the equation, as a result of anthropogenic emissions, causes the accumulation of ozone concentrations to approach unhealthy and environmentally dangerous levels. Accumulation of ozone is especially likely to occur in urban areas where man-made NOx and VOC emissions are very high.[9] Urban populations are therefore likely the most affected by ozone's negative effects, such as reduction in lung function and respiratory inflammation and distress.[10] Ozone can also cause disruptions in ecosystems and reductions in plant growth, including crop yield loss.[11]

2.2 Legal Requirements and Guidance

In accordance with Clean Air Act (CAA) section 108, the Environmental Protection Agency (EPA) Administrator must identify, list, and issue criteria for certain air pollutants that in her "judgment, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare." EPA has listed six such pollutants, commonly called "criteria pollutants." Because of ozone's negative health and welfare (i.e. environmental) effects, ozone is regulated through the CAA as a criteria pollutant. According to CAA section 109, EPA must set air quality standards for criteria pollutants, also known as National Ambient Air Quality Standards (NAAQS).

Once EPA establishes or revises the NAAQS, CAA section 107(d)(1) mandates the governor of each state to submit initial area designations to EPA within the time required by EPA, but no later than one year after the NAAQS revision. The initial designations must list all areas within the state as either nonattainment, attainment, or unclassifiable. A nonattainment area is any area that does not meet (or that contributes to ambient air quality in a nearby area that does not meet) the national primary or secondary ambient air quality standard (NAAQS) for the pollutant. An attainment area is any area outside of a nonattainment area that meets the NAAQS. An unclassifiable area is any area that cannot be classified on the basis of available information as meeting or not meeting the NAAQS.

ADEQ is tasked with preparing the boundary designations and supporting documents for the entire state of Arizona.[12] According to Arizona statute, ADEQ's proposed recommendations must

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[8] *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 *available at* http://www.grida.no/publications/other/ipcc_tar/?src=/climate/ipcc_tar/wg1/127.htm (last visited May 27, 2016).

[9] *See* EPA, *Criteria for Ozone, supra* note 7 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.").

[10] *See generally* EPA, *supra* note 7 at E-10 – E-23.

[11] *See generally* EPA, *supra* note 7 at E-23 – E-30.

[12] *See* Arizona Revised Statutes § 49-405 (2015) *available at* http://www.azleg.state.az.us/FormatDocument.asp?inDoc=/ars/49/00405.htm&Title=49&DocType=ARS.

first be completed and posted on ADEQ's website between four and five months before they are due to the governor.[13] ADEQ must then hold a public hearing regarding the recommendations after a comment period.[14] These proposed recommendations are then submitted to the governor at least one month before the governor must submit his initial designations.[15] Finally, the governor submits his initial boundary designations to EPA before the federally imposed deadline.

EPA most recently revised and promulgated the ozone NAAQS to 70 ppb[16] on October 1, 2015.[17] In order to comply with CAA section 107(d)(A) and the 2015 Ozone standard final rule,[18] all states' initial boundary designations are due before October 1, 2016. ADEQ's draft recommendation is further time constrained by state statute as noted above.

To comply with statutory time constraints, ADEQ collected and analyzed data as it became available. ADEQ also applied current guidance as it became available, including EPA's Background White Paper[19] and Boundary Guidance.[20] Attachment 3 of the Boundary Guidance lays out the main factors to consider in determining nonattainment area boundaries for the 2015 Ozone NAAQS. EPA will consider this guidance and associated factors in determining final boundary designations. The five guiding factors and a short summary of each follows:

1. Air Quality Data
2. Emissions and Emissions-Related Data
3. Meteorology
4. Geography/Topography
5. Jurisdictional Boundaries

For air quality data, designators are advised to identify all monitors in an area, all monitored violations, and design values for all monitors. Such data should exclude concurred exceptional event data. States will use 2013-2015 monitored design value data for initial designations, while EPA will use 2014-2016 data. EPA suggests evaluating historical trend data to provide a greater understanding of the nature of ozone issues in an area. EPA also suggests evaluating the spatial and temporal distribution of exceedances.

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[13] *See id.*
[14] *See id.*
[15] *See id.*
[16] As calculated per 40 CFR § 50.19 (2015).
[17] *See National Ambient Air Quality Standards for Ozone Final Rule*, 80 FR 65292, 65435 (Oct. 26, 2015) (standards were promulgated October 1, 2015).
[18] *Id.* at 65438.
[19] *Implementation of the 2015 Primary Ozone NAAQS: Issues Associated with Background Ozone – White Paper for Discussion* [*Background White Paper*] (December 30, 2015), *available at* https://www.epa.gov/ozone-pollution/background-ozone-workshop-and-information.
[20] *Area Designations [Guidance] for the 2015 Ozone National Ambient Air Quality Standards* [*Boundary Guidance*], Memorandum from Janet G. McCabe, Acting Assistant Administrator, to Regional Administrators, Regions 1-10 (February 25, 2016), *available at* https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data.

For emissions and emissions-related data, EPA recommends using the most recent National Emissions Inventory (NEI) data to evaluate county level emissions magnitudes and the geographic locations of NO_x and VOC sources. As of the date of this analysis, the most current National Emission Inventory is 2011. EPA encourages examining whether an area is NOx or VOC limited, although ADEQ notes that when considering background and transported emissions impacts, it is sometimes difficult to practicably make this kind of determination. EPA recommends evaluating emissions data from "nearby" counties to assess potential contribution (See Section 2.3.2). EPA points out that while far upwind sources are not "nearby," an evaluation of an area can help identify the impact of emissions from distant sources and differentiate such emissions from nearby emissions. EPA also suggests analyzing population and location of urbanization as these can be indicators of emissions-related activities. In addition, traffic and commuting patterns can directly relate to precursor emissions and can show the interrelatedness to a nearby area. EPA suggests examining major arteries, traffic volume, and vehicle miles traveled (VMT).

EPA encourages evaluating meteorological information to "assess the fate and transport of emissions contributing to ozone concentrations."[21] The agency also suggests assessing source-receptor analysis relationships using wind speed and wind speed direction, possibly by running HYSPLIT (Hybrid Single-Particle Lagrangian Integrated Trajectory) model trajectories.

EPA states that geography and topography, the location of physical features of land, may influence the fate, formation, and distribution of ozone concentrations.

Jurisdictional boundaries may be considered "once the geographic extent of the violating area and the nearby area contributing to violations is determined...for the purposes of providing a clearly defined legal boundary and carrying out the air quality planning and enforcement functions for nonattainment areas."[22]

The final step is that all of the above five factors are then weighed together as a whole in a weight of evidence. In a weight of evidence, when considering all of the data, one conclusion may outweigh, and in a sense appear superior to, other conclusions that could be made based on the same data.

2.3 ADEQ's Approach

2.3.1 ADEQ's Five Factor Data and General Approach

After consideration of currently available data within the context of available guidance, and after consultation with stakeholders, ADEQ recommends portions of Maricopa, Pinal, and Gila Counties as one nonattainment area, a portion of Yuma County as another nonattainment area, and the rest of the state as attainment/unclassifiable areas. ADEQ also suggests future data contingent Phoenix area alternatives for EPA's consideration.

[21] *Boundary Guidance, supra* note 20, Attachment 3 at 7.
[22] *Boundary Guidance, supra* note 20, Attachment 3 at 10.

These recommendations are based on monitoring data for the years 2013 through 2015. Depending on future design values, ADEQ may revise these recommendations.

ADEQ analyzed the best available data using the guiding five factors. The general sources of analyzed data are presented in Tables A1-1, -2, -3, -4, and -5 in Section A1.1 of Appendix A.

For air quality data, ADEQ analyzed 2015 design values based on the 4th highest maximum daily values for 2013-2015. Design values for the entire state are available in the Table A2-1 of Appendix A (Technical Support Document). All design values are derived from certified data monitored according to 40 CFR Part 58, including both CASTNET, ADEQ, and county operated monitors. Most ADEQ operated ozone monitors in the state have historically reported data for the ozone season only (April through October), per 40 CFR Part 58, Appendix D, Paragraph 4.1(i) and Arizona's approved annual network plans.[23] However, from 2016 forward the monitors will report year-round. ADEQ notes that while no exceptional events are concurred with by EPA, there is at least one exceptional event demonstration that has been submitted to EPA that may impact attainment status for future year design values.[24] See Figure A2-1 in Section A2.1 of Appendix A for an overall picture of the Arizona's monitoring network.

For emissions and emissions related data, ADEQ analyzed the following resources: the 2011 National Emissions Inventory ("2011 NEI"); 2014 permitted synthetic minor and major point source reporting data from ADEQ, Maricopa County, and Pinal County ("2014 point source data"); EPA transport modeling information ("EPA transport modeling"); U.S. Department of Agriculture data ("USDA data"); Arizona State Land Department land ownership data ("AZ land ownership data"); U.S. Census population data for 2000 and 2010 ("U.S. Census data"); Pinal County prison population data; Highway Performance Monitoring System (HPMS) traffic data; U.S. Department of Transportation statistics on border crossing data; and metropolitan planning organizations' (MPO) regional transportation plans (RTPs). Regarding traffic data, ADEQ looked at both average annual daily traffic (AADT)[25] and vehicle miles traveled (VMT).[26] ADEQ found that visually viewing roads in terms of VMT was unrepresentative in that not all traffic-counted road segments are the same length. Hence, all visual representations are shown in terms of AADT. VMT is provided as an area-wide estimate based on HPMS-sourced AADT for a specific area.

For meteorological data, ADEQ extracted real time data for the design value period from various monitoring sites, unless no meteorological data was available onsite. Using the best available meteorological data, ADEQ created annual average wind roses and wind roses for the 10 highest concentration days between 2013 and 2015. ADEQ also ran HYSPLIT model trajectories for at least the 10 highest days for every violating monitor in the state. All modeled trajectories are shown in Exhibit AI of the attached TSD. ADEQ performed analyses juxtaposing HYSPLIT modeling

[23] For more information see Appendix A (2015 Ozone Boundary Recommendation TSD), Section A2.1: Ozone Design Values.
[24] ADEQ, MAG, and Maricopa County have flagged and submitted an exceptional event demonstration in response to high concentrations resulting from a regional wildfire that affected certain monitors on June 20, 2015.
[25] ADT is a bidirectional count of average number of cars passing through a particular road segment in one day
[26] VMT is AADT multiplied by the length of the counted road segment, and annual VMT is that number multiplied by the number of days in the year.

results to hourly concentrations. Meteorological analyses are detailed in Section A3 of Appendix A to this recommendation.

For geographical and topographical maps, ADEQ used available base and reference maps in ESRI and GIS. Meteorological information was analyzed and weighted as appropriate within the context of geography and topography.

Jurisdiction was analyzed by evaluating known entities who have various types of authorities and the physical boundaries of such authorities. ADEQ evaluated what entities have air quality permitting authority, air quality planning authority, transportation planning authority, and where county boundaries, tribal land boundaries, and previously established ozone nonattainment areas are located.

EPA guides the regions and the states to consider the above five factors together in a weight of evidence analysis. While ADEQ heavily relied on the five factor analysis for evaluating the Phoenix area, ADEQ finds that the five factor analysis is not as relevant to the Yuma County area, and in fact, is not reasonably applied to the area (See Section 4.6)

In developing its recommendations, ADEQ involved as many stakeholders as possible. The agency held public stakeholder meetings on February 23, 2016, April 14, 2016, May 23, 2016, May 24, 2016, July 12, 2016, July 14, 2016, August 3, 2016, and August 9, 2016. ADEQ closely consulted with several agencies and stakeholders throughout the process, including, but not limited to: Pinal County Air Quality Control District ("PCAQCD"), Maricopa Association of Governments ("MAG"), Maricopa County Air Quality Department ("MCAQD"), Yuma Metropolitan Planning Organization ("YMPO"), and Yuma County officials.

In accordance with A.R.S. § 49-405, ADEQ posted the draft recommendations on May 31, 2016 on ADEQ's website and opened a formal comment period. ADEQ sent actual notice of the draft document and comment period to all counties and municipalities that would be included in the nonattainment area, and to all persons who had previously requested actual notice of the draft documents. Finally, ADEQ held a public hearing regarding the proposed recommendations on July 1, 2016.

In Section 3 below, ADEQ analyzed available data and recommends one future state nonattainment designation boundary for the Phoenix metropolitan area for the 2015 Ozone standard. In Section 4 below, ADEQ identifies a partial county nonattainment boundary for the Yuma nonattainment area. In Section 5 below, ADEQ identifies attainment/unclassifiable areas in the state, including Mohave County among other counties. In Section 6, ADEQ identifies three alternative boundaries for the Phoenix area contingent upon future data.

2.3.2 Transport and Background

As scientists learn more about background and the NAAQS approaches background levels, it becomes increasingly important to attempt to quantify background and transport levels. As standard levels lower, background and transport have a proportionally increased effect on nonattainment concentrations, especially as background levels continue to increase in

magnitude. Quantifying background and transport can inform how to design effective control strategies and the feasibility of reaching attainment through such control strategies. For this reason, ADEQ weighed transport and background heavily, as appropriate, in its determination of effective boundaries.

2.3.2.1 Transport

Transport has been shown to affect ambient concentrations in Arizona and in the southwestern region generally. Several studies show that long-range interstate and international transport of ozone occurs throughout the atmosphere. Two studies performed in northern U.S. cities showed that ozone concentrations over metropolitan areas increase with wind speed, indicating that the transport of ozone and its precursors from upwind areas is important.[27] [28] Another study by Comrie (1994) used an air-mass trajectory analysis to evaluate the sources of high ozone events in rural, forested Pennsylvania and found that the Ohio River Valley and Texas are the most probable sources of NOx emissions.[29] A study by Blumenthal (1997) showed that during episodes of high ozone in the eastern U.S. winds several hundred meters above the ground can transport pollutants from the west, even if surface winds are from another direction.[30] Additional studies established that nocturnal low level jets are able to transport pollutants that have been entrained into the residual boundary layer several hundred kilometers, and can contribute to high levels of ozone overnight and in the early morning.[31] There have been numerous other studies, such as Levy (1985),[32] Lin (2012),[33] and Langford (2010)[34], to show that the transport of surface ozone over long distances is possible, and that previously thought hindrances such as topography and lack of daylight are not as important. There are also several studies performed using chemical modeling to analyze tropospheric ozone transport. EPA performed chemical modeling to assess the impact of transport on ozone concentrations throughout the country. Their analysis utilized the Comprehensive Air Quality Model with Extensions (CAMx version 6.11). This modeling

[27] Schichtel, BA; Husar, RB. (2001). Eastern North American transport climatology during high- and low-ozone days. *Atmos Environ* 35: 1029-1038.

[28] Husar, RB; Renard, WP. (1998). Ozone as a function of local wind speed and direction: Evidence of local and regional transport. 91st annual meeting and exhibition of the Air & Waste Management Association, San Diego, CA.

[29] Comrie, A.C. (1994). Tracking ozone: air-mass trajectories and pollutant source regions influencing ozone in Pennsylvania forests. *Annals of the Association of American Geographers* 84 (4), 635-651.

[30] Blumenthal, DL; Lurmann, FW; Kumar, N; Dye, TS; Ray, SE; Korc, ME; Londergan, R; Moore, G. (1997). Transport and mixing phenomena related to ozone exceedances in the northeast US (analysis based on NARSTO-northeast data). Santa Rosa, CA: Sonoma Technology. Retrieved from http://capita.wustl.edu/otag/reports/otagrept/otagrept.html

[31] Corsmeier, U; Kalthhoff, N; Kolle, O; Motzian, M; Fiedler, F. (1997). Ozone concentration jump in the stable nocturnal boundary layer during a LLJ-event. *Atmos Environ* 31: 1977-1989.

[32] Levy, H., Mahlman, J. D., Moxim, W. J., & Liu, S. C. (1985). Tropospheric ozone: The role of transport. *Journal of Geophysical Research, 90*(D2), 3753-3772.

[33] Lin, M., Fiore, A. M., Horowitz, L. W., Cooper, O. R., Naik, V., Holloway, J., Wyman, B. (2012). Transport of asian ozone pollution into surface air over the western united states in spring. *Journal of Geophysical Research: Atmospheres, 117*(D21), - D00V07.

[34] Langford, A. O. (2010). Long-range transport of ozone from the Los Angeles basin: A case study. *Geophysical Research Letters*, 37(6).

platform utilized a 2011 base year for emissions, meteorology, and other inputs and was then projected forward to 2017.

2.3.2.2 Background

Background has also been shown to affect monitors in Arizona and in the southwestern region generally. EPA's definition for background includes internationally transported emissions and interstate transport of natural emissions. EPA considers policy relevant background ozone to be any ozone "formed from sources or processes other than U.S. manmade emissions of nitrogen oxides (NOx), volatile organic compounds (VOC), methane (CH_4), and carbon monoxide (CO)."[35] Background ozone can be: (1) naturally produced from sources such as stratospheric intrusion, lightning, wildfires, and vegetation within the U.S. or abroad or (2) manmade abroad from emission sources such as industrial processes, manmade fires, and car emissions outside of U.S. borders. Ozone can exist in the atmosphere for weeks and can be transported long distances, as shown by the literature above. According to a study commissioned by MAG, "background ozone can vary significantly over daily, seasonal, and inter-annual time scales, and over a wide range of spatial scales" and "natural sources contribute significantly to the daily-to-seasonal variability."[36] However, no model at this time is "capable of precise background estimates on a daily level."[37] Long term background ozone is "influenced by industrialization and climate change trends."[38] Some scientists have produce evidence that background is increasing by as much as 1 ppb per year.[39]

2.3.3 "Nearby" Interpretation

In the Boundary Guidance, EPA states that it evaluates emissions data from nearby counties to assess each county's potential contribution to a violating monitor. "Nearby" in EPA's view means that EPA will review relevant information associated with Office of Management and Budget delineated statistical boundaries such as Combined Statistical Areas (CSA) and Core Based Statistical Areas (CBSA, e.g. Metropolitan Statistical Areas (MSA)).[40] While CBSAs and CSAs do not presumptively form a nonattainment boundary,[41] the areas within such CBSAs and CSAs are evaluated to determine whether such areas are likely to be contributing to nearby areas within the same CBSA or CSA.

It is not necessarily appropriate to start with the CBSA or CSA and assume that the entire CBSA or CSA is contributing to a violating monitor. ADEQ believes this is especially true in a state with counties as large as those found in Arizona. Many areas in Arizona are practically, and for all intents and purposes, rural areas. Such areas are still technically a part of an MSA or CSA

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[35] *Background White Paper, supra* note 19, at 2; *see also Ozone Standard Final Rule supra* note 17, at 65436.
[36] ENVIRON, *Analysis of Rising Ozone Concentrations in Maricopa County in 2011-2012* (prepared for Maricopa Association of Governments) (July 2013), p. 53, *available at* http://www.azmag.gov/Documents/EP_2013-11-05_Analysis-of-Rising-Ozone-Concentrations-in-Maricopa-County-in-2011-2012.pdf.
[37] *Background White Paper supra* note 19, at 4.
[38] ENVIRON, *supra* note 36.
[39] ENVIRON, *supra* note 36.
[40] *See Boundary Guidance, supra* note at 5-7.
[41] *See Boundary Guidance, supra* note at 6.

because there is an urban area somewhere else in the same county, even if not nearby in the general sense of that word. Some violating monitors may be physically nearby, but outside of, a highly populated or high emitting MSA, and impacted mostly by that high emitting area, rather than by other sources within the same CBSA as themselves. Hence, CBSAs are not necessarily a good presumptively nearby starting point for a boundary; and in Arizona, given the large size of the counties, CBSAs may also not be an appropriate limiting factor either. If CBSA boundaries are the presumptive limit to a nonattainment boundary, and CBSAs envelop entire counties, including large swaths of undeveloped land, then essentially rural areas could inappropriately be a presumptive part of a nonattainment area.

2.3.4 EPA's Mapping Tool

EPA's mapping tool gives an excellent broad view of the state of the country and eases many comparisons between states.[42] However, after review, ADEQ believes that EPA's mapping tool is generally not an appropriate tool to use to define nonattainment boundaries in Arizona because the resolution is far too low given the large county sizes in Arizona. The representation of emissions is skewed because the ratio of populated and developed areas compared to county sizes is so small in comparison to many other areas in the country.

For example, the Dallas-Fort Worth-Arlington MSA is comprised of 11 counties, whereas the Phoenix-Scottsdale-Mesa MSA is made of two vast counties. Figure 2-2 below shows a side by side image comparison in the mapping tool, and Table 2-1 below shows a comparison of land area, emissions, and population between two MSAs. The summed emissions total of the 11 counties that comprise the Dallas area is similar to the Phoenix area sum of emissions from its two vast counties, of which only a limited area is actually urbanized. However, when viewing the mapping tool map, the Dallas-Fort Worth-Arlington area appears to emit less than the Phoenix-Scottsdale-Mesa area as a result of the color coding of the emissions in the individual counties that make up the Dallas and Phoenix areas. On the map, the severity of emissions from the Dallas area's individual counties actually pales in contrast to Phoenix area county contributions because of the vast size of Phoenix area counties in comparison to Dallas area counties.

For this reason, ADEQ believes that EPA's mapping tool is an inappropriate visual aid due to the size of counties in Arizona (and other western states) relative to the size of urban populated areas in those counties.

[42] EPA's ozone designations guidance mapping tool is located at https://www.epa.gov/ozone-designations/ozone-designations-guidance-and-data#C.

Figure 2-2 EPA Mapping Tool Phoenix and Dallas MSA Comparison

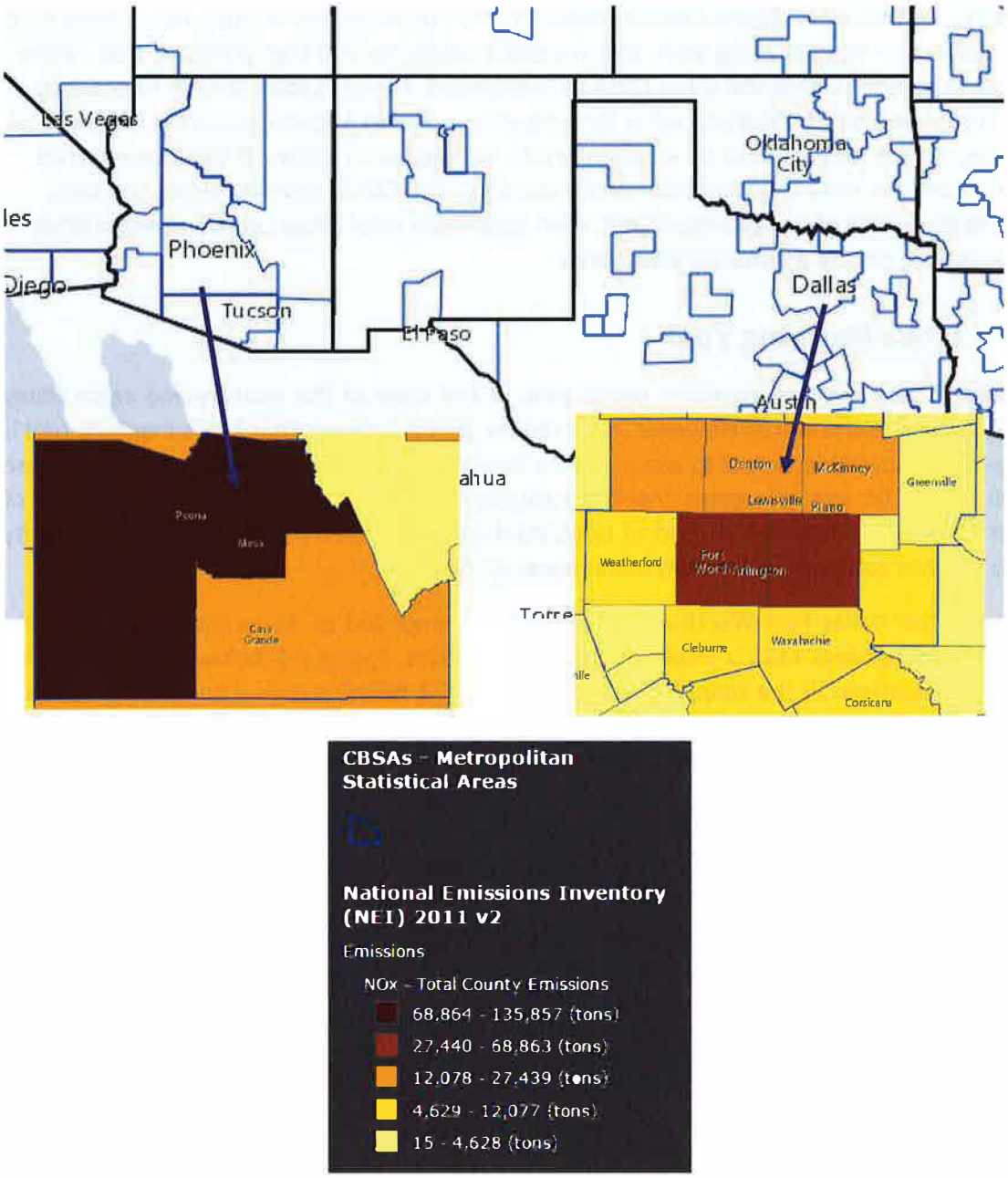


Table 2-1 EPA Mapping Tool Phoenix and Dallas MSA Comparison

Dallas-Fort Worth-Arlington MSA		
Land Area (mi)	9,279	---
Number of Counties	13	
Total 2011 Emissions NOx (TPY)/VOC (TPY)	178,595	307,050
2011 Emissions (TPY) per sq. mi. NOx (TPY)/VOC (TPY)	19.25	33.09
2010 Population	6,426,214	---
2010 Population Density (persons per sq. mi.)	455	

Phoenix-Mesa-Scottsdale MSA		
Land Area (mi)	14,599	---
Number of Counties	2	
Total 2011 Emissions NOx (TPY)/VOC (TPY)	103,347	421,857
2011 Emissions (TPY) per sq. mi. NOx (TPY)/VOC (TPY)	7.08	28.90
2010 Population	4,192,887	---
2010 Population Density (persons per sq. mi.)	287	

Additionally, ADEQ encourages EPA to refer to ADEQ's VMT calculations for recommended areas as the mapping tool's gridded resolution is a lower resolution than in ADEQ's recommendations. Visually, ADEQ also encourages EPA to consider ADEQ's average annual daily traffic images to understand the actual approximate daily traffic in applicable areas.

Ultimately, ADEQ requests EPA to consider the apparent skew in county versus urban area representation and low VMT resolution when making its final designations.

Finally, ADEQ relied upon ADEQ-produced HYSPLIT and meteorological analyses in its recommendation, except for as applied to the Mohave area.

3 Maricopa-Pinal-Gila Nonattainment Area

Given current 2015 ozone design values, both Pinal County's Queen Valley ozone monitor and Gila County's Tonto National Monument ozone monitor violate the 2015 Ozone NAAQS. Therefore, Arizona recommends that the 2008 Phoenix-Mesa Ozone Nonattainment Area boundary be expanded by a small section of Gila County to include the Tonto National Monument monitor, and by an additional section of Pinal County to include the Queen Valley monitor and San Tan Valley (excluding Indian Country as defined by federal law). Figure 3-1 below shows the recommended boundary, and Figure 3-2 shows the recommended boundary in the context of other relevant data.

Figure 3-1 Maricopa-Pinal-Gila Nonattainment Area

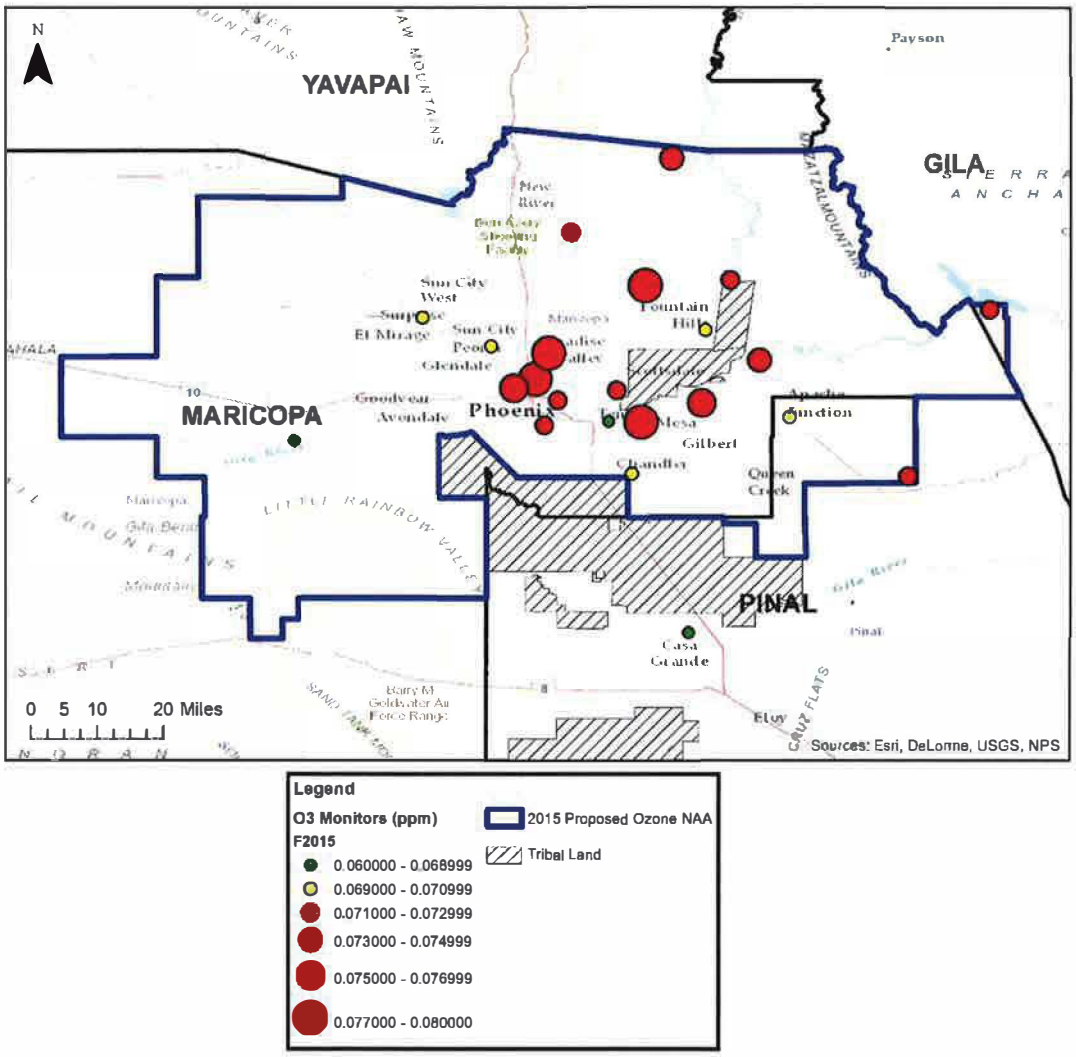
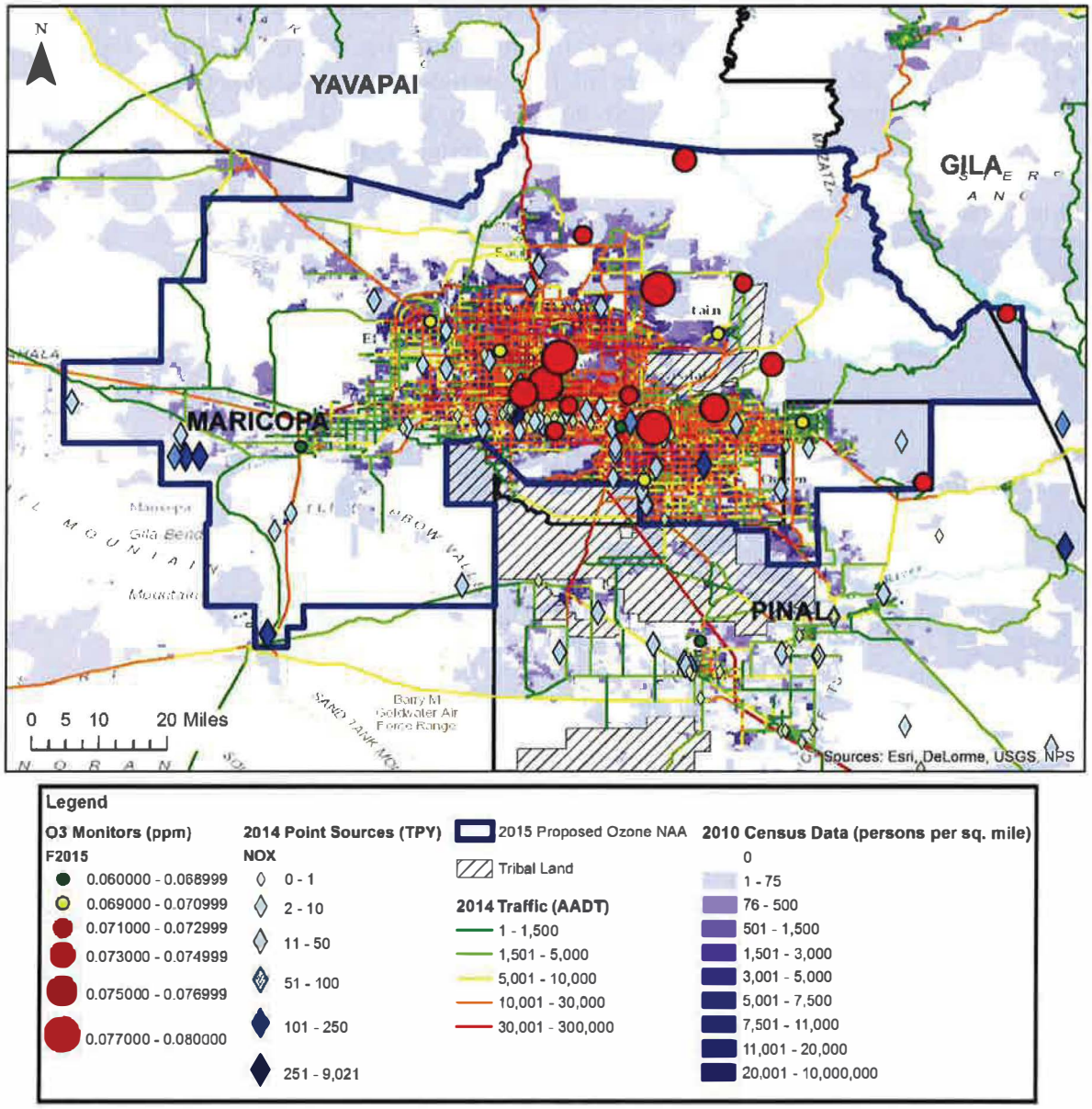


Figure 3-2 Maricopa-Pinal-Gila Nonattainment Area with Relevant Data



3.1.1 Air Quality Data

For this factor, ADEQ considered data from air quality monitors in the existing 2008 Phoenix-Mesa Nonattainment Area, as well as nearby[43] certified monitors. ADEQ also looked at all

[43] EPA generally interprets nearby as limited to the CBSA. The Tonto National Monument monitor is located outside of the Phoenix-Mesa-Scottsdale CBSA, which is comprised of Maricopa and Pinal Counties and is not "nearby" according to this definition. However, it is geographically nearby the existing nonattainment area boundary and considering the five factors, the Tonto monitor is likely impacted most by emissions from the Phoenix Metropolitan Area.

monitors within Gila County and Pinal County. ADEQ considered the 8-hr ozone design values for these monitors, based on the three most recent consecutive years of certified data, 2013-2015. By policy, the design value (DV) for a recommended area is determined by the monitor with the highest level. For the 2015 DV, there are two monitors with the same DV of 78 ppb, the Pinnacle Peak monitor and the Mesa Monitor. See the DVs for monitors in Maricopa County in Table 3-1 (two highest monitors are shown in bold), Pinal County in Table 3-2, and Gila County in Table 3-3. Figure 3-3 below shows a color-coded map of the monitor locations in the multi-county area.

Table 3-1 Maricopa County Design Values - All Monitors

County	AQS ID	Colloquial Name	2013-2015 DV (ppm)
Maricopa	04-013-0019	West Phoenix	0.075
	04-013-1003	**Mesa**	**0.078**
	04-013-1004	North Phoenix	0.077
	04-013-1010	Falcon Field	0.075
	04-013-2001	Glendale	0.070
	04-013-2005	**Pinnacle Peak**	**0.078**
	04-013-3002	Central Phoenix	0.072
	04-013-3003	South Scottsdale	0.071
	04-013-4003	South Phoenix	0.072
	04-013-4004	West Chandler	0.070
	04-013-4005	Tempe	Incomplete
	04-013-4008	Cave Creek	0.071
	04-013-4010	Dysart	0.070
	04-013-4011	Buckeye	0.060
	04-013-9508	Humboldt Mountain	0.073
	04-013-9702	Blue Point	0.074
	04-013-9704	Fountain Hills	Incomplete
	04-013-9706	Rio Verde	0.071
	04-013-9997	JLG Supersite	0.077

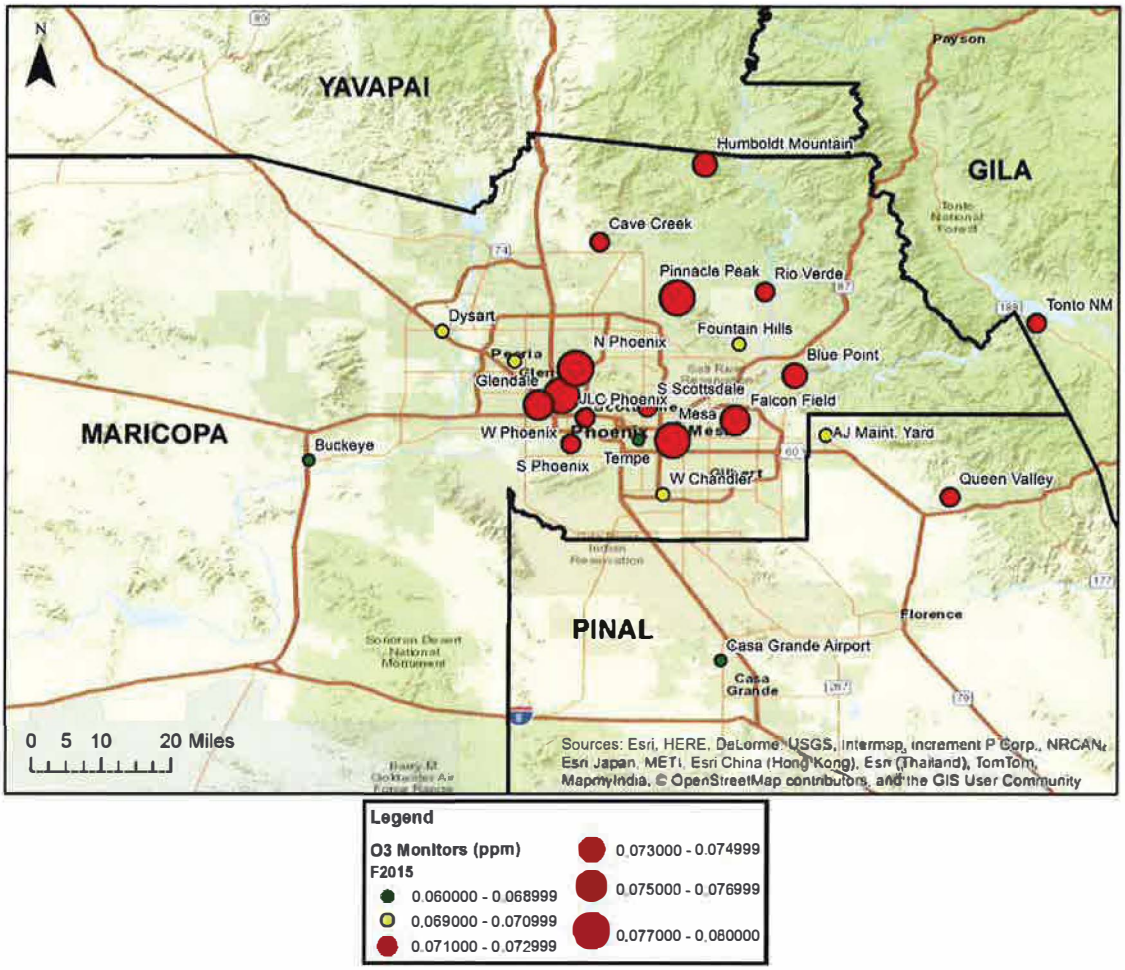
Table 3-2 Pinal County Design Values - All Monitors

County	AQS ID	Colloquial Name	2013-2015 DV (ppm)
Pinal	04-021-3001	AJ Maintenance Yard	0.069
	04-021-3003	Casa Grande Airport	0.065
	04-021-3007	Pinal Air Park	0.065
	04-021-8001	Queen Valley	0.071

Table 3-3 Gila County Design Values - All Monitors

County	AQS ID	Colloquial Name	2013-2015 DV (ppm)
Gila	04-007-0010	Tonto National Monument	0.072

Figure 3-3 Maricopa-Pinal-Gila Monitor Locations[44]



Overall, all monitors in the multi-county area have been trending downward. See Figure 3-4 for the long-term trends in the multi-county area. Because nonattainment areas are defined by their highest violating monitors, the historical trend of one of the two highest nonattaining monitors is shown below in Figure 3-5. The year 2015 marks the Mesa monitor's first valid design value in years. Hence, for purposes of viewing a trend line for the highest monitor in Maricopa County, only the trend for the Pinnacle Peak monitor is shown in Figure 3-5. Historical trends for the Gila and Pinal monitors are shown in Figure 3-6 and Figure 3-7, respectively.

[44] The Pinal Air Park monitor is not shown in this figure in order to allow a better resolution in the immediate area of the recommended boundary. The monitor is much further south on the border with Pima County, at the east to west midpoint of Pinal County. Please see Section A2 of the TSD for more detail regarding the monitor.

Figure 3-4 Maricopa, Pinal, and Gila Multi-County Long-Term Design Value Trend

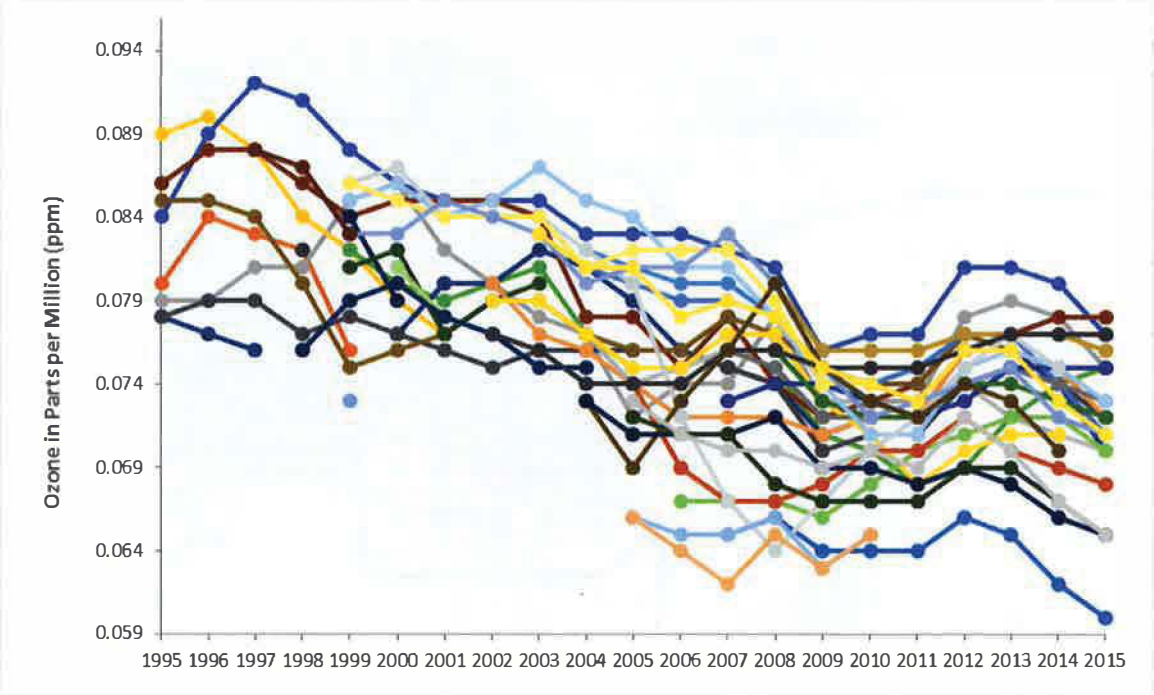


Figure 3-5 Maricopa County Long-Term Design Value Trend

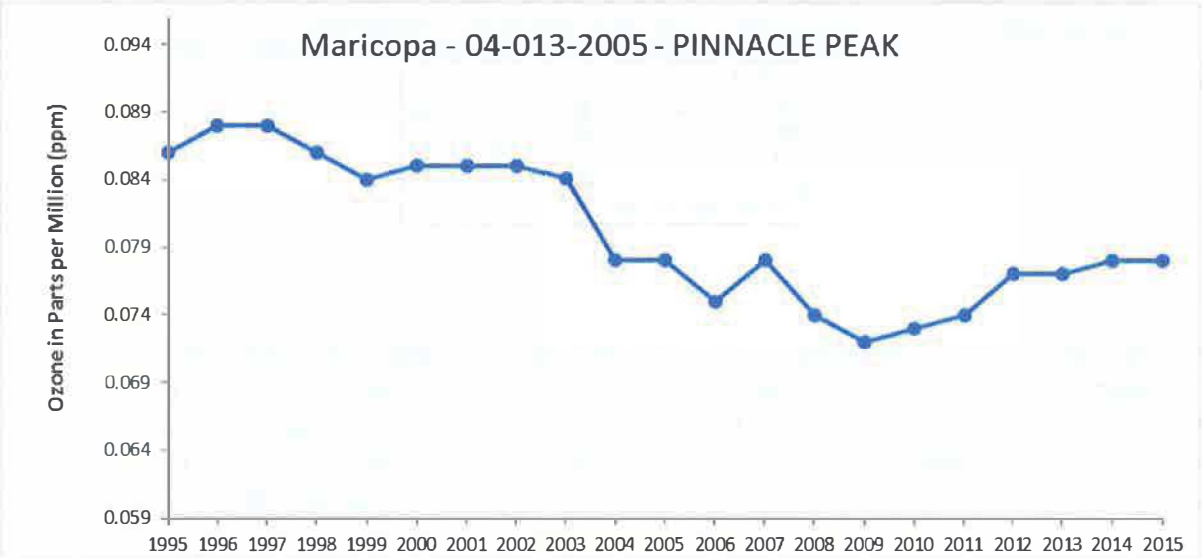


Figure 3-6 Pinal County Long-Term Design Value Trend

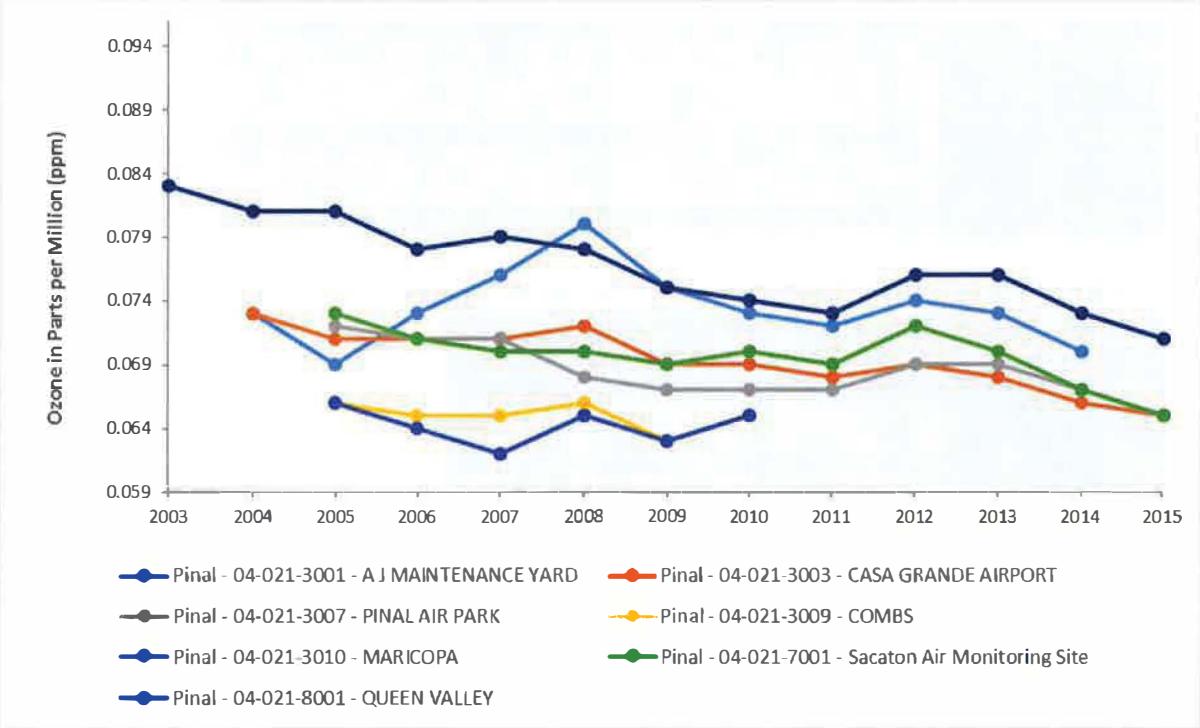
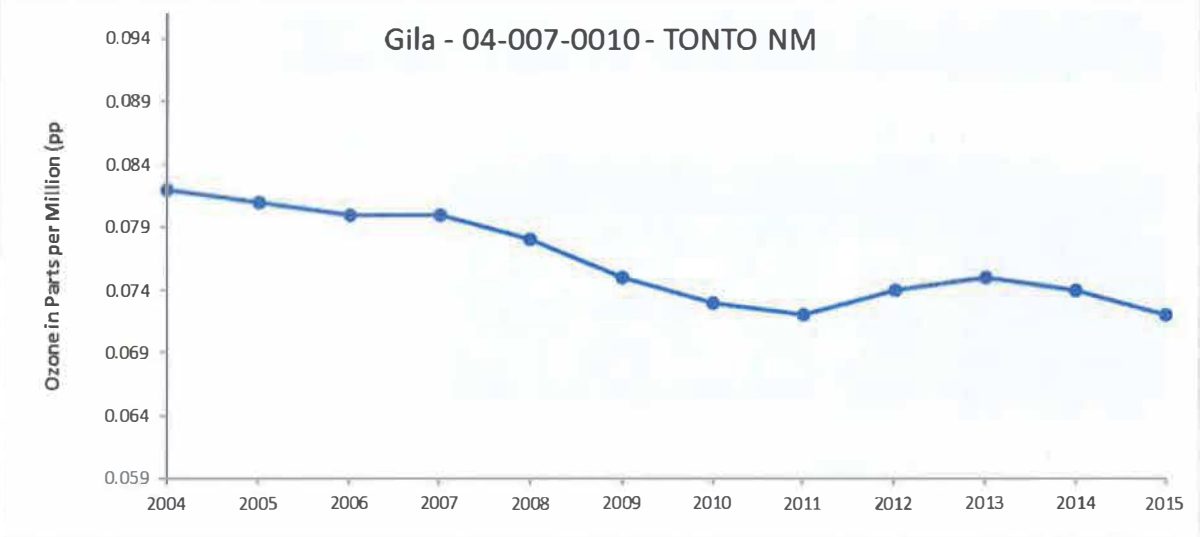


Figure 3-7 Gila County Long-Term Design Value Trend



3.1.2 Emissions and Emissions-Related Data

ADEQ evaluated emissions and emissions-related data from Maricopa, Pinal, and Gila Counties. Table 3-4, Table 3-5, Table 3-6, and Table 3-7 below represent the 2011 NEI emission data.

Table 3-4 County Level NOx Emissions

NOx Emissions (TPY)					
County	Point	Nonpoint	Onroad	Nonroad	County Total
Gila	338	399	1,329	340	2,406
Maricopa	4,684	8,274	56,748	18,738	88,443
Pinal	984	2,943	9,273	1,575	14,774
Multi-County Total	6,006	11,616	67,350	20,653	105,625

Table 3-5 County Level NOx Emissions as Percentage of County Total

NOx Emissions Approximate Percentage of County Total				
County	Point	Nonpoint	Onroad	Nonroad
Gila	14%	16.5%	55%	14%
Maricopa	5%	9.4%	64.2%	21.2%
Pinal	6.5%	20%	62.8%	10.6%
Multi-County	5.7%	11%	63.8%	19.6%

Table 3-6 County Level VOC Emissions

VOC Emissions (TPY)					
County	Point	Nonpoint	Onroad	Nonroad	County Total
Gila	110	108,389	758	2,255	111,512
Maricopa	1,150	244,022	25,659	15,839	286,670
Pinal	921	128,054	3,750	1,525	134,249
Multi-County Total	2,181	480,465	30,167	19,619	543,432

Table 3-7 County Level VOC Emissions as Percentage of County Total

VOC Emissions Approximate Percentage of County Total				
County	Point	Nonpoint	Onroad	Nonroad
Gila	0%	97.2%	55%	0.7%
Maricopa	0.4%	85.1%	9%	5.5%
Pinal	0.7%	95.4%	6.9%	1.1%
Multi-County	0.4%	88.4%	5.6%	3.6%

3.1.2.1 Point Source Data

See Figure 3-8 and Figure 3-9 for visual representations of NO_x and VOC emission sources, respectively, and the recommended boundary. These figures represent 2014 permitted point source data as reported by ADEQ, Maricopa County, and Pinal County, binned and displayed by actual emitted tons per year thresholds.

Maricopa and Pinal Counties both permit facilities down to one ton per year, ensuring that facilities are well controlled. There are numerous controls already in place in the current Phoenix-Mesa 2008 Ozone Nonattainment area. Additional controls are also being put in place according

to CTG guidelines on RACT sources because of the involuntary reclassification to moderate as a result of the area not having attained the 2008 standard by the marginal classification deadline.[45] Law regarding Area A,[46] an area first established by statute in 1988,[47] ensures that reformulated gas is used and that car emissions are controlled through a stringent vehicle emissions inspection program. See an image of the current Area A boundary in Figure 3-10. While in northern Pinal County there are several low emitting sources, they likely contribute little to monitor concentrations. Far away from the Phoenix center in Pinal County are a few mid-range emitting facilities.

There are also a few mid-range point sources in Gila County that are not nearby the Phoenix center. These sources are not located within the same CBSA as the Phoenix area. Given the lack of any other emissions activities in the areas of these mid-range point sources, the proportion of point source emissions in both Pinal and Gila compared to other emission values shown in Table 3-5 and Table 3-7 above does not support significant contribution of these point sources to the Phoenix area's nonattainment. Additionally, these mid-range sources are more market driven and do not have as much assured potential to constantly emit during ozone season as other sources, such as electric generating stations.

Existing fossil fuel electric generating stations are captured within the recommended boundary. Electric generating stations have high potentials for emissions during the hot Phoenix summer months because of greater temperature modulation usage (i.e. air conditioning, refrigerators, other cooling equipment). As of 2009, Arizona homes used about a quarter less energy than the national average.[48] However, one quarter of the energy consumed in Arizona homes is for electricity dependent air conditioning, which is four times the national average.[49] This indicates that electric generating stations may typically be emitting more during the ozone season than any other time of the year.

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[45] *See Determinations of Attainment by the Attainment Date, Extensions of the Attainment Date, and Reclassification of Several Areas for the 2008 Ozone NAAQS*, 81 FR 26697, 26699 (May 4, 2016).

[46] Area A has been modified and expanded several times over the years to include additional areas of Maricopa County, Yavapai County, and Pinal County, the latest revision being in 2001. House Bill 2538 Amending ARS § 49-541, Forty-fifth Legislature, First Regular Session, 2001, Chapter 371, § 8) *available at* http://www.azleg.gov/legtext/45leg/1r/laws/0371.pdf.

[47] The area has had controls since the 1970s because it was designated a nonattainment area in 1974. The legal definition of "Area A" was established and added to ARS § 41-2121 in the HB 2206 (Thirty-eighth Legislature, Second Regular Session, 1988, Chapter 252, § 13).

[48] U.S. Energy Information Administration, *Household Energy Use in Arizona: EIA's 2009 Residential Energy Consumption Survey, available at* http://www.eia.gov/consumption/residential/reports/2009/state_briefs/pdf/az.pdf (last visited Aug. 12, 2016).

[49] U.S. Energy Information Administration, *Arizona State Profile and Energy Estimates: Quick facts* (December 17, 2015), http://www.eia.gov/state/?sid=az ("Twenty-five percent of the energy consumed in Arizona homes is for air conditioning, which is more than four times the national average of 6 percent....").

Figure 3-8 Permitted NOx Point Sources

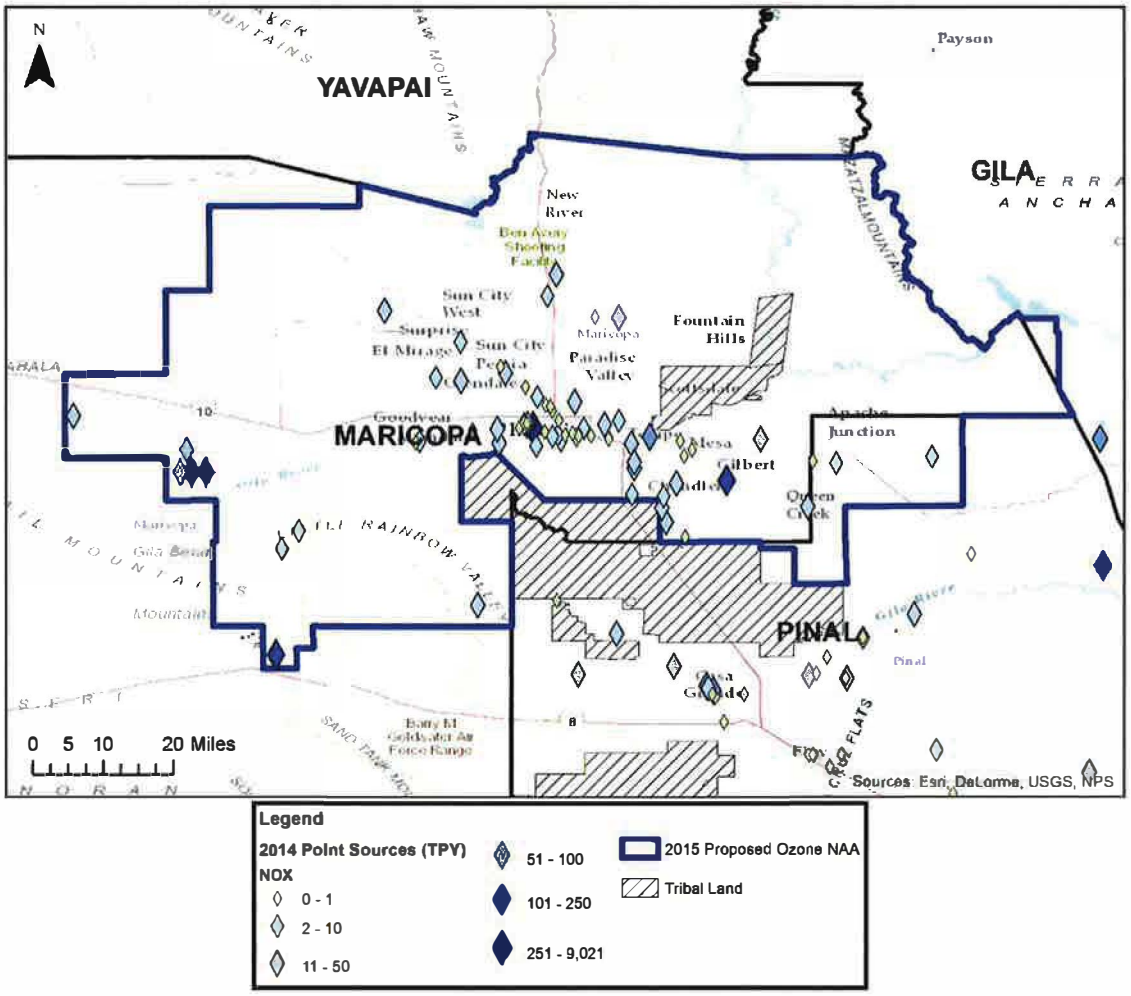


Figure 3-9 Permitted VOC Point Sources

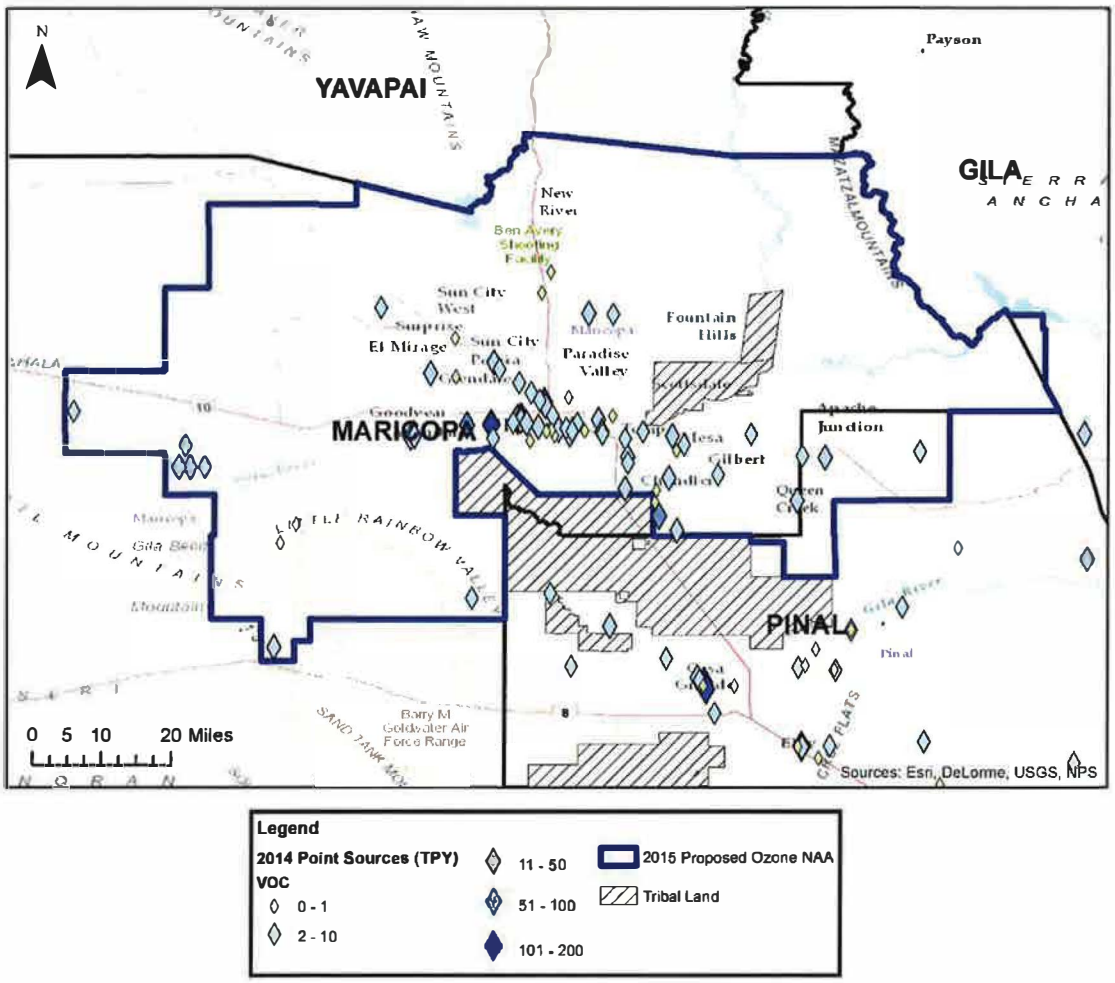
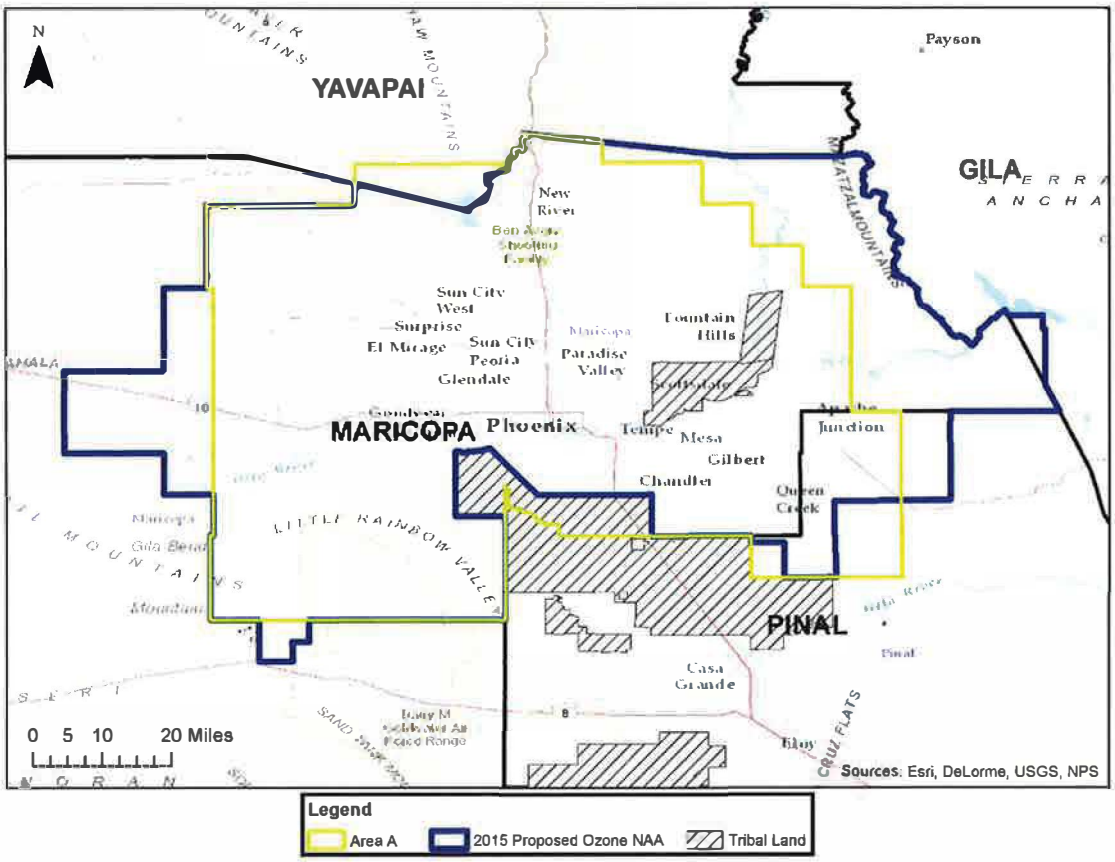


Figure 3-10 Area A Boundary in Maricopa and Pinal Counties



3.1.2.2 Traffic Data

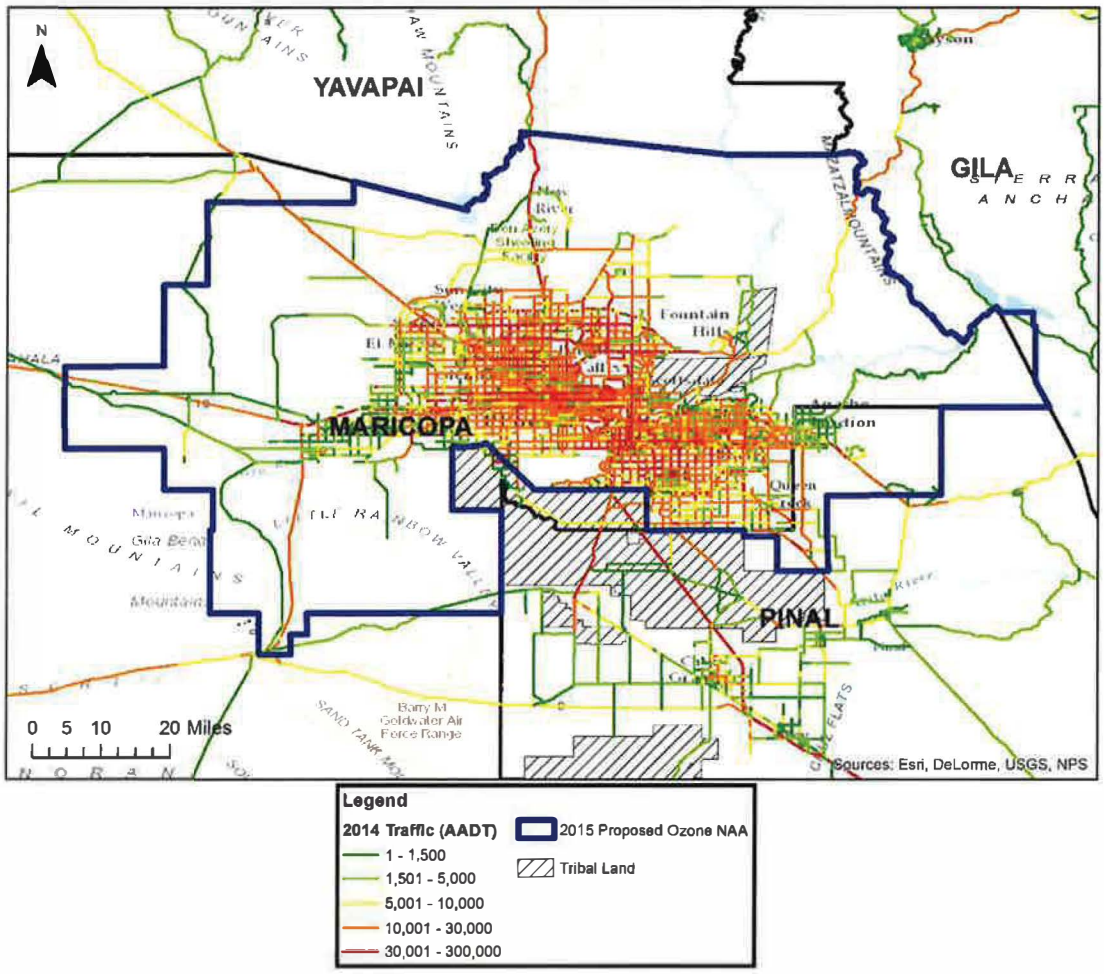
Figure 3-11 below represents average annual daily traffic (AADT) in the Maricopa-Pinal-Gila area. AADT is the annualized average 24-hour volume of vehicles at a given point or section of highway or road. It is normally calculated by determining the bidirectional volume of vehicles during a given period and dividing that number by the number of days in that period.[50]

Annual vehicle miles traveled (VMT) for a particular road segment is AADT multiplied by the length of the road segment for which AADT was calculated. VMT for an area is the summed VMT for each road segment in an area. VMT for the Phoenix-Scottsdale-Mesa CBSA (Maricopa and Pinal Counties combined) is 35,063,383,521 miles, according to 2014 HPMS data. The VMT for the Maricopa-Pinal-Gila recommended area is 31,325,749,782 miles. That means that 89% of annual VMT in the entire CBSA is captured by recommending this area.

[50] Arizona Department of Transportation, *Data and Analysis: Average Annual Daily Traffic (AADT)*, https://www.azdot.gov/planning/DataandAnalysis (last visited May 27, 2016).

ADEQ also evaluated inter-county commuting flows in area. According to the U.S. Census 2009-2013 5-Year American Community Survey,[51] approximately 45% of surveyed Pinal County residents commute from Pinal to Maricopa County for work, specifically, 58,647 out of 130,542 commuters. Urban traffic is clearly apparent in San Tan Valley.

Figure 3-11 Maricopa-Pinal-Gila Nonattainment Area Traffic



3.1.2.3 Population Data

EPA's Boundary Guidance asserts that population information can serve as a potential indicator of the probable location and magnitude of ozone emissions sources. ADEQ believes that this in combination with the other four factors, especially meteorology, may serve to inform areas that should be included in a nonattainment boundary. Figure 3-12 and Figure 3-13 below represents the change in population density in the Phoenix metropolitan area between the years 2000 and 2010, according to the U.S. Census. Table 3-8, Table 3-9, and Table 3-10 below show the change

[51] U.S. Census Bureau, *2009-2013 5-Year American Community Survey Commuting Flows, Table 1 County to County Commuting Flows, available at* http://www.census.gov/hhes/commuting/ (last visited May 27, 2016).

in actual population between 2000 and 2010. Table 3-11 also represent the change in population, or first survey of population, for particular Census Designated Places (CDPs) in areas in and near the Queen Valley ozone monitor in Pinal County. These CDP areas are shown in Figure 3-14. San Tan Valley was not yet a CDP in 2000. 2010 was the first year that population was estimated for that particular area. Figure 3-13 shows that a large area of dense population growth is captured within the recommended nonattainment area. The total 2010 population for the CBSA is 4,192,887 people, and the 2010 population for the Maricopa-Pinal-Gila area is 3,945,124 people. That means that approximately 94% of the CBSA population is contained within the recommended area, even though the recommended area only comprises 36% of the entire CBSA. Given the high density of the San Tan Valley, it is likely that a considerable portion of Pinal County's population related activity is attributable to San Tan Valley.

Figure 3-12 Maricopa-Pinal-Gila Nonattainment Area 2000 Census Population Density

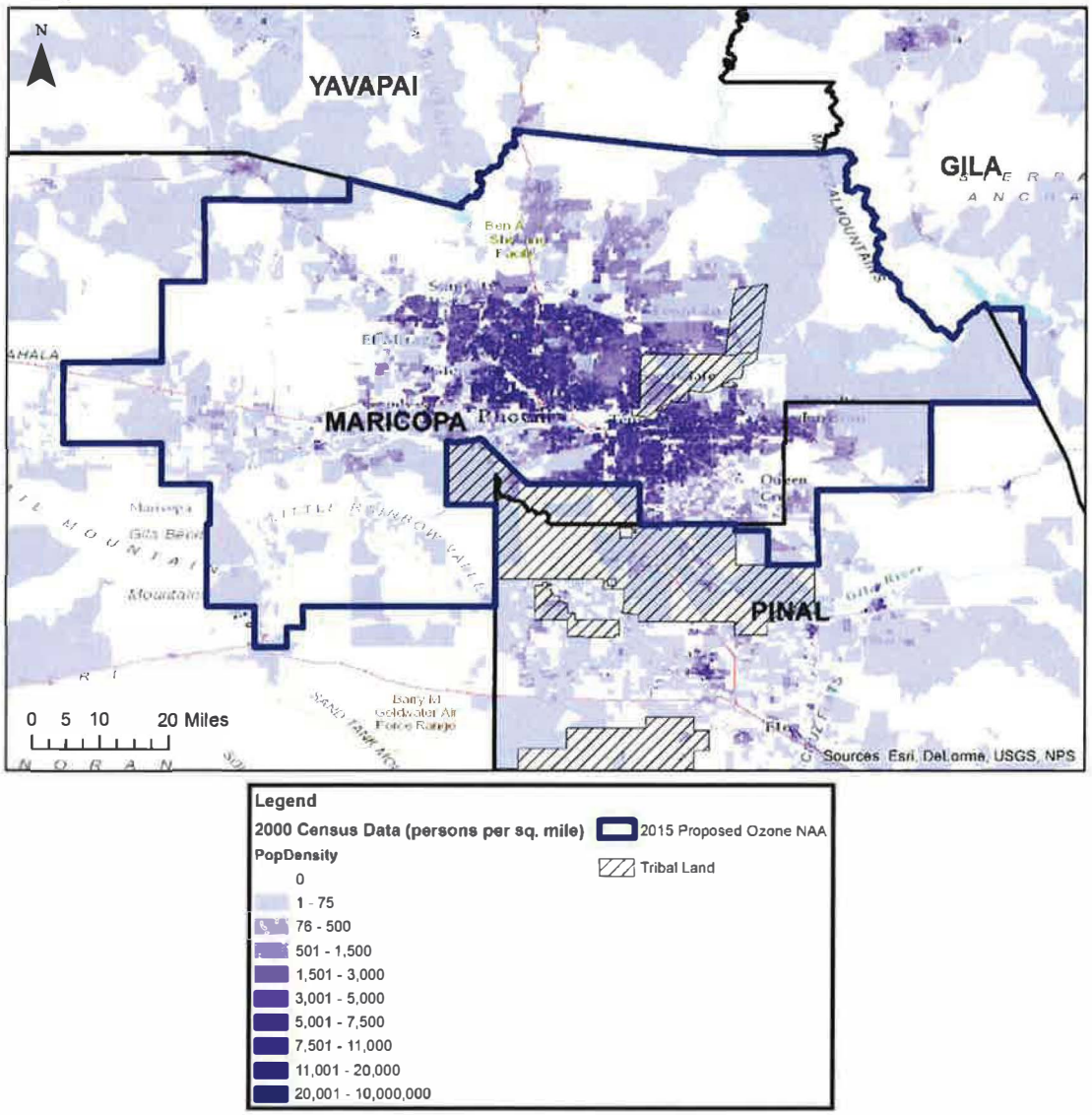
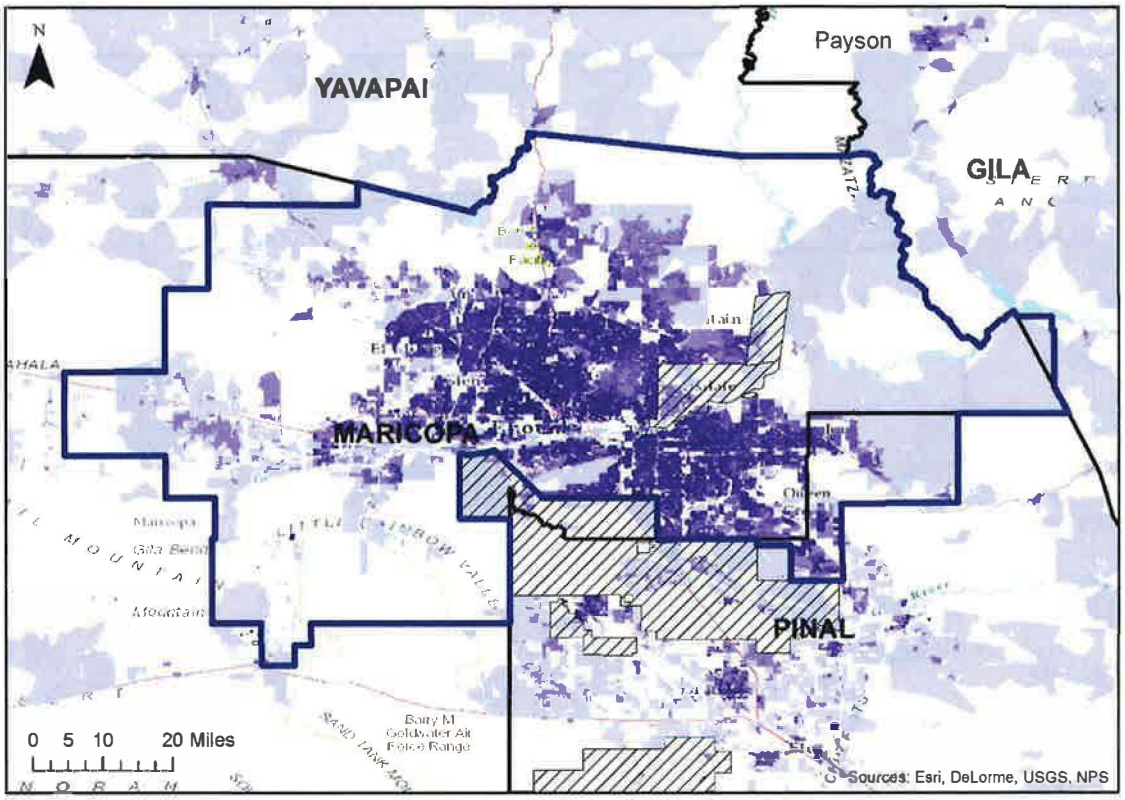


Figure 3-13 Maricopa-Pinal-Gila Nonattainment Area 2010 Census Population Density



Legend

2010 Census Data (persons per sq. mile)

PopDensity

- 0
- 1 - 75
- 76 - 500
- 501 - 1,500
- 1,501 - 3,000
- 3,001 - 5,000
- 5,001 - 7,500
- 7,501 - 11,000
- 11,001 - 20,000
- 20,001 - 10,000,000

2015 Proposed Ozone NAA

Tribal Land

Table 3-8 Maricopa County Population Changes

County/Municipality	Census 2000	Census 2010	Population Growth (% increase)
Maricopa	**3,072,149**	**3,817,117**	**24.2%**
Apache Junction (part)	273	294	7.7%
Avondale	35,883	76,238	112.5%
Buckeye	6,537	50,876	678.3%
Carefree	2,927	3,363	14.9%
Cave Creek	3,728	5,015	34.5%
Chandler	176,581	236,123	33.7%

County/Municipality	Census 2000	Census 2010	Population Growth (% increase)
El Mirage	7,609	31,797	317.9%
Fountain Hills	20,235	22,489	11.1%
Gila Bend	1,980	1,922	-2.9%
Gilbert	109,697	208,453	90.0%
Glendale	218,812	226,721	3.6%
Goodyear	18,911	65,275	245.2%
Guadalupe	5,228	5,523	5.6%
Litchfield Park	3,810	5,476	43.7%
Mesa	396,375	439,041	10.8%
Paradise Valley	13,664	12,820	-6.2%
Peoria (part)	108,363	154,058	42.2%
Phoenix	1,321,045	1,445,632	9.4%
Queen Creek (part)	4,197	25,912	517.4%
Scottsdale	202,705	217,385	7.2%
Surprise	30,848	117,517	281.0%
Tempe	158,625	161,719	2.0%
Tolleson	4,974	6,545	31.6%
Wickenburg	5,082	6,363	25.2%
Youngtown	3,010	6,156	104.5%
Balance of Maricopa County	211,050	284,404	34.8%

Table 3-9 Pinal County Population Changes

County/Municipality	Census 2000	Census 2010	Population Growth (% increase)
Pinal	**179,727**	**375,770**	**109.1%**
Apache Junction (part)	31,541	35,546	12.7%
Casa Grande	25,224	48,571	92.6%
Coolidge	7,786	11,825	51.9%
Eloy	10,375	16,631	60.3%
Florence	17,054	25,536	49.7%
Kearny	2,249	1,950	-13.3%
Mammoth	1,762	1,426	-19.1%
Maricopa City[52]	(X)	43,482	--
Queen Creek (part)	119	449	277.3%
Superior	3,254	2,837	-12.8%
Winkelman (part)	4	0	-100.0%
Balance of Pinal County	78,737	187,517	138.2%

[52] Locality was formed or incorporated after Census 2000.

Table 3-10 Gila County Population Changes

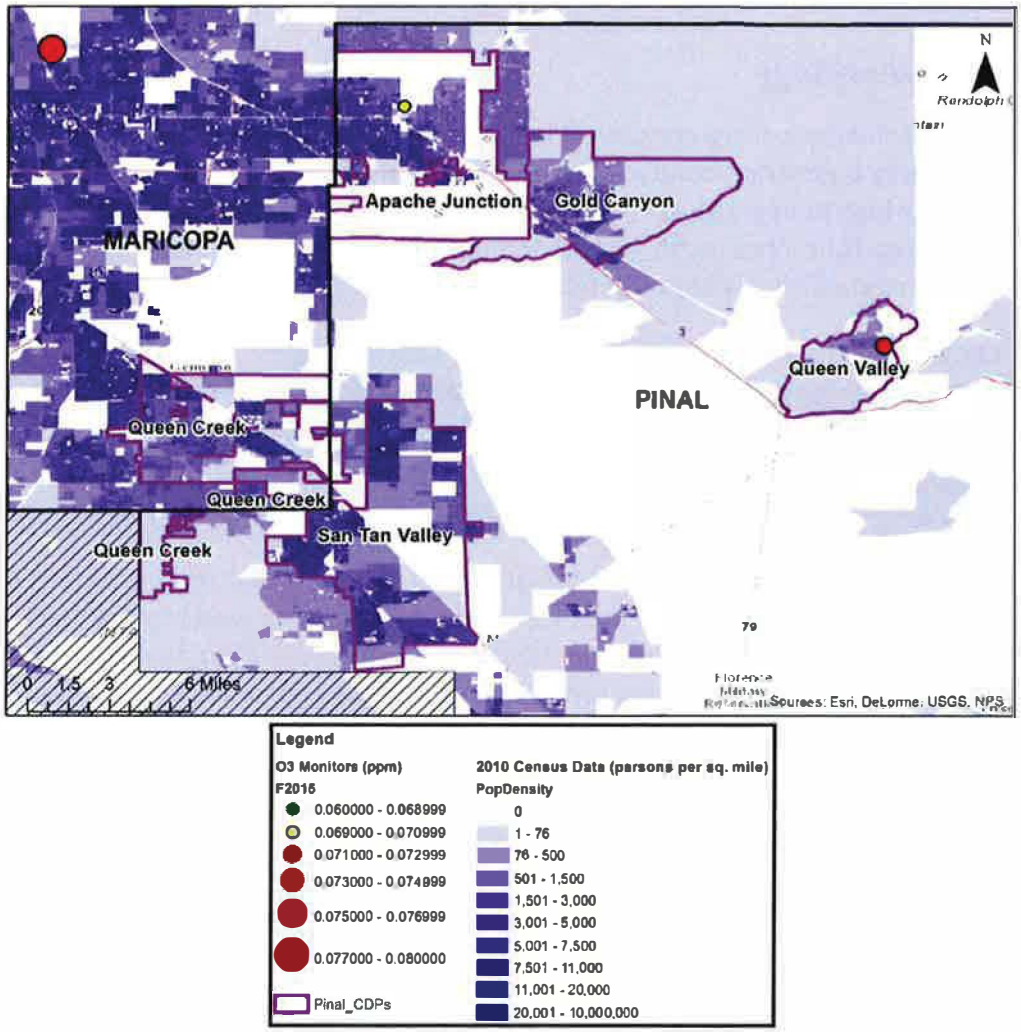
County/Municipality	Census 2000	Census 2010	Population Growth (% increase)
Gila	**51,335**	**53,597**	**4.4%**
Globe	7,486	7,532	0.6%
Hayden	892	662	-25.8%
Miami	1,936	1,837	-5.1%
Payson	13,620	15,301	12.3%
Star Valley [53]	(X)	2,310	--
Winkelman (part)	439	353	-19.6%
Balance of Gila County	24,940	25,602	2.7%

Table 3-11 Census Designated Places (CDPs) Population Changes

Area Name	2000 Population	2010 Population	% Growth
Pinal County Overall	179,727	375,770	109%
Specific areas:			
Queen Creek (total)	4,316	26,361	511%
Apache Junction	31,814	35,840	13%
Gold Canyon CDP	6,029	10,159	68.5%
Queen Valley CDP	820	788	-3.9%
San Tan Valley CDP	N/A	81,321	--

[53] Locality was formed or incorporated after Census 2000.

Figure 3-14 Census Designated Places of and near the Queen Valley Monitor



3.1.2.4 Transport and Background Data

In addition to the literature mentioned in Section 2.3.2, the Atmospheric Chemistry and Physics Journal published a paper documenting a photochemical modeling study demonstrating transport from California.[54] Past observations and studies through aircraft observations, back trajectory analyses, and now photochemical transport modeling have indicated that tropospheric ozone is attributable to both Arizona anthropogenic emissions and regional transport. The study shows that Arizona emissions are a main contributor to hourly daytime concentrations in Phoenix in July, but that Southern California emissions transported to Phoenix can contribute hourly emissions between 10-40 ppb during the day.[55] In addition, Southern California emissions can

[54] J. Li et al., *Regional-scale Transport of Air Pollutants: Impacts of Southern California Emissions on Phoenix Ground-Level Ozone Concentrations*, 15 ATMOSPHERIC CHEMISTRY AND PHYSICS DISCUSSIONS 8361-8401 (2015), *available at* http://www.atmos-chem-phys.net/15/9345/2015/acp-15-9345-2015.pdf.
[55] *Id.* at 8372.

increase daily 8-hour maxes in the Phoenix area by up to 32 ppb.[56] While the contribution from California varies, it has the potential to be significantly in the Phoenix area.

3.1.3 Meteorology

Meteorological conditions play a critical role in the formation and distribution of ozone. Daytime in the Phoenix area is generally conducive to ozone formation because of the near constant heat and sun. Average high temperatures in the ozone season from April to October, range from about 85 to 105 degrees Fahrenheit, with highest temperatures occurring in July. Table 3-12 below shows average temperatures and precipitation at the Phoenix Sky Harbor Airport location.

Table 3-12 Climate Summary at Phoenix Sky Harbor Location, AZ[57]

Years 1933-2015	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg. Max. Temp. (F)	66.2	70	76	84.5	93.7	103	105.7	103.6	99.1	88.3	75.3	66.5	86
Avg. Min. Temp. (F)	41.7	44.5	49.2	55.9	64.3	72.9	80.6	79.4	73.1	61	48.5	41.8	59.4
Avg. Total Precip. (in.)	0.78	0.76	0.84	0.28	0.13	0.09	0.86	1.02	0.68	0.57	0.55	0.9	7.46

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. Wind patterns in Phoenix suggest that ozone and ozone precursors can be transported in the morning from the far west and southern portions of the valley and impact central and eastern monitors in the Phoenix valley. The NOX and VOC rich air mass can become photochemically active during the transport process and begin to produce ozone. When the air parcel finally drifts into the Phoenix metropolitan area, the NOX and VOC rich air can mix with the NOX and VOC rich Phoenix air, and depending on the conditions (i.e. sunlight, heat, VOC/NOX mixing ratios) ozone concentrations can begin to climb. Absent 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.

3.1.3.1 Maricopa County Representative Data

3.1.3.1.1 Wind Roses

Figure 3-15 shows the location of the five selected representative ozone monitoring sites in Maricopa County for wind rose analysis. Figure 3-16, Figure 3-17, Figure 3-18, Figure 3-19, and Figure 3-20 are wind roses showing the annual wind patterns at those selected sites in Maricopa County for 2013-2015. Overall, for the five sites displayed below, the annual winds show significant variability in wind direction across the valley.

[56] *Id.* at 8379.

[57] WESTERN REGIONAL CLIMATE CENTER, *Phoenix Sky Harbor Int'l AP, Arizona (026481) Period of Record Monthly Climate summary, period of record 06/01/1933 to 01/20/2015*, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?az6481 (last visited May 27, 2016).

Figure 3-15 Locations of Selected Wind Rose Monitoring Sites

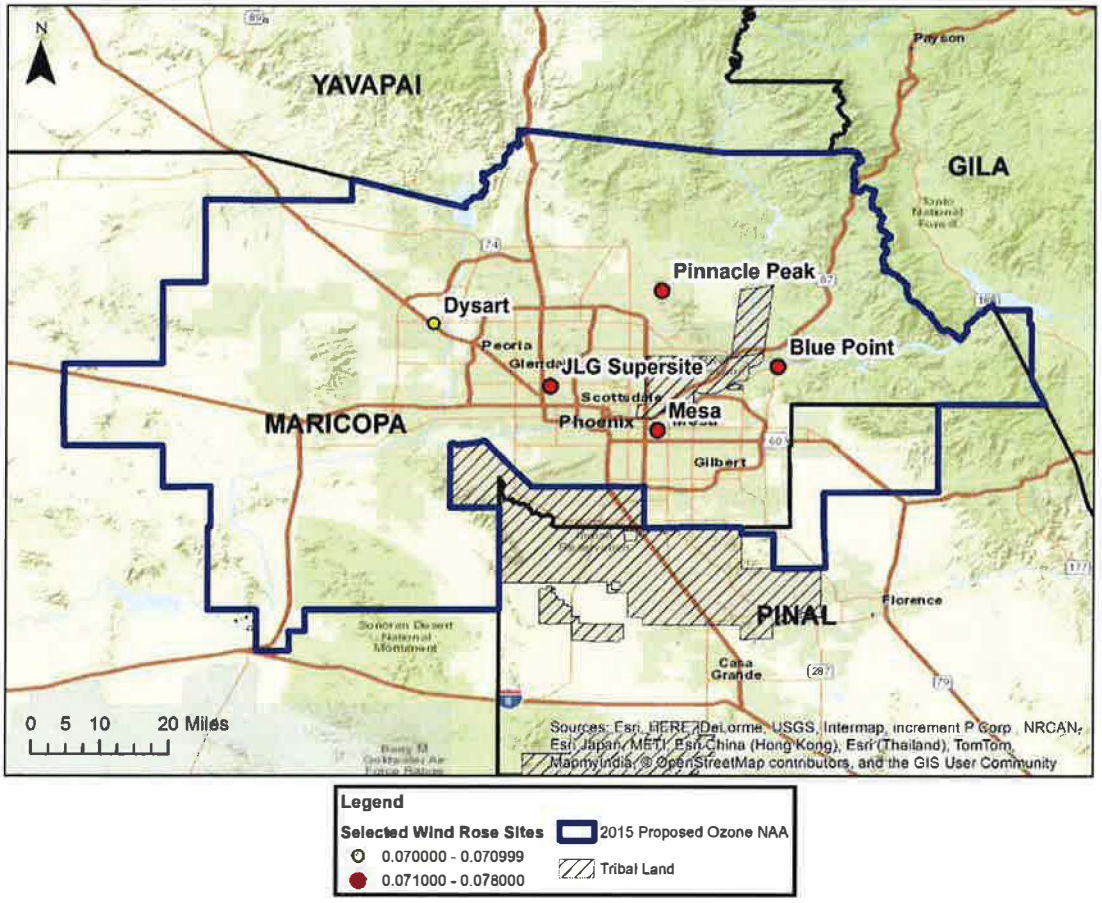


Figure 3-16 Blue Point Monitor – Annual Winds

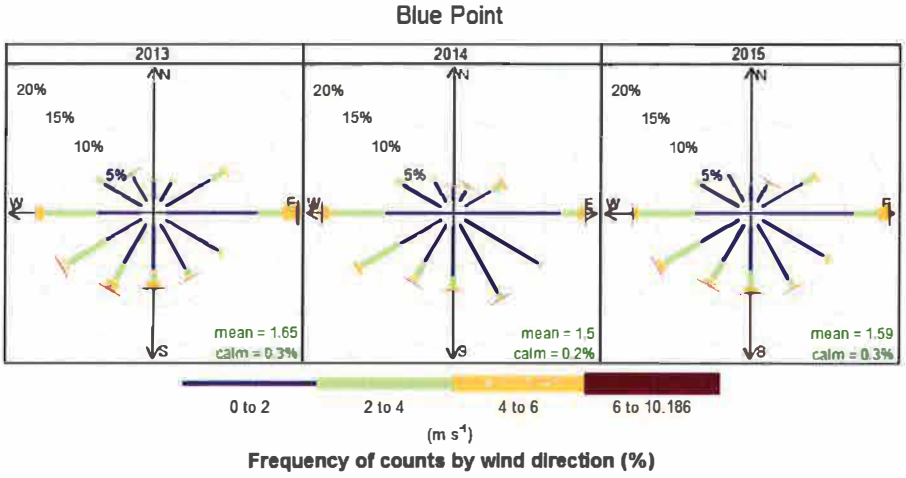


Figure 3-17 Dysart Monitor – Annual Winds

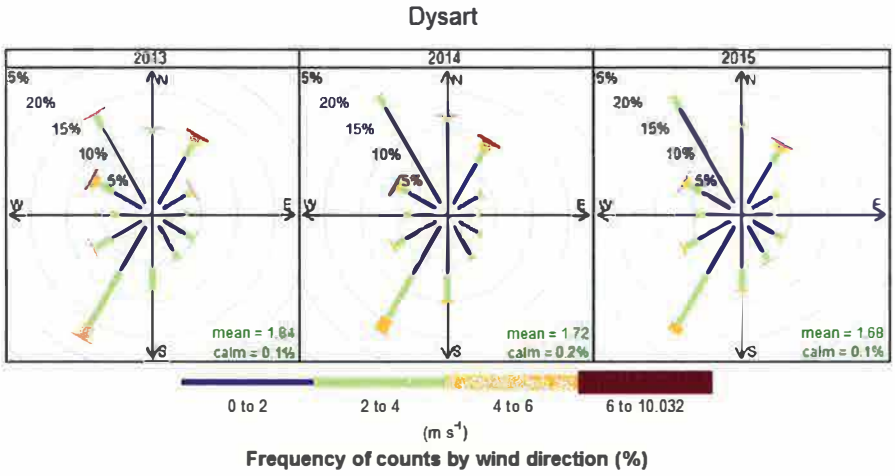


Figure 3-18 JLG Supersite Monitor – Annual Winds

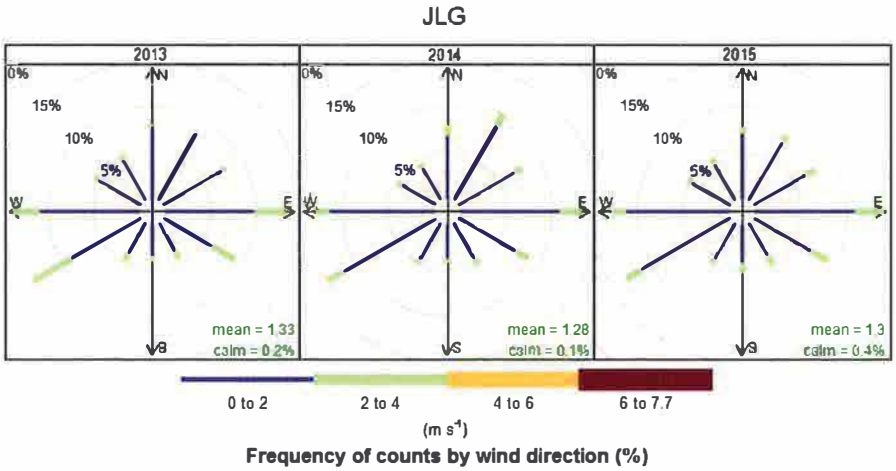


Figure 3-19 Mesa Monitor – Annual Winds

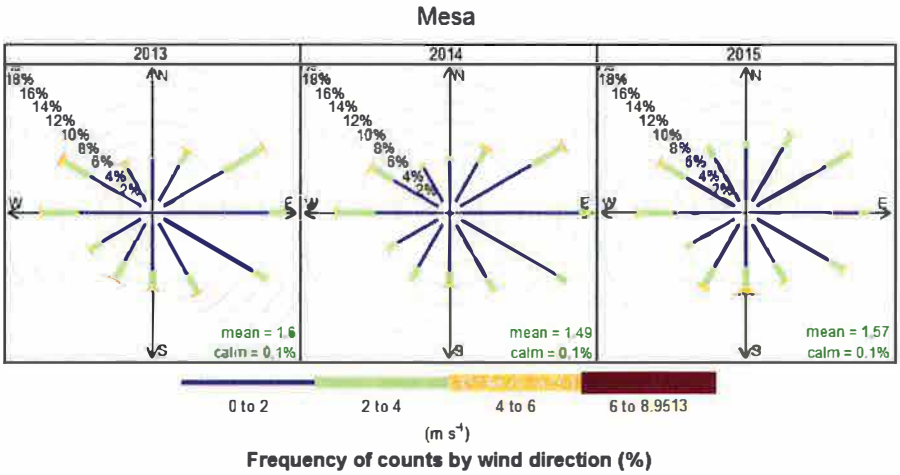


Figure 3-20 Pinnacle Peak Monitor – Annual Winds

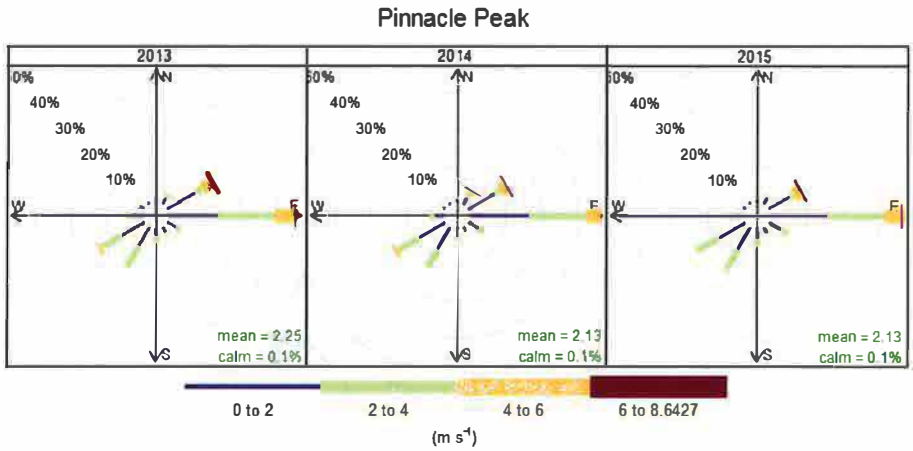
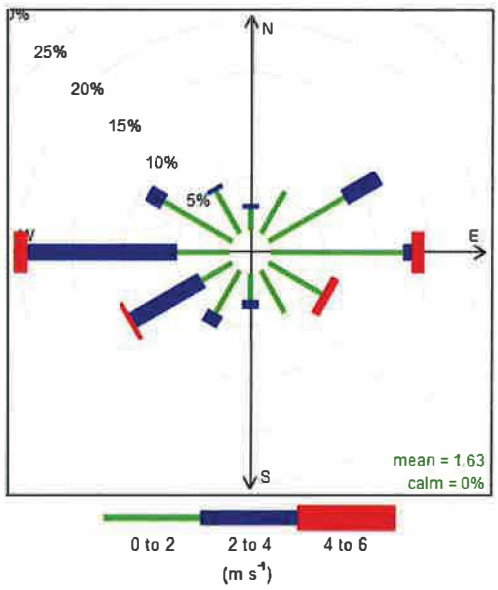


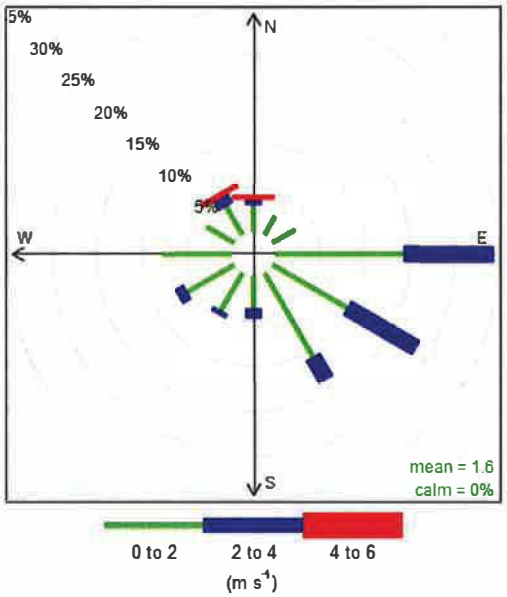
Figure 3-21, Figure 3-22, Figure 3-23, and Figure 3-24 are wind roses showing 24 hour wind patterns for the 10 highest ozone concentration days in 2013-2015 at selected representative violating ozone monitoring sites in Maricopa County.

Figure 3-21 Blue Point Monitor – 10 Highest Ozone Concentration Day Winds



This 24-hour wind rose for the eastern most selected monitor shows strong winds from the west, the urban core of the Phoenix metropolitan area, during ozone exceedance days. Further analysis also showed that winds from 10am-8pm on these 10 days were predominantly from the west.

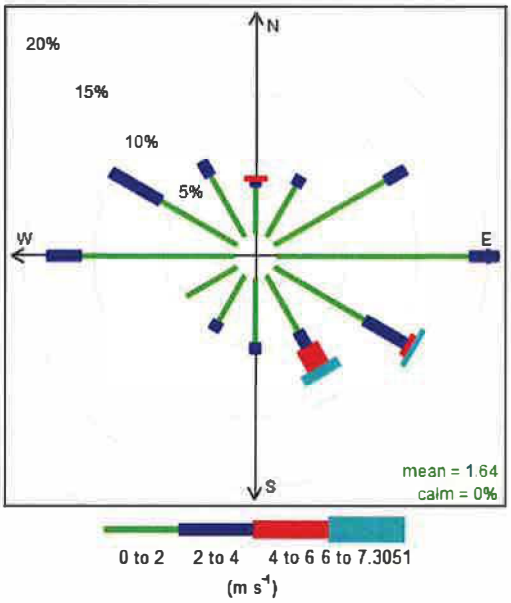
Figure 3-22 JLG Supersite Monitor – 10 Highest Ozone Concentration Day Winds



Frequency of counts by wind direction (%)

This 24-hour wind rose for this monitor located in central Phoenix shows a high frequency of winds from the east and southeast on ozone exceedance days. Further analysis showed that winds from 10am-8pm on these 10 days flowed somewhat less frequently from the east and slightly more frequently from the southwest than displayed above.

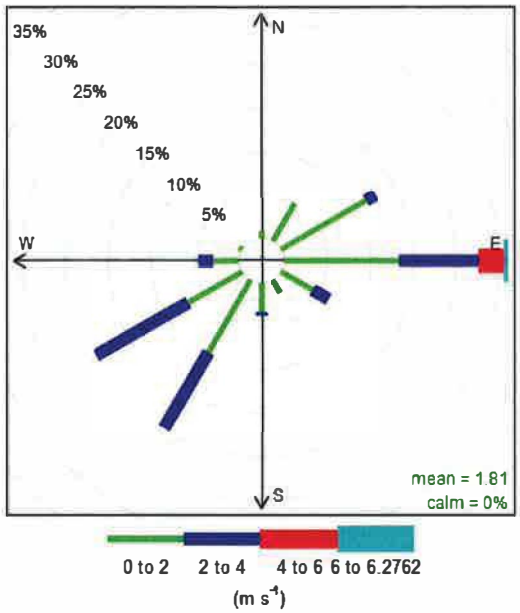
Figure 3-23 Mesa Monitor – 10 Highest Ozone Concentration Day Winds



Frequency of counts by wind direction (%)

The 24-hour wind rose for the southeastern most selected monitor shows varied wind directions on ozone exceedance days. Further analysis of the 10am-8pm winds on these 10 days showed far fewer easterly winds and significantly more westerly winds than shown above.

Figure 3-24 Pinnacle Peak Monitor – 10 Highest Ozone Concentration Day Winds



Frequency of counts by wind direction (%)

The 24-hour wind rose for this northeastern monitor, shows a split between easterly winds and southwesterly winds on these ozone exceedance days. Further analysis also showed that the 10am-8pm winds on these 10 days were predominantly from the southwest, but showed little wind flow from the east.

3.1.3.1.2 HYSPLITs

Pictured in Figure 3-25 below are 24 hour HYSPLIT trajectories to the ADEQ operated JLG Supersite. The image reflects a back trajectory for each hour in the 8 hour exceedance day average for the 10 highest ozone concentration days between 2013 and 2015. For methodologies and additional HYSPLIT model results please see Appendix A, section 3 and Exhibit A1, Section 14.

Figure 3-25 JLG Supersite – 10 Highest Ozone Days HYSPLIT Back Trajectories

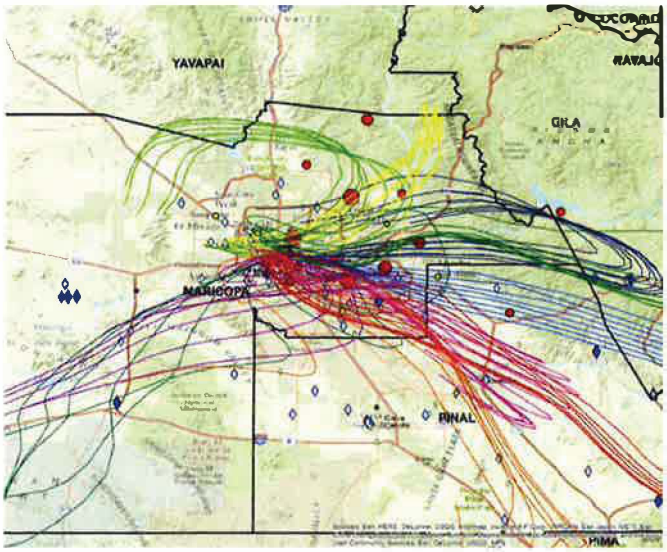
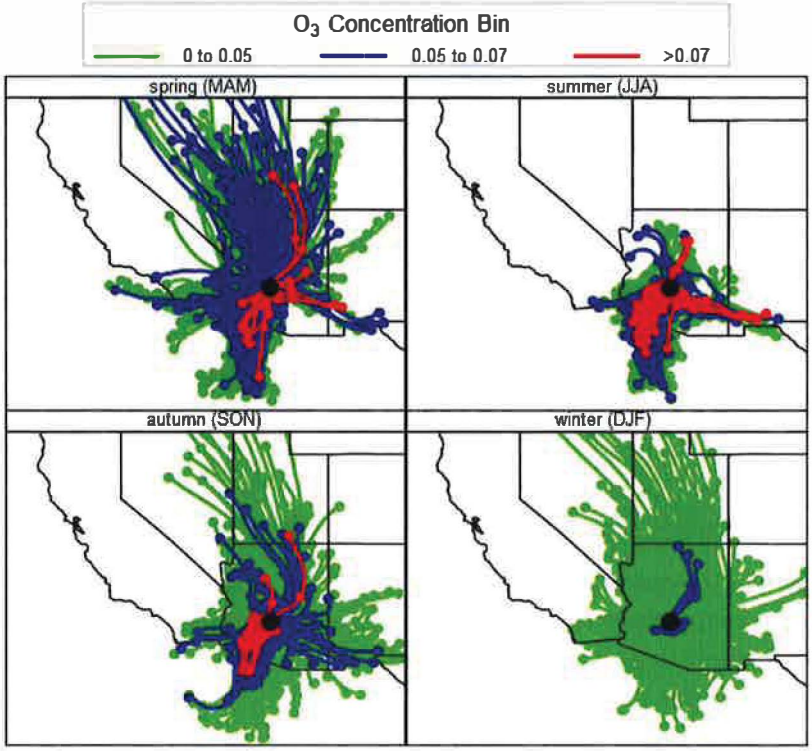


Figure 3-26 below is a diagram representing HYSPLIT 24 hour back trajectories. A trajectory is drawn to represent every third hour in a two year period (2013-2014),[58] and color-coded by concentration. The image is provided in order to give an overall contextual picture of modeled incoming meteorology over the course of a year.

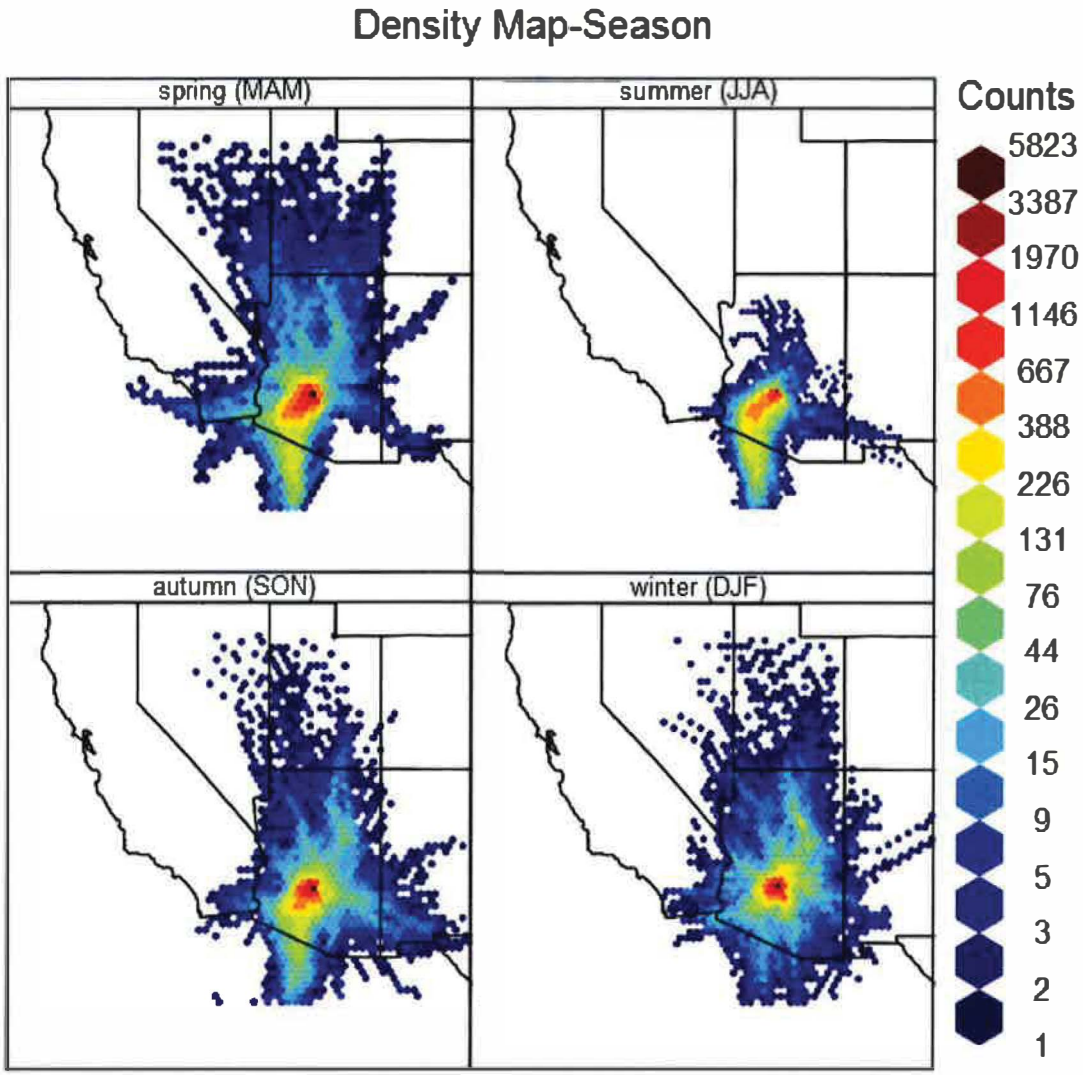
[58] i.e. Eight trajectories are drawn in a day.

Figure 3-26 JLG Supersite Seasonal Ozone Concentration Specific HYSPLIT Trajectory Map



In Figure 3-27 below, see a back-trajectory density analysis showing how frequently modeled wind trajectories passed through gridded area sections on their way to the JLG Supersite monitor between 2013 and 2014. A 24 hour trajectory is drawn to represent every third hour in a two year period (2013-2014)

Figure 3-27 JLG Supersite Seasonal HYSPLIT Density Map



3.1.3.2 Pinal County's Queen Valley and San Tan Representative Data

3.1.3.2.1 Wind Roses

Figure 3-28 shows wind roses for the annual wind patterns at the Queen Valley monitor for 2013-2015. The annual wind rose below shows a pattern of strong winds coming from the northeast and east and similarly frequent cumulative winds coming from the west, northwest, and southwest.

Figure 3-28 Queen Valley Monitor – Annual Winds

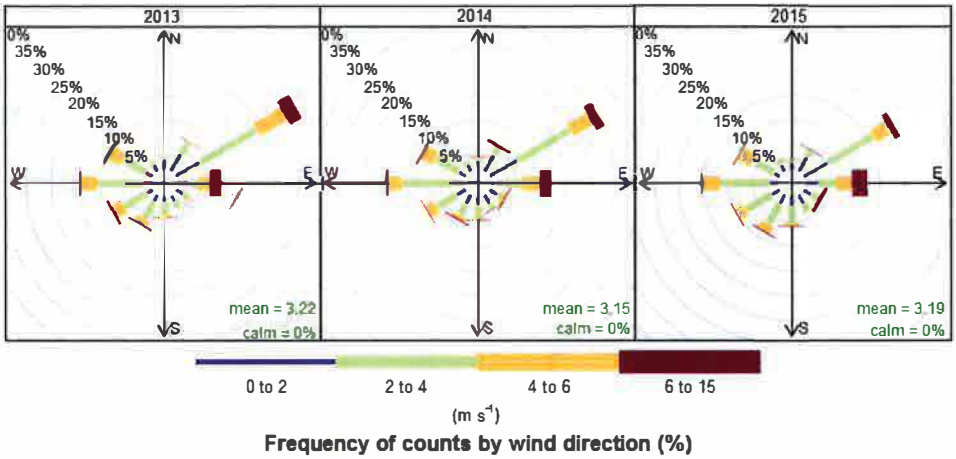
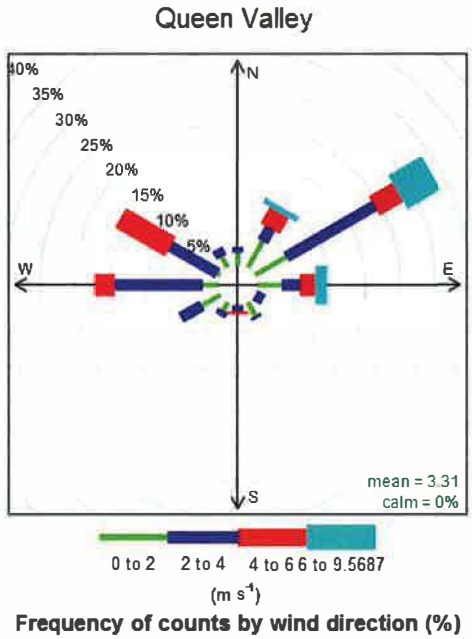


Figure 3-29 is a wind rose showing 24 hour wind patterns for the 10 highest days in 2013-2015 at the Queen Valley monitor. The ozone exceedance days' wind rose shares a similar pattern with the annual wind rose, with strong frequent winds from the northeast, and slightly less frequent, calmer winds from the northwest and west.

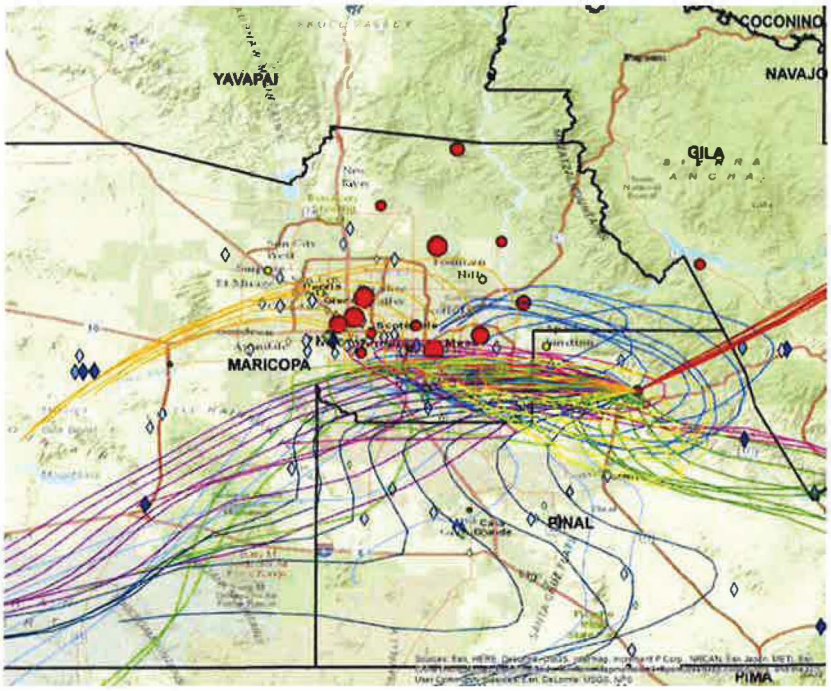
Figure 3-29 Queen Valley Monitor – 10 Highest Ozone Concentration Day Winds



3.1.3.2.2 HYSPLITs

Pictured in Figure 3-30 below are 24 hour HYSPLIT trajectories to the Queen Valley ozone monitor in Pinal County. The images reflect a trajectory for each hour in the 8-hour exceedances for the 10 highest ozone concentration days during 2013-2015. For methodology and additional HYSPLIT model results please see Appendix A, Section 3 and Exhibit A1, Section 15.

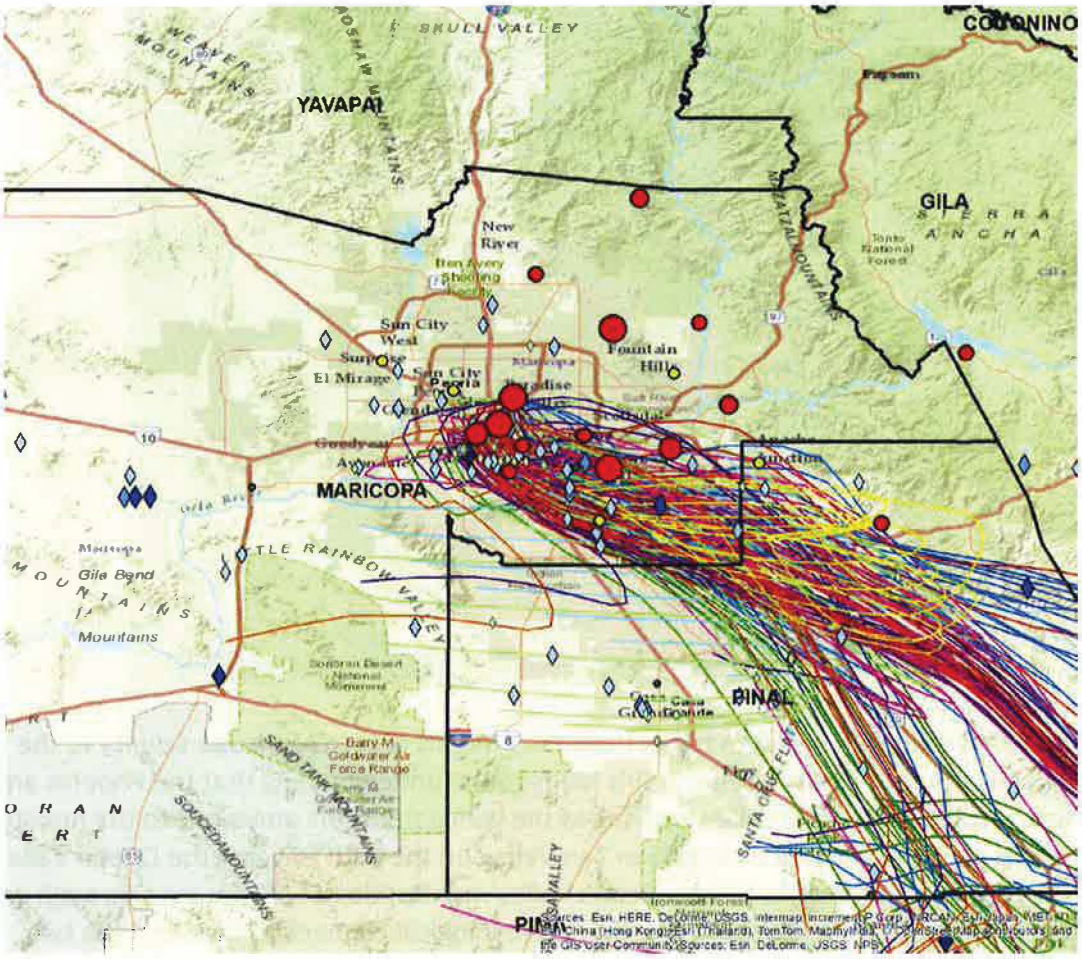
Figure 3-30 Queen Valley – 10 Highest Ozone Days HYSPLIT Back Trajectories



As shown above, air parcels often travel from the Phoenix area in Maricopa County to the Queen Valley monitor in Pinal County. This lends to the understanding that the Phoenix area emissions impact the Queen Valley monitor as the winds transport emissions to the monitor. Some of the air parcels travel through San Tan Valley on the path towards the Queen Valley monitor. While air trajectories for the Queen Valley monitor do not always pass through or originate from San Tan Valley, there is still a meteorological connection between the two.

Further, ADEQ also analyzed HYSPLIT trajectories from several other monitors in the central Phoenix area. Several of the air parcel trajectories that impact central Phoenix travel through the San Tan Valley. See Figure 3-31 below. This shows a strong meteorological connection between San Tan Valley and the rest of the Phoenix area.

Figure 3-31 Phoenix Area HYSPLITs That Pass Through San Tan Valley on Exceedance Days



3.1.3.2.3 Diurnal Analysis

ADEQ staff conducted a diurnal wind pattern analysis for the Queen Valley monitor, to determine where the emissions are likely transported from during exceeding hours. The HYSPLITs indicate that emissions are likely from the Maricopa County area of Phoenix and the nearby San Tan Valley. Looking at wind roses for the 10 highest days at Queen Valley, staff suspected that mountain valley wind patterns were the cause of the high percentage of eastern winds, shown on the above wind roses (See Figure 3-28 and Figure 3-29). ADEQ further analyzed diurnal wind patterns on the 10 highest ozone concentration days for 2013-2015 and found that during the exceedance hours (between 10:00 a.m. and 8:00 p.m.), winds are generally westerly. See Figure 3-32, Figure 3-33, and Figure 3-34 below:

Figure 3-32 Diurnal Wind Pattern for 10 Highest Ozone Days at Queen Valley

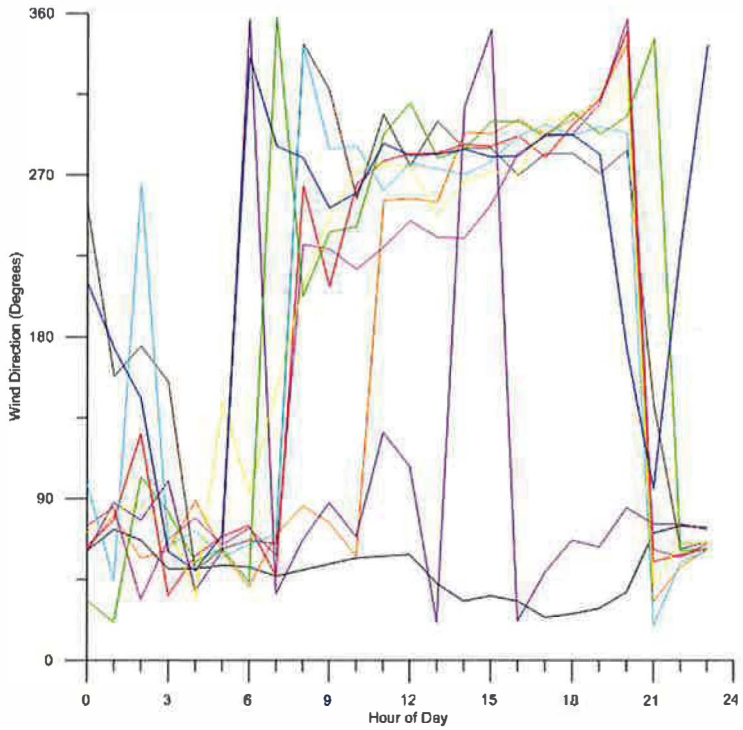


Figure 3-33 Average Diurnal Wind Pattern for 10 Highest Ozone Days at Queen Valley

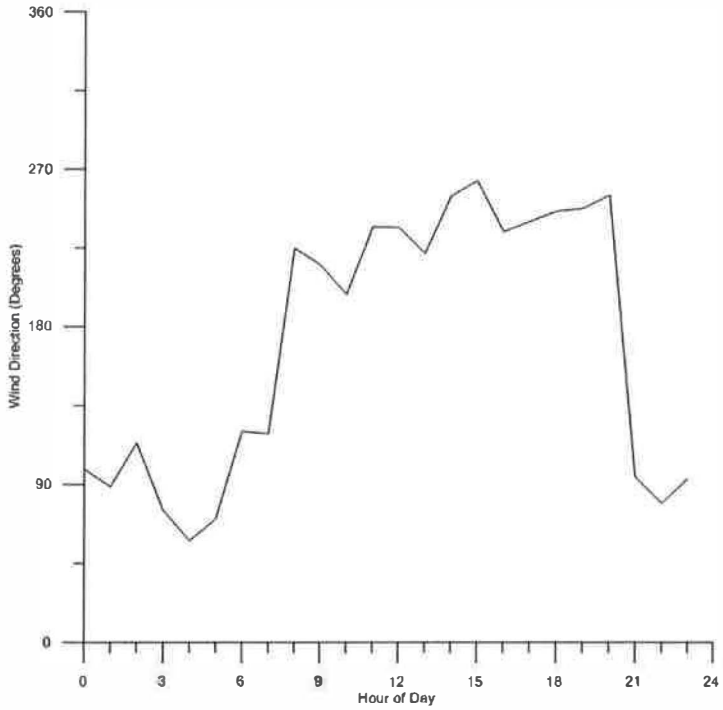
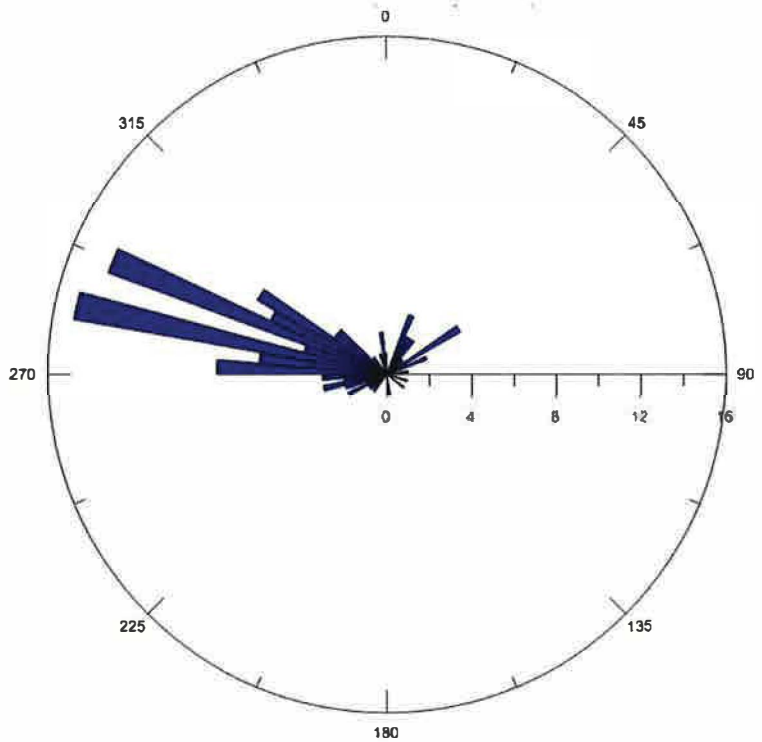


Figure 3-34 Queen Valley 10 am to 8pm 10 Highest Ozone Days Wind Directions



3.1.3.3 Gila County's Tonto National Monument Representative Data

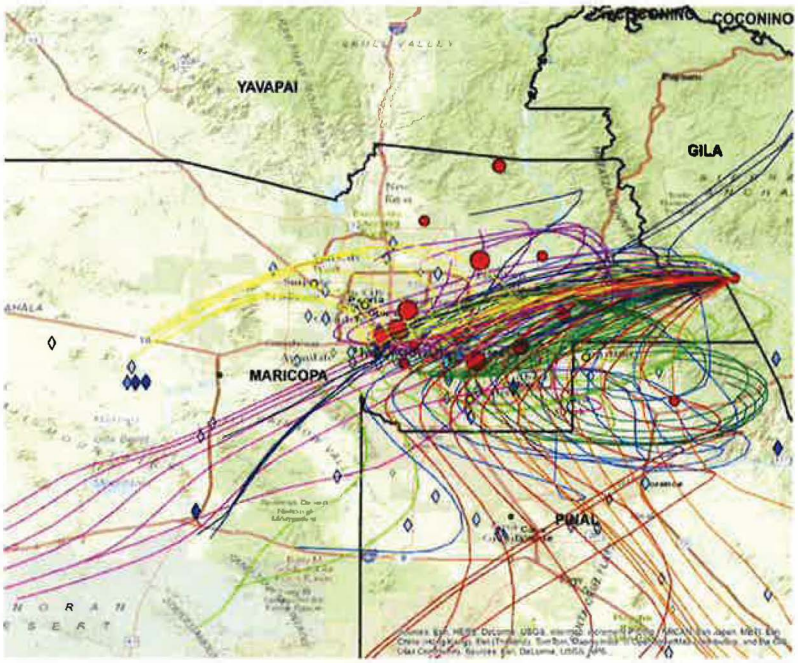
3.1.3.3.1 Wind Roses

There is no meteorological station located at the Tonto National Monument ozone monitor in Gila County. ADEQ considered reviewing meteorological data at the Blue Point ozone monitor as a surrogate for weather information at the Tonto National Monument monitor, but concluded that Blue Point data is likely not representative enough considering the distance from the Tonto monitor and the difference in topography.

3.1.3.3.2 HYSPLITs

Pictured in Figure 3-35 are 24 hour HYSPLIT back trajectories from the Tonto National Monument ozone monitor in Gila County. The images reflect a trajectory for each hour in the 8 hour exceedances for the 10 highest ozone concentration days during 2013-2015. For methodology and additional HYSPLIT model results please see Appendix A, Section 3 and Exhibit A1, Section 1.

Figure 3-35 Tonto National Monument – 10 Highest Ozone Days HYSPLIT Back Trajectories



3.1.4 Topography

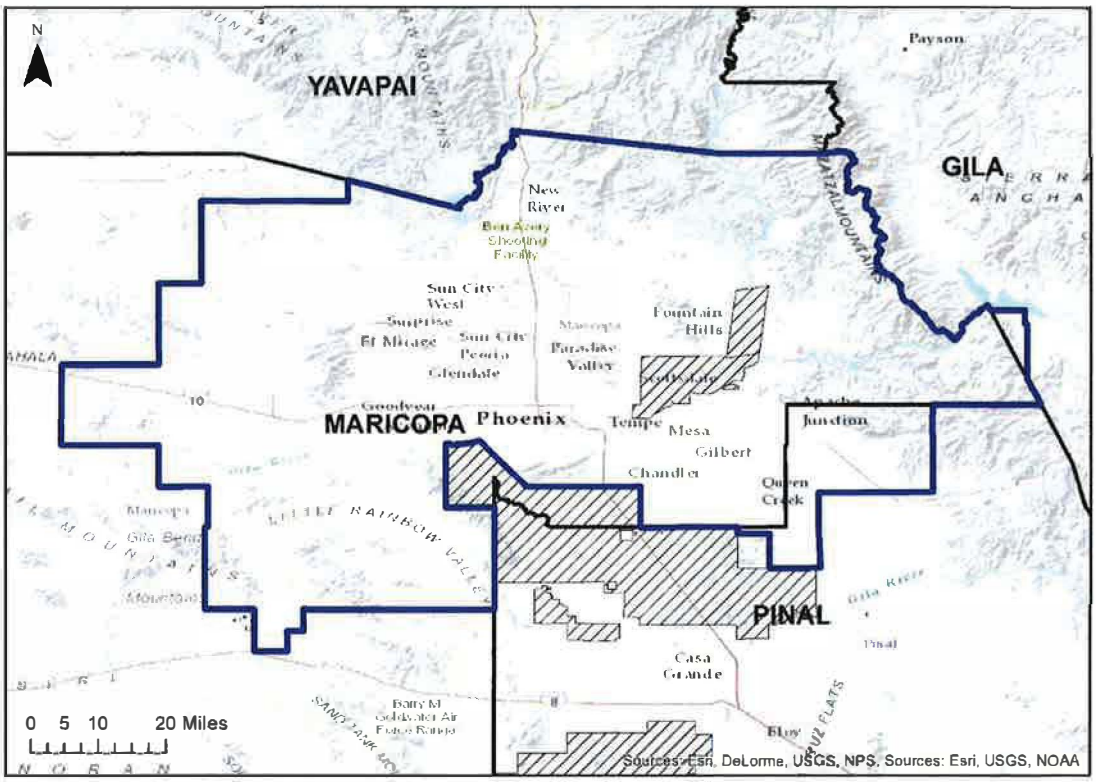
Although located in the broad and mostly flat Salt River Valley, metropolitan Phoenix lies close to mountainous, complex terrain. The valley is bordered by several mountain chains including: the Mazatzal and Superstition Mountains to the east, the New River Mountains to the north and northeast, the Hieroglyphic Mountains to the northwest near Lake Pleasant, the White Tank Mountains in the west, the Estrella Mountains to the southwest, and the South Mountains to the south. Elevations range from about 1000 feet above sea level near downtown Phoenix to nearly 8000 feet along the Maricopa County border with Gila County and Yavapai County. This higher terrain, located to the north and east, generally forms a natural boundary between the Salt River Valley and complex terrain beyond the County border.

Because Phoenix lies within a valley, a typical mountain-valley diurnal wind pattern takes place. Hence, in the absence of major storm fronts, topography dictates the strength and direction of surface winds and drives the diurnal wind shift and flow. Eastern Maricopa County typically receives the Phoenix urban plume because of the prevailing late daytime and early evening valley-to-mountain surface winds out of the southwest. Absent any overriding weather pattern, winds typically start out from the east in the morning, become near calm around noon, and shift out of the southwest and west during the afternoon. On days where there is a thermal low situated over Baja, the afternoon southwest flow may have enough momentum to push the ozone plume up and over the mountains to the east, triggering exceedances at the Tonto National Monument monitor in Gila County. When there is little influence from the thermal low, these afternoon westerly (out of the west) winds may not have the momentum to get over the mountains, and thus fall back down to the west. This is often evident by a secondary spike at several locations late at night or early morning the next day. For example, ozone levels at the Rio

Verde monitor may increase steadily throughout the day, peaking late in the afternoon. At this point, concentrations at the monitor may begin to decrease until the air parcel reaches the mountains and sloshes back to cause a concentration spike in the late evening or early the next morning. This slosh effect has been discussed in a paper entitled *A Case Study of the Climatic Mechanisms Contributing to the Transport of Lower Atmospheric Ozone Across Metropolitan Phoenix, Arizona, USA* (Ellis, Hilenbrandt, Thomas, Fernando 1999).

For an overall picture of the topography in the Phoenix area, see Figure 3-36 below:

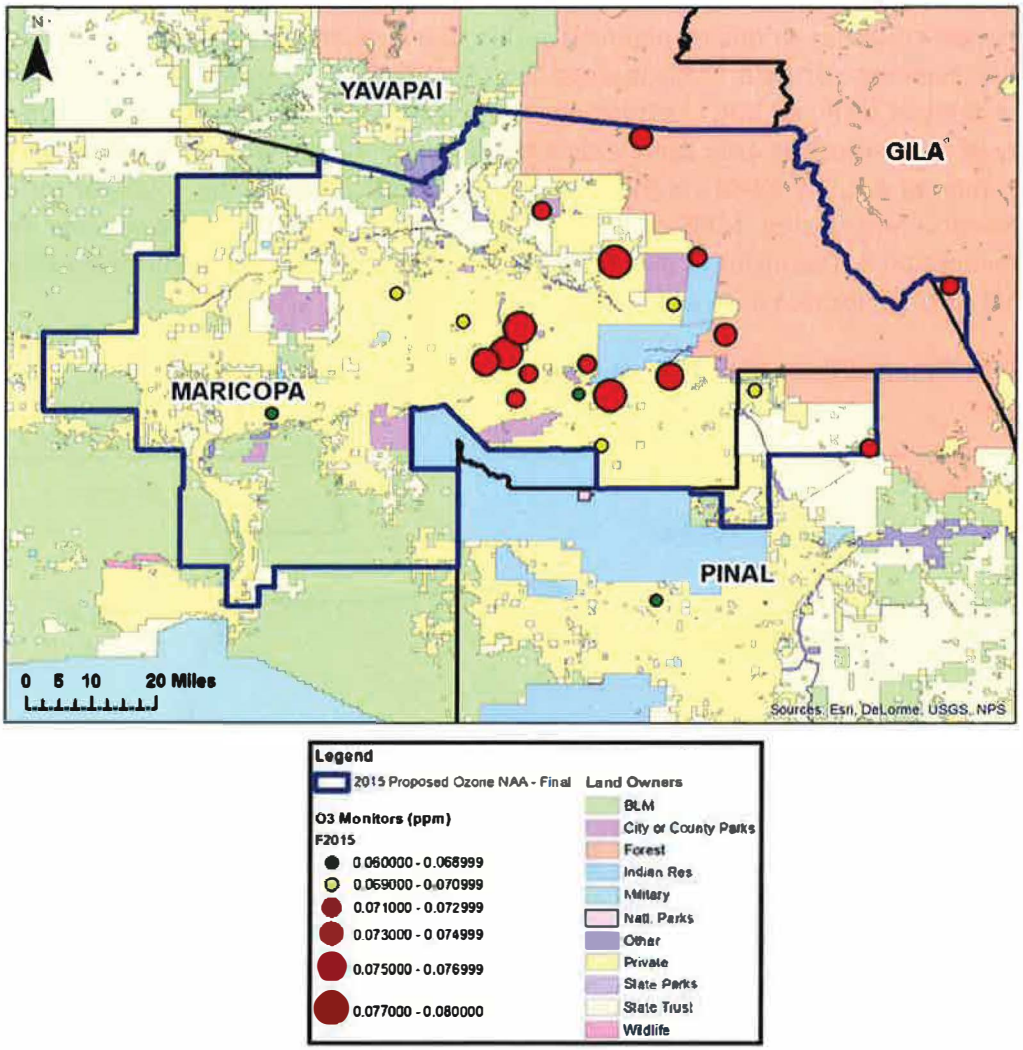
Figure 3-36 Phoenix Metropolitan Area Topography



3.1.5 Jurisdiction

ADEQ did not base its analysis on monitors located on tribal land. While many of the monitors in the city lay on private or state land, five of the monitors in the Phoenix area are located adjacent to or on Tonto National Forest land. See Figure 3-37 for land ownership.

Figure 3-37 Phoenix Metropolitan Area Land Ownership[59]



3.1.5.1 Air Quality Planning

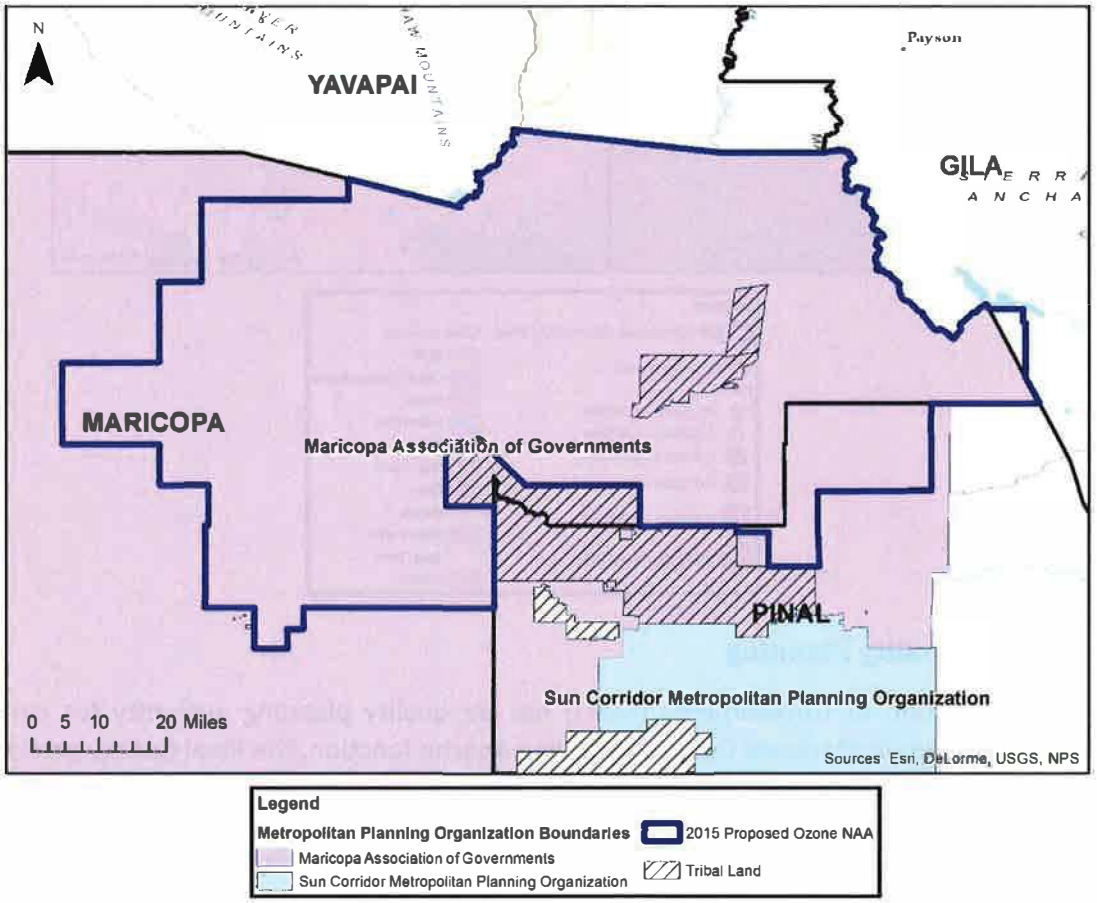
Maricopa Association of Governments (MAG) has air quality planning authority for current nonattainment areas in Maricopa County, including Apache Junction, the Pinal County portion of the 2008 Phoenix-Mesa Ozone Nonattainment Area. MAG also has jurisdiction over two particulate matter nonattainment areas in Pinal County, even where the areas overlap with Sun Corridor's jurisdiction as the certified metropolitan planning organization (MPO) under the

[59] The Pinal Air Park monitor is the only monitor not pictured in this figure because it is located so much further south and including the monitor would decrease resolution on the recommended area. The monitor is attaining the 2015 standard by a wide margin at 65 ppb and is located on the border with Pima County near the east to west midpoint of Pinal County. Please see Figure A2-1 of the TSD to see all the monitor locations in Pinal County.

Federal Highway Administration, according to Governor Ducey's 2016 certification and re-certification of air quality planning organizations per A.R.S. § 49-406(A).[60]

ADEQ also generally has air quality planning authority over parts of the state that do not have an air quality planning certified MPO (except for tribal land).[61] Figure 3-38 below shows the locations of tribal land and MPO jurisdiction. There is no MPO that has transportation planning authority in the immediate area surrounding the Gila County ozone monitor. However, ADEQ's interpretation of A.R.S. § 49-406 is that given a new certification by the governor for the 2015 Ozone Nonattainment area, MAG could assume air quality planning authority over the entire nonattainment area. This includes the small area in Gila County with no applicable MPO and any additional portions located in Pinal County.

Figure 3-38 Phoenix Metropolitan Area Tribal Land and MPO Jurisdiction



[60] Letter from Hon. Doug Ducey, Governor of Arizona, to Ms. Alexis Strauss, Acting Regional Administrator, EPA Region 9 (June 22, 2016) (on file with ADEQ).
[61] *See* ARS § 49-406(B).

3.1.5.2 Source Permitting and Enforcement[62]

Maricopa County has original jurisdiction to permit major sources within the County because it has an approved nonattainment NSR program and delegation by EPA to administer the federal PSD program.[63] Maricopa County also has permitting jurisdiction over other minor sources, except where ADEQ has asserted jurisdiction, and so is able to issue minor source permits. Permitting and enforcement is administered by Maricopa County Air Quality Department (MCAQD).

Pinal County has a SIP-approved PSD program, but lacks EPA approval for nonattainment NSR. ADEQ therefore has original jurisdiction over major sources in Pinal County, but has delegated that jurisdiction to Pinal County. PCAQD also has jurisdiction over minor sources, except where ADEQ has asserted jurisdiction. Permitting and enforcement is administered by Pinal County Air Quality Control District (PCAQD).

Gila County does not have an air pollution control program and ADEQ's interpretation is that ADEQ automatically has jurisdiction in such a case.[64]

Also, under ARS § 49-402(B), county permitting jurisdiction is subject to ADEQ's authority to assert jurisdiction over specific matters, geographical areas, or sources within those counties.

3.1.6 Weight of Evidence Analysis and Recommendation Summary

First, ADEQ is generally relying on its analysis for the 2008 ozone nonattainment area boundary as a basis for this recommendation. After review of all of the data, ADEQ generally finds the analysis is valid and sound.

However, given 2015 design values and the data presented, there are likely impacts from the Phoenix area to monitors outside of the 2008 boundary, namely the Tonto National Monument monitor in Gila County and the Queen Valley monitor in Pinal County. Concentrations at these monitors, like all monitors in the area, have been trending down in the long term, which indicates improving air quality. However, neither of these monitors are currently attaining the new 2015 ozone NAAQS according to 2015 design value data. Therefore, this recommendation includes the Queen Valley monitor and the Tonto National Monument monitor.

While monitor concentrations have trended downward and the Phoenix area is partly impacted by transported emissions, the Phoenix area largely impacts its own nonattainment for the new 2015 standard. It should be noted, however, that point sources are highly accounted for and

[62] *See generally* ADEQ, *Second Submission of Supplemental Information to the 2012 New Source Review State Implementation Plan Submission*, July 2, 2014, *available at* http://www.regulations.gov/document?D=EPA-R09-OAR-2015-0187-0006 (relating to jurisdiction, supplementing the October 29, 2012 SIP Revision).
[63] *See* ARS § 49-402(A)(1).
[64] *See* ARS § 49-402(B) (before asserting jurisdiction over air quality permits in a county, ADEQ must give prior notice and an opportunity to confer to the "control officer"); *see also* ARS § 49-471(6) (control officer means "the executive head of the department authorized or designated to enforce air pollution regulations, or the executive head of an air pollution control district established pursuant to section 49-473"). In Gila County's case, there is no control county air quality agency control officer for ADEQ to notify.

controlled in both Maricopa and Pinal Counties. Facilities are permitted down to a ton. The existing 2008 Phoenix-Mesa Ozone Nonattainment Area is implementing RACT on point sources. Also, Area A, an area encompassed mostly by the 2008 nonattainment area and extending into Pinal County, already implements reformulated gas and is mandated to participate in the vehicle emissions inspection program. ADEQ's Ozone Transport I-SIP submission contained a list of many of the controls that apply in the Phoenix area.

Overall, the Phoenix area has become more densely populated within the 2008 boundary and in some areas outside of the 2008 boundary. Despite population growth, ozone has been decreasing overall due to continuous measures and potential fleet turnover within the metropolitan area. However, population, along with its associated activity and data, is still a distinct indicator and projection factor for emissions inventories (such as Maricopa County's 2011 emission inventory). With population, development and traffic have also grown, all of which are indicators of ozone precursor emitting activities. Outside of the Phoenix-Mesa Urbanized Area, and even in large expanses of it, there is little population or activity. However, the area that appears to have experienced the most growth, and has some of the most growth potential due to land ownership, existing infrastructure, and ease of transportation to and from the Phoenix area is the San Tan Valley. San Tan Valley was not even classified as a CDP in the 2000 U.S. Census, and according the 2010 Census, there were 81,321 people in the 35.781 square mile area of the CDP alone, with a density of 2,273 people per square mile. There is clearly a tight link between Pinal County and Maricopa County as 45% of surveyed working residents in Pinal County commute to Maricopa County for work. Traffic analysis supports this due to relatively significant traffic in the San Tan Valley area. ADEQ's recommended area captures 94% of the population in the Phoenix-Scottsdale-Mesa CBSA and 89% of the VMT for the area so that most high emitting activities caused by the urbanized area are included in the recommended area.

There has been no growth in the immediate area surrounding the Tonto National Monument monitor in Gila County. There are very few sources, point or otherwise, in Gila County near the monitor. Gila County is a micropolitan statistical area and the City of Payson is approximately forty miles away from the monitor. There is very little population or traffic near the monitor and the monitor is located on Tonto National Forest land. The Phoenix area is slightly closer to the Tonto National Monument monitor in Gila County than the City of Payson. Also, urban ozone contributing activities are far higher in Maricopa County than Gila County, likely because of the sheer size and population difference between Phoenix and Payson—Phoenix is far larger in both population and size (see Figure 3-13, Table 3-8, and Table 3-10). These facts indicate that likely contributing sources are those in the Phoenix area. Also, considering HYSPLIT modeling results (see Figure 3-35 in Section 3.4 below), the likely contributing sources to high ozone concentrations at the Tonto National Monument monitor are located in Maricopa County. The lack of growth near the Tonto National Monument monitor and the increased growth in San Tan Valley, which is close in proximity to the Queen Valley monitor, lead ADEQ to further analyze these areas through meteorological and topographical analyses for possible transport paths to these monitors.

ADEQ analyzed back trajectories for the Tonto National Monument monitor in Gila County to verify that emissions impacting the Tonto monitor were likely from the Phoenix area as opposed

to the Payson area. As shown in the HYPSLIT trajectories in Figure 3-35 above, and Exhibit AI1 of Appendix A, the likely source of emissions impacts are from the Phoenix area, rather than the Payson area. As discussed in Section 3.1.4, there may sometimes be enough momentum from the southwestern flow to push emissions from Phoenix up and over the mountains near Roosevelt Lake to reach the Tonto National Monument monitor.

As shown in the Queen Valley monitor HYSPLIT trajectories in Figure 3-30 above, and Exhibit AI15 of Appendix A, several HYPSLIT back trajectories pass through Maricopa County and over the San Tan Valley area before reaching the Queen Valley monitor. In fact, the Queen Valley monitor is listed in ADEQ's monitoring plan as a PAMS site "considered to be downwind of the source of maximum precursor emissions in the Phoenix metropolitan area."[65] Given the topography and known mountain valley flow, as evidenced by the sloshing effect mentioned in Section 3.1.4, and the diurnal meteorological analysis in Section 3.1.3.2.3 showing a mainly western flow of actual winds during exceedance time periods, the Queen Valley monitor is likely impacted by emissions activities in the 2008 Phoenix-Mesa Ozone Nonattainment Area and San Tan Valley. While emissions from the San Tan Valley/Queen Creek area don't always directly impact the Queen Valley monitor, they do likely contribute to the monitor on some exceedance days. In addition, considering HYSPLIT trajectories from multiple monitors in the Phoenix area that travel through San Tan Valley, as shown in Figure 3-31, it is likely that emissions from the San Tan Valley/Queen Creek area likely affect multiple monitors in Phoenix. This especially likely considering that San Tan Valley is essentially a developed extension of the Phoenix-Scottsdale-Mesa metropolitan area.

For all the reasons above, ADEQ recommends that the 2015 Phoenix ozone nonattainment area should expand the 2008 ozone boundary to include portions of Pinal and Gila Counties. The newly expanded boundary should include a small portion of Pinal County encompassing the Queen Valley monitor and San Tan Valley, and a small portion of Gila County encompassing the Tonto National Monument monitor.

[65] ADEQ, *State of Arizona Annual Monitoring Network Plan*, p. 27 (2014), *available at* http://www.azdeq.gov/environ/air/assessment/download/amnp2014.pdf.

4 Yuma Nonattainment Area

ADEQ recommends that only a small part of Yuma County should be nonattainment. While ADEQ lays out some data reflecting the five factors below, ADEQ determined it was only appropriate to apply the five factors to a very tight area around the monitor. See Section 4.6 for further explanation as to why the five factors are not reasonably applied to the Yuma area. Figure 4-1 below shows the recommended boundary, and Figure 4-2 shows the recommended boundary in the context of other relevant data.

Figure 4-1 Yuma Nonattainment Area

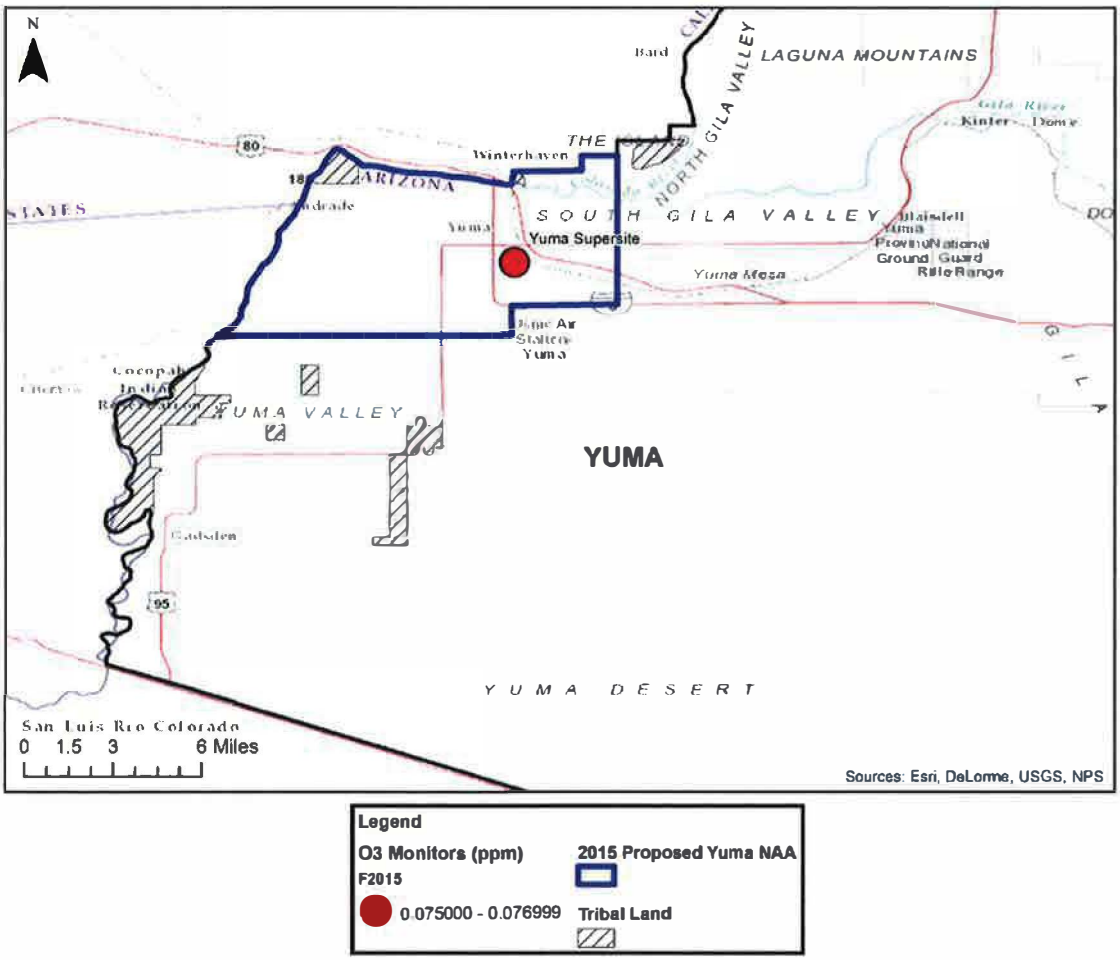
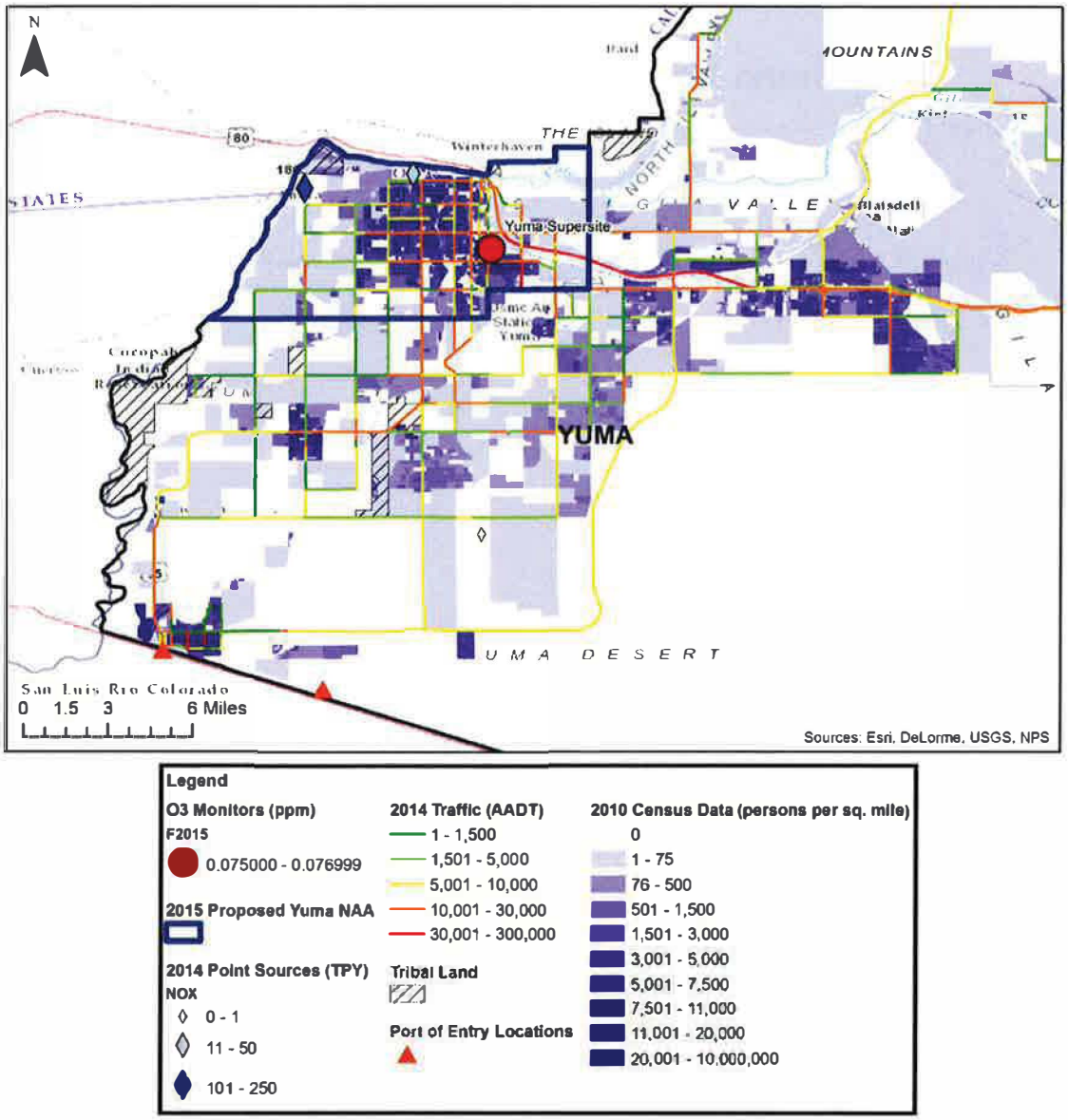


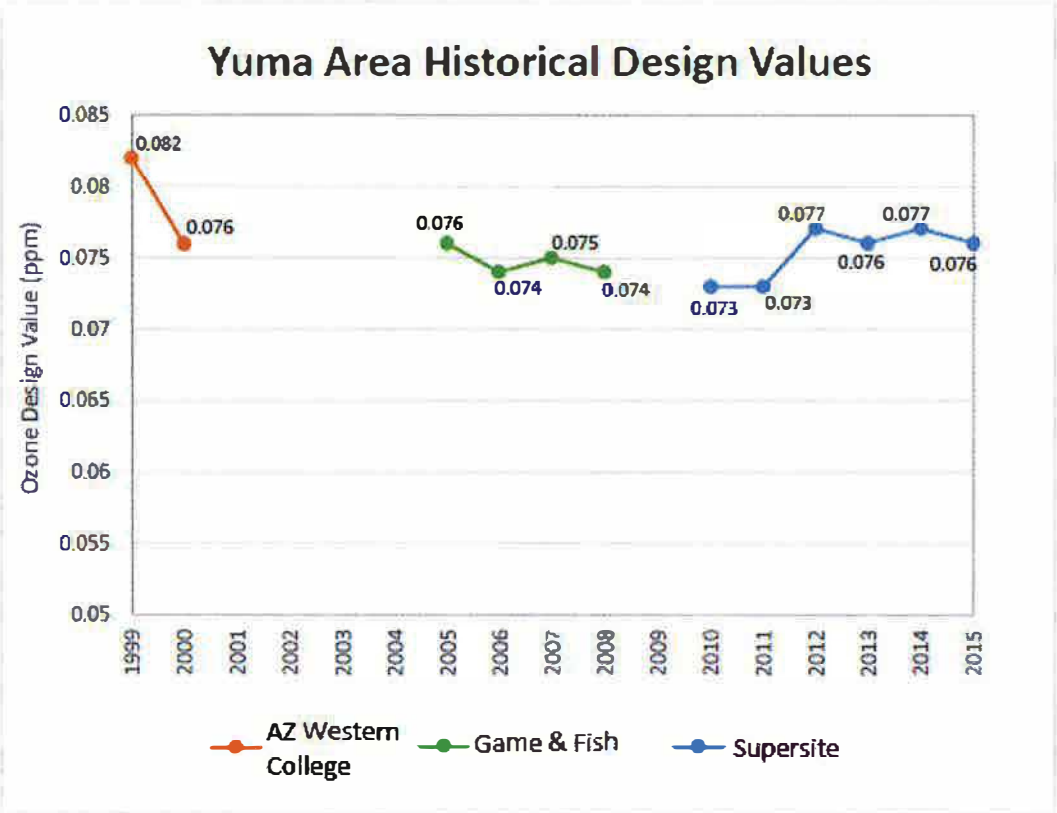
Figure 4-2 Yuma Nonattainment Area with Relevant Data



4.1 Air Quality Data

There is currently only one ozone monitor in the Yuma area, Yuma Supersite, which is operated by ADEQ. Design value concentrations at Yuma Supersite have generally trended upward since 2010, although values are much lower than the 1999 starting point at 82 ppb (Figure 4-3).

Figure 4-3 Yuma County Long-Term Design Value Trend



4.2 Emissions and Emissions-Related Data

ADEQ evaluated emissions and emissions-related data from Yuma County. Table 4-1 and Table 4-2 represent 2011 NEI emission data for NO_x and VOCs, respectively. Emissions totals are rather low, especially when compared to an area like Maricopa County or Southern California. It should be noted that approximately 95.5% of all VOCs in the county are estimated to be from biogenic emissions (e.g. vegetation and soils).

Table 4-1 Yuma County NOx Emissions

NOx Emissions		
Source Type	Emissions (TPY)	Percent of Total
Point Source	418	5.3%
Nonroad	898	10.8%
Onroad	4,234	50.9%
Nonpoint	2,768	33%
Total	8,318	100%

Table 4-2 Yuma County VOC Emissions

VOC Emissions		
Source Type	Emissions (TPY)	Percent of Total
Point Source	109	.2%
Nonroad	1,586	1.1%
Onroad	2,561	1.7%
Nonpoint	142,879	97 %
Total	147,135	100%

4.2.1 Point Source Data

Figure 4-4 and Figure 4-5 give visual representations of NO_x and VOC emission point sources, of which there are very few in Yuma County. These figures represent 2014 permitted point source data as reported by ADEQ, binned and displayed by actually emitted tons per year thresholds, and also show the proposed Yuma nonattainment boundary. There are two major point sources in the immediate area, an electric generating station (emitted approximately 135 tons of NO_x and 9.6 tons of VOCs during 2011) and a cogeneration plant (emitted only 23 tons of NO_x and 0.705 tons of VOCs during 2011). Yuma Proving Grounds are also nearby but the emissions are minimal (24.77 tons of NO_x and 21.5 tons of VOCs during 2011). Also, the facility is north of the monitor and HYPSLITs do not show that the facility is likely to contribute to the monitor. See Section 4.3.2 for the HYSPLIT analyses. South Yuma County Landfill is also nearby, but its emissions are similarly minimal (0.041 tons of NO_x and 27.6146 tons of VOCs during 2011). The landfill emits almost no NOx emissions, and VOC emissions are extremely small in comparison to total county VOC emissions (See Section 4.2 above).

Figure 4-4 Permitted NOx Point Sources

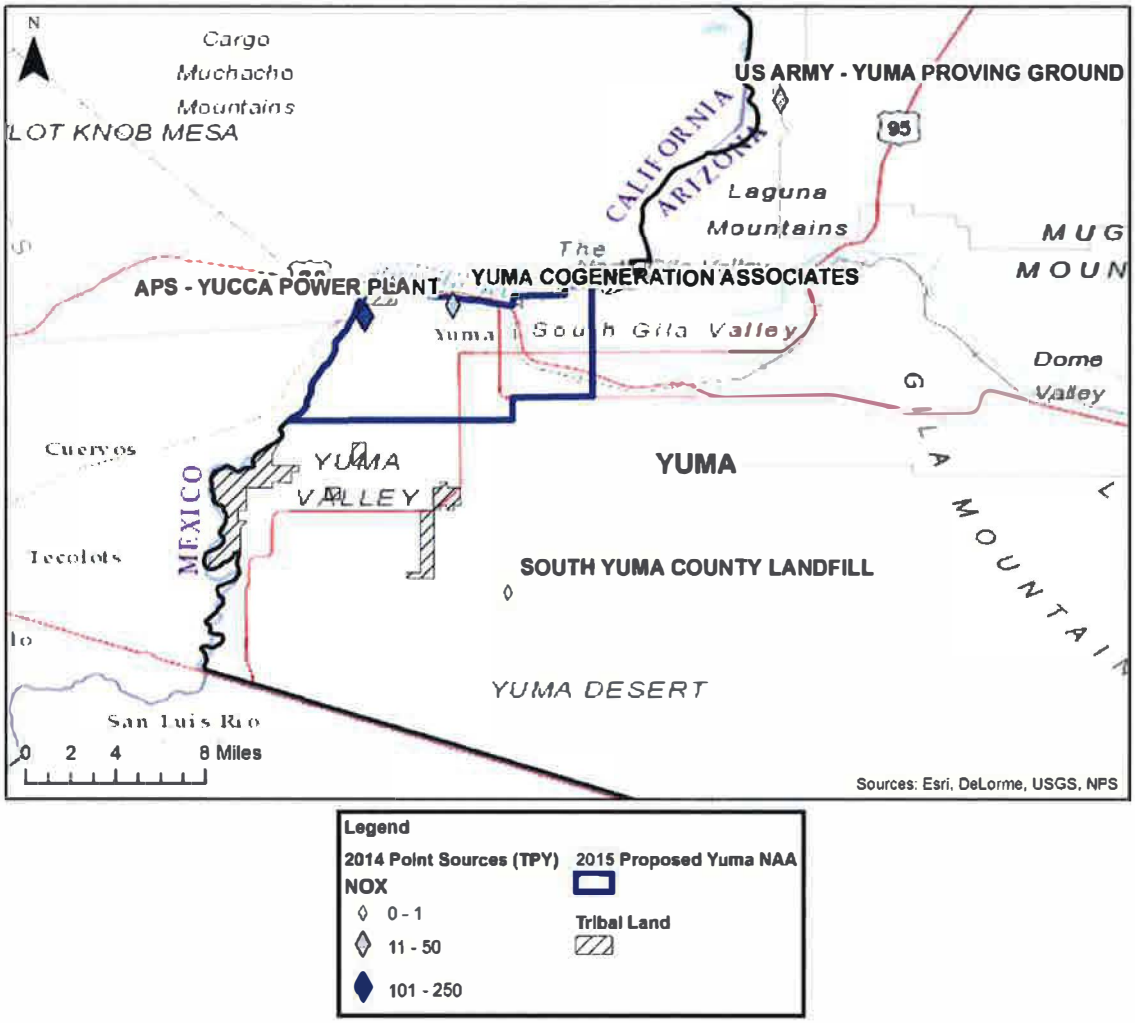
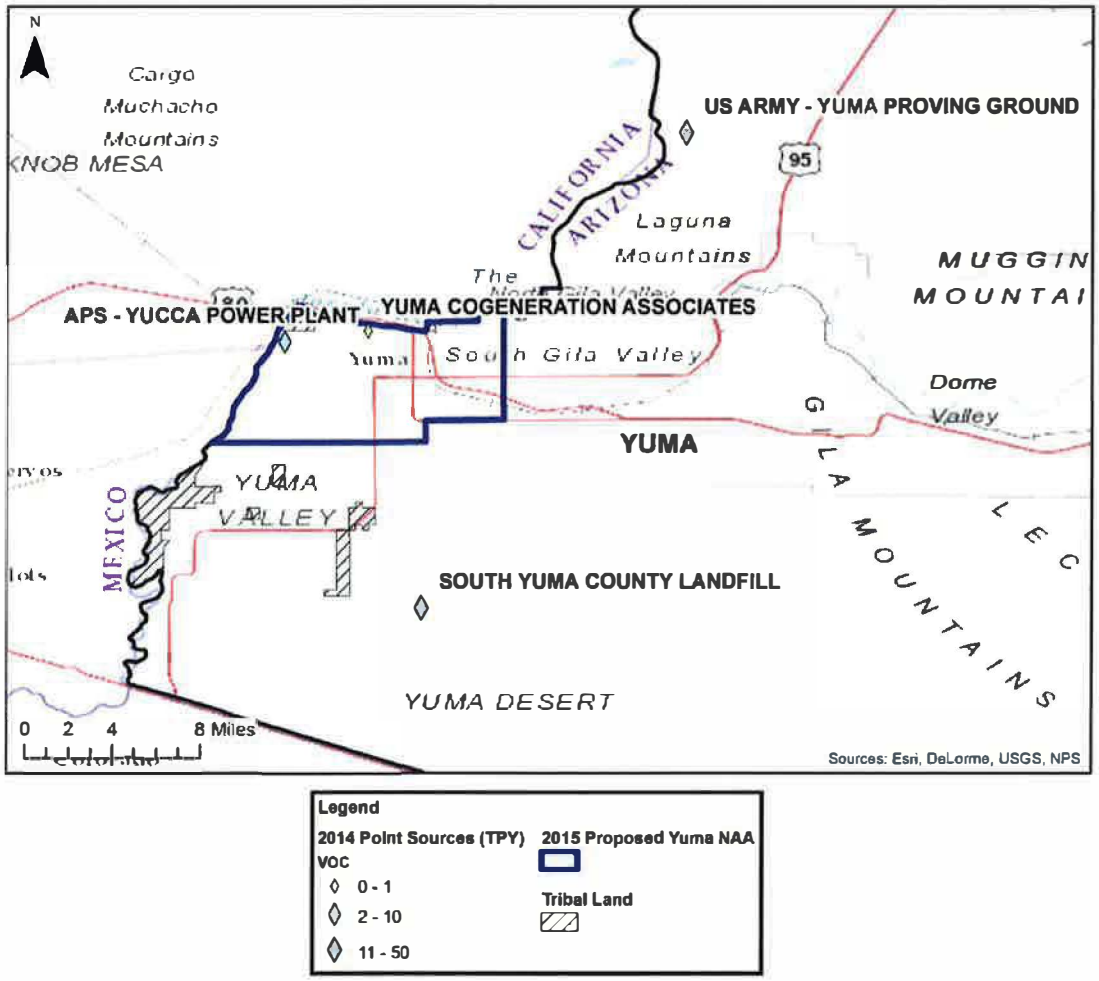


Figure 4-5 Permitted VOC Point Sources



4.2.2 Traffic Data

The Yuma area is a land port area and therefore subject to substantial amounts of transient interstate and international traffic. In addition, much of the economy in the Yuma area is seasonally dependent because of a higher rate of agricultural activity during cooler months. The Yuma area houses two ports of entry to and from Mexico, Port of Entry (POE) I in San Luis for personal vehicles and POE II east of San Luis for commercial traffic. Yuma is located on Interstate 8, which provides access between San Diego and Phoenix via Interstate 10. I-10 extends to Florida and also links to the I-40, which provides access to eastern states further north.

According to U.S. Customs and Border Protection located at POE II, all commercial truck traffic is diverted to POE II. State Route (SR) 195 provides ease of access between POE II and I-8. The interstate connections provide access for truck freight traffic between states and countries. According to Yuma Metropolitan Planning Organization ("YMPO"), "seventeen major trucking

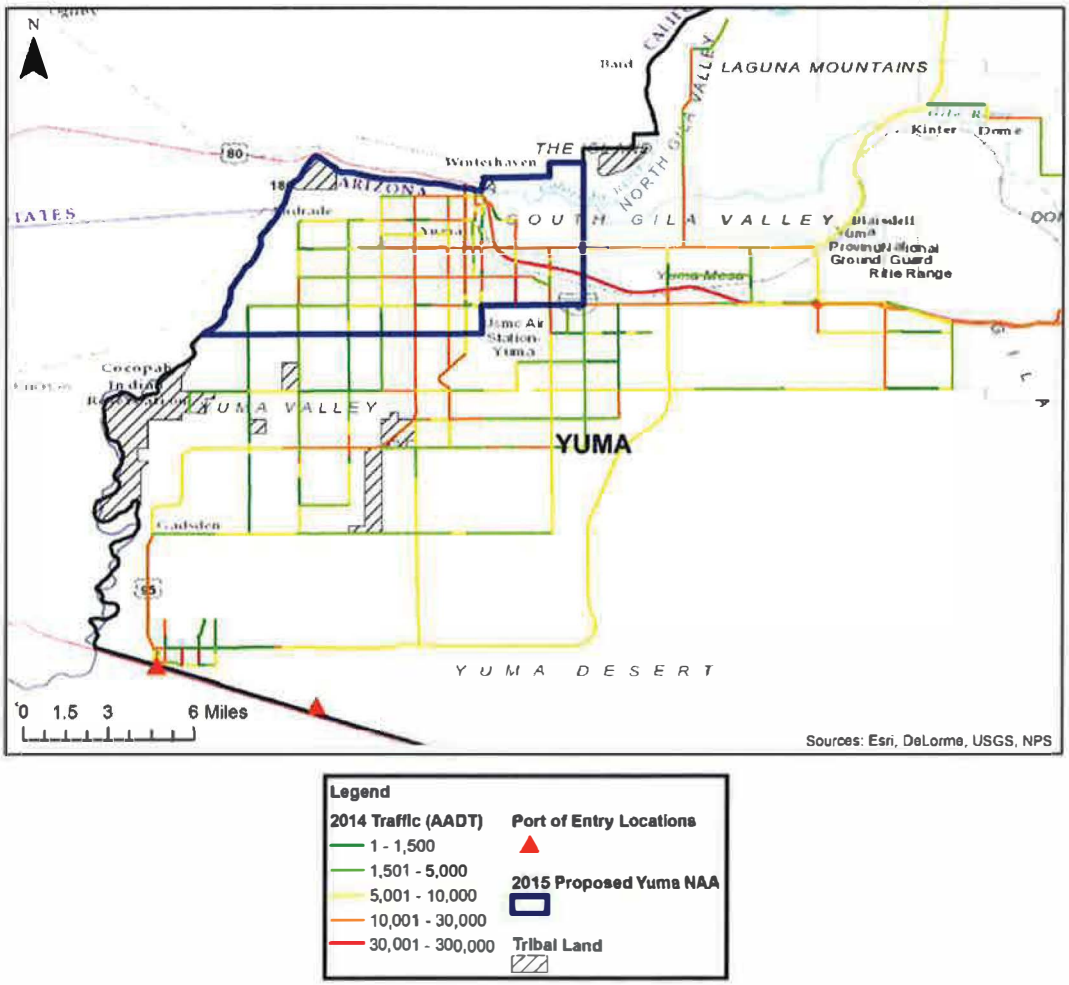
companies are located in the YMPO region."[66] While some truck shipments carry goods from Yuma to Mexico, the majority of shipments originate from Mexico with intended destinations outside of Yuma, typically in Los Angeles, San Diego, and Phoenix.[67] However, between 2013 and 2015, POE II experienced an average of only 33,027 commercial trucks per year, whereas a location like Nogales, AZ saw an average of 314,475 trucks over the same time period,[68] indicating that the area is not a significant shipping center.

Personal vehicles typically travel along Main Street between I-8 and the Mexican border. San Luis saw an annual average of 3,027,763 personal vehicles between 2013 and 2015, and comparably, Nogales experienced an average of 3,306,484 personal vehicles over the same time period.[69] According to YMPO, higher percentage traffic volume occurs in the cooler months because the agricultural season peaks during the winter. [70] This is because of agricultural worker travel from Mexico into the Yuma area to work, and because of other agricultural traffic related flows during planting and harvesting seasons. YMPO states that "aggregate traffic volumes in February 2012 were 33 percent higher than in July 2012."[71] This indicates that mobile source emissions are likely lower during the warmer ozone season months.

According to 2014 HPMS data, the proposed nonattainment area captures approximately 19% of the total county VMT, or 379,091,328 annual VMT out of 1,996,740,940 annual VMT for the entire county. See Figure 4-6 below for an image of AADT in the Yuma area and the locations of the two ports of entry.

[66] YMPO, *2014-2037 Regional Transportation Plan (RTP)*, p. 111 (2013), *available at* http://ympo.org/wp-content/uploads/2013/01/YMPORTP_FINAL_5-LOW-RES.pdf
[67] *Id.* at. 105.
[68] U.S. DEPARTMENT OF TRANSPORTATION, *Border Crossing Query Detailed Statistics* (recent data from January – March 2016) http://transborder.bts.gov/programs/international/transborder/TBDR_BC/TBDR_BCQ.html.
[69] http://transborder.bts.gov/programs/international/transborder/TBDR_BC/TBDR_BCQ.html
[70] *Yuma RTP supra* note 66 at 38-39.
[71] *Yuma RTP supra* note 66 at 38-39.

Figure 4-6 Yuma Nonattainment Area Traffic



4.2.3 Population Data

Population may be relevant in identifying areas that should be included in a nonattainment boundary. Figure 4-7 and Figure 4-8 represent the change in population density in the Yuma area between the years 2000 and 2010, according to the U.S. Census. Table 4-3 shows the change in actual population in the Yuma area between 2000 and 2010. Table 4-4 also represents the change in population of the Census Designated Place (CDP) Fortuna Hills. While the area of the proposed nonattainment area only captures approximately 1% of the area of Yuma County, (52 square miles out of 5,523 square miles), the area still encompasses the main population center, capturing approximately 45% of year 2010 Yuma County population (87,348 out of 195,751 people).

Figure 4-7 Yuma Nonattainment Area 2000 Population Density

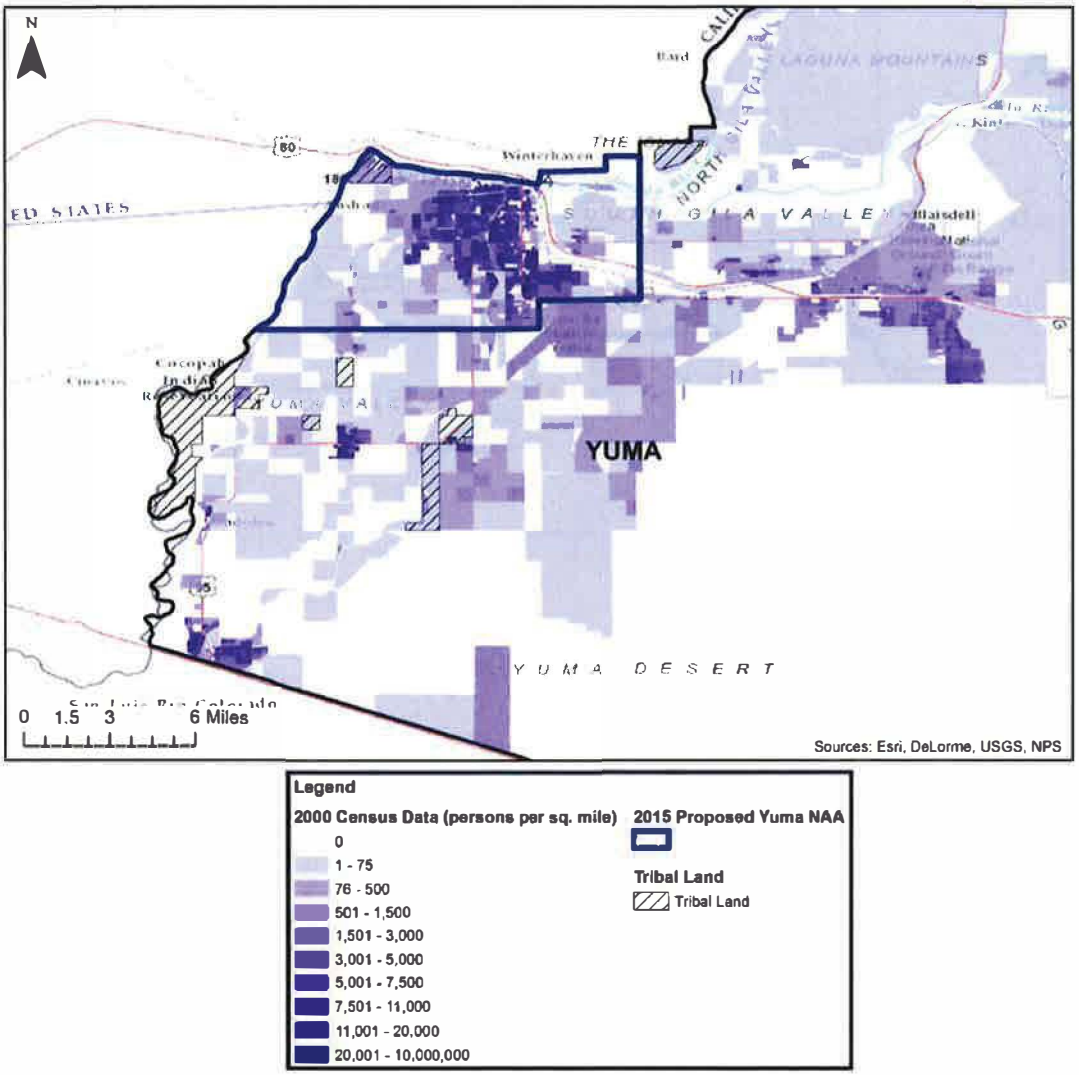


Figure 4-8 Yuma Nonattainment Area 2010 Population Density

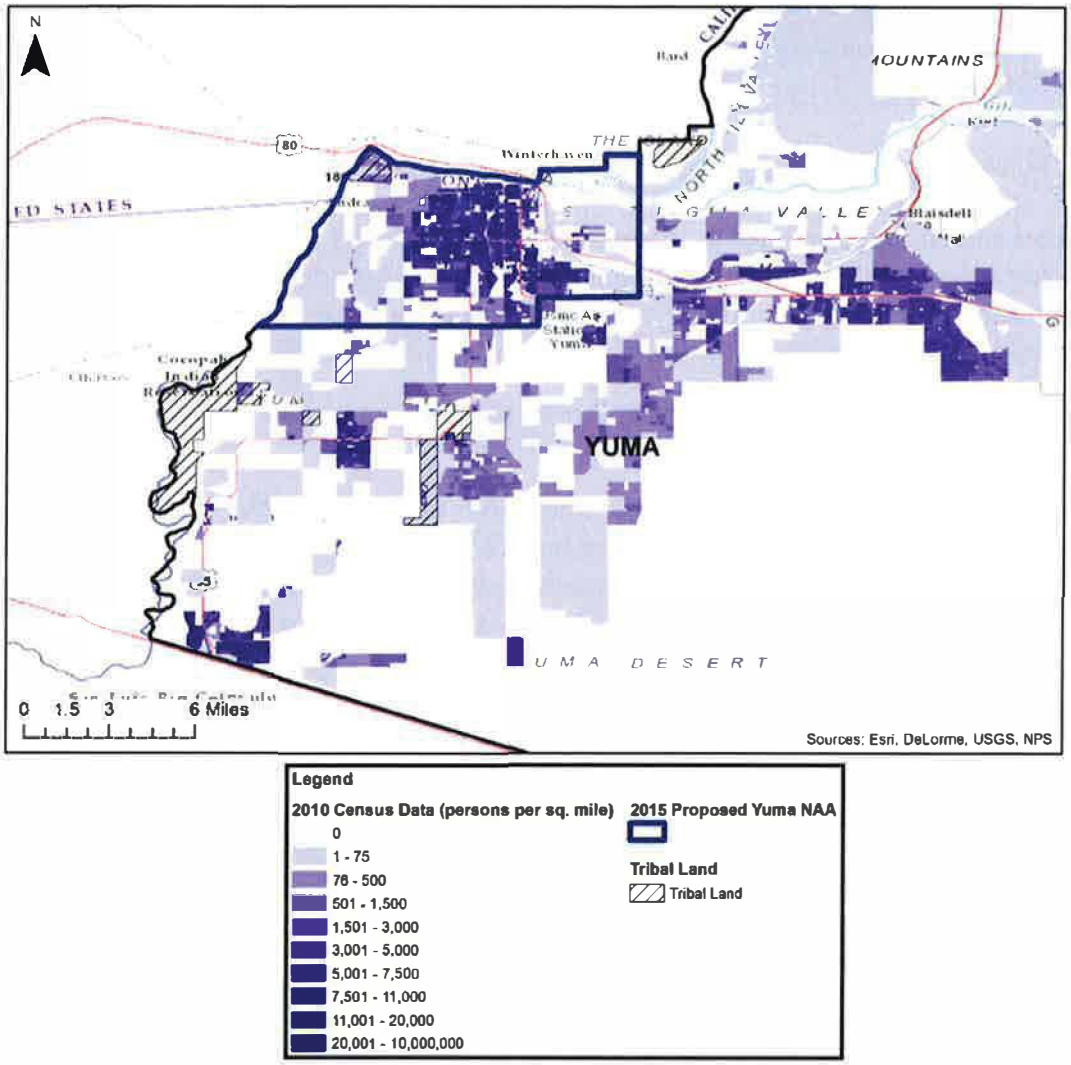


Table 4-3 Yuma Area Population Changes between 2000 and 2010

	Municipality	2000 Persons	2010 Persons	Percent Growth
Population	San Luis	15,322	25,505	66.5%
	Somerton	7,266	14,287	96.6%
	Wellton	1,829	2,882	57.6%
	Yuma	77,515	93,064	20.1%
	Balance of County	58,094	60,013	3.3%
	Yuma Total	**160,026**	**195,751**	**22.3%**

Table 4-4 Yuma Area CDPs Population Change between 2000 and 2010

Area Name	2000 Population	2010 Population	% Growth
Fortuna Hills (CDP*)	20,478	26,265	28%

4.2.4 Transport Data

Transport and background, such as that described in Section 2.3.2 clearly affects nonattainment at the Yuma monitor. Evidence shows that emissions are transported to the Yuma area and affect concentrations at the monitor. There is relatively little population or industry in the area, and yet concentrations at the monitor are several parts per billion higher than the standard.

EPA has estimated that about 7% of 2017 projected concentrations at the Yuma monitor are attributable to manmade sources from within Arizona.[72]

In a separate assessment,[73] but likely using the same data, EPA also projected ozone concentrations out to 2017 for the 2008 standard, for exceedance days of 76 ppb and higher, and modeled that Arizona manmade sources would contribute 6% of the projected concentration at the Yuma monitor, California manmade sources would contribute 20%, Mexico and Canada would contribute 7%, and biogenics would contribute 4% (Table 4-5). These modeling results indicate that Yuma County concentrations are highly impacted by transported emissions, instead of by local sources.

Table 4-5 EPA Transport Modeling Results for Yuma

County	2017 Avg. DV (ppb)	AZ (ppb) and % of projected DV		CA (ppb) and % of projected DV		Canada & Mexico (ppb) and % of projected DV		Initial[74] & Boundary[75] (ppb) and % of projected DV		Biogenics (ppb) and % of projected DV		Everything Else (other states, tribal, fires, offshore, etc.) (ppb) and % of projected DV	
Yuma	70.7	4.32	6%	13.81	20%	5.08	7%	43.36[76]	61%	2.69	4%	1.30	2%

[72] *Background White Paper*, *supra* note 19 at 11 and Table 2c.

[73] EPA, *Air Quality Modeling TSD for the 2008 Ozone NAAQS Cross-State Air Pollution Rule Proposal, Data File with 2017 Ozone Contributions* (November 2017), *available at* https://www.epa.gov/airmarkets/proposed-cross-state-air-pollution-update-rule.

[74] Initial condition for this model's purposes is "the time-varying chemical state of the atmosphere just outside the edges of the modeling domain." EPA, *Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM25, and Regional Haze, Memorandum from Richard Wayland, Air Quality Assessment Division Director to Regional Air Division Directors Regions 1-10*, p. 58 (Dec. 3, 2014), *available at* https://www3.epa.gov/scram001/guidance_sip.htm (last visited May 18, 2016).

[75] Boundary condition for this model's purposes is the "specification of the initial state of the chemical conditions within the [modeling] domain at the first step of the modeling period." *Id.*

[76] "Given limitations in available ambient data, it is impossible to exactly specify the complex three dimensional chemical characteristics of the initial or boundary conditions." *Id.*

4.3 Meteorology

Temperatures in Yuma, Arizona are similar to those in the Phoenix area with highs during ozone season ranging from about 86 to 107 degrees Fahrenheit, but Yuma has even less precipitation overall. See Table 4-6 for a general climatic summary:

Table 4-6 Climate Summary at Yuma Proving Ground, AZ[77]

Years 1955-2015	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Avg. Max. Temp. (F)	68.6	72.9	78.6	85.6	94.1	103.2	106.7	105.5	100.6	89.8	76.9	67.8	87.5
Avg. Min. Temp. (F)	43.3	46.8	51.4	57.2	64.8	72.9	80.8	80.8	74.2	62.1	50	42.7	60.6
Avg. Total Precip. (in.)	0.51	0.42	0.33	0.14	0.03	0.04	0.23	0.53	0.42	0.31	0.25	0.45	3.64

4.3.1 Wind Roses

Figure 4-9 presents wind roses showing the annual wind patterns at the Yuma Supersite monitor for 2013-2015. The average wind rose shows a split between northerly and southerly winds. Northerly winds are more frequent in the winter.

Figure 4-9 Yuma Supersite Monitor – Annual Winds

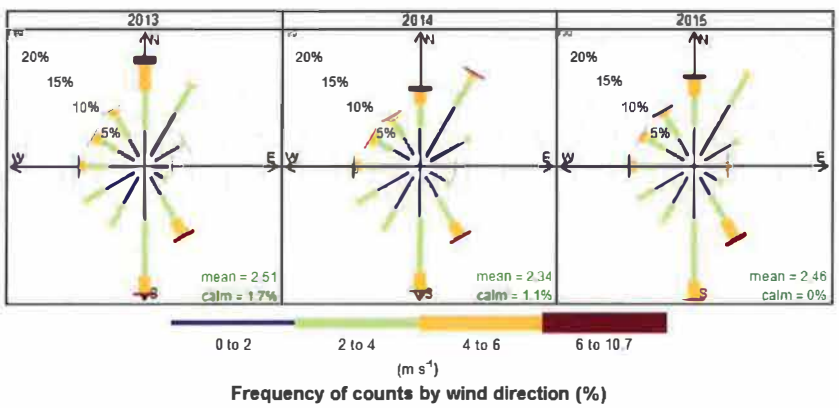
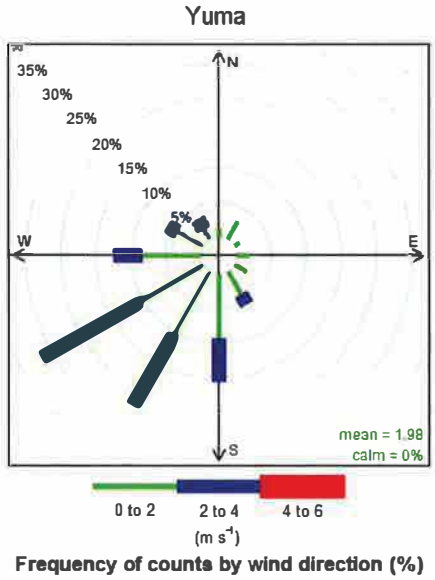


Figure 4-10 presents a wind rose showing the 24 hour wind patterns for the 10 highest days in 2013-2015 at the Yuma Supersite monitor. The wind rose shows a strong pattern of southwesterly winds during ozone exceedance days.

[77] WESTERN REGIONAL CLIMATE CENTER, *Yuma Proving Grounds*, http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?az9654 (last visited May 27, 2016).

Figure 4-10 Yuma Supersite Monitor – 10 Highest Ozone Concentration Day Winds



4.3.2 HYSPLIT Analyses

Pictured in Figure 4-11 and Figure 4-12 are 24 hour HYSPLIT back trajectories to the Yuma Supersite ozone monitor in Yuma County. The images reflect a trajectory for each hour in the 8 hour exceedance day average for the 10 highest ozone concentration days between 2013 and 2015.

Figure 4-11 Yuma Supersite – 10 Highest Ozone Days HYSPLIT Back Trajectories

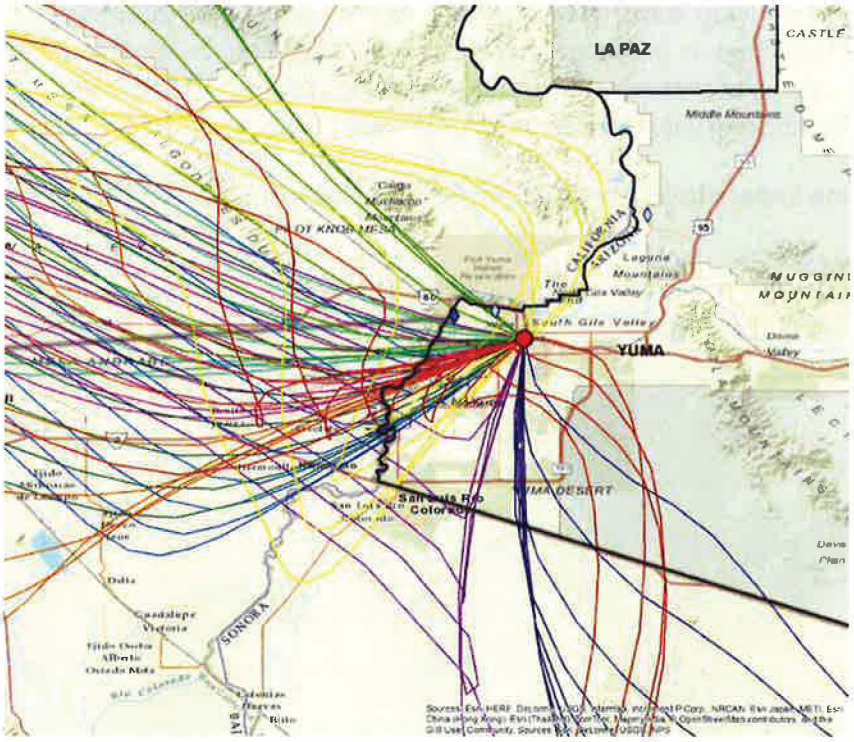


Figure 4-12 Yuma Supersite – 10 Highest Ozone Days HYSPLIT Back Trajectories Broad View

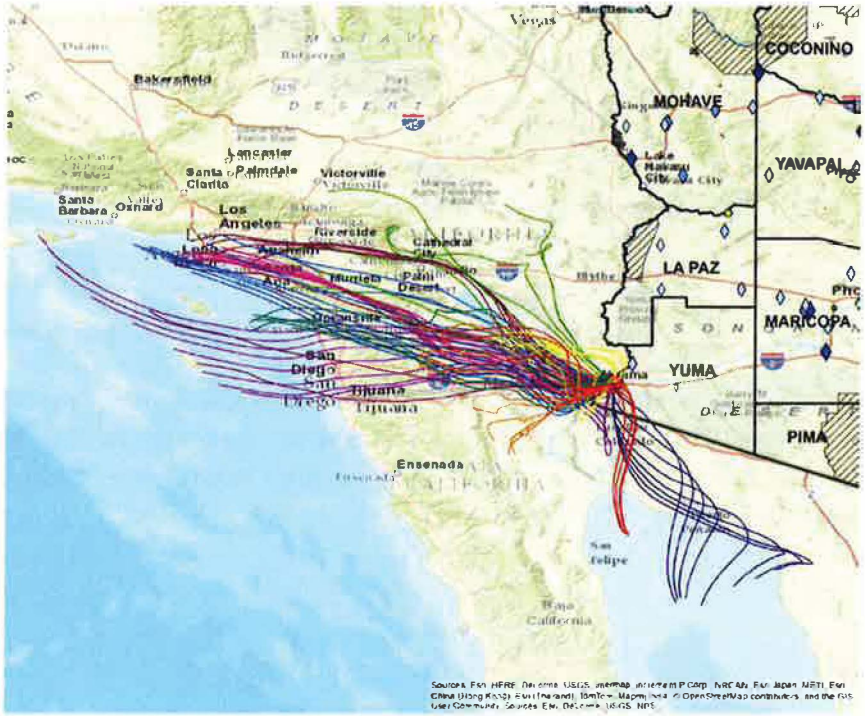
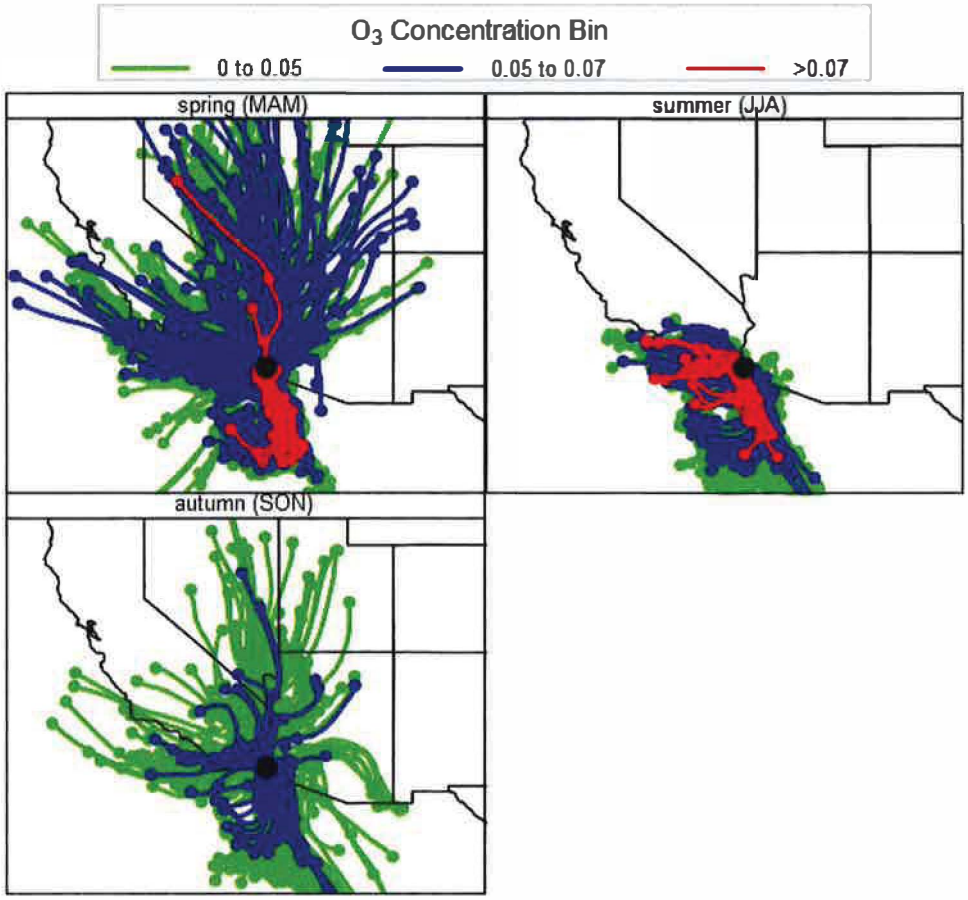


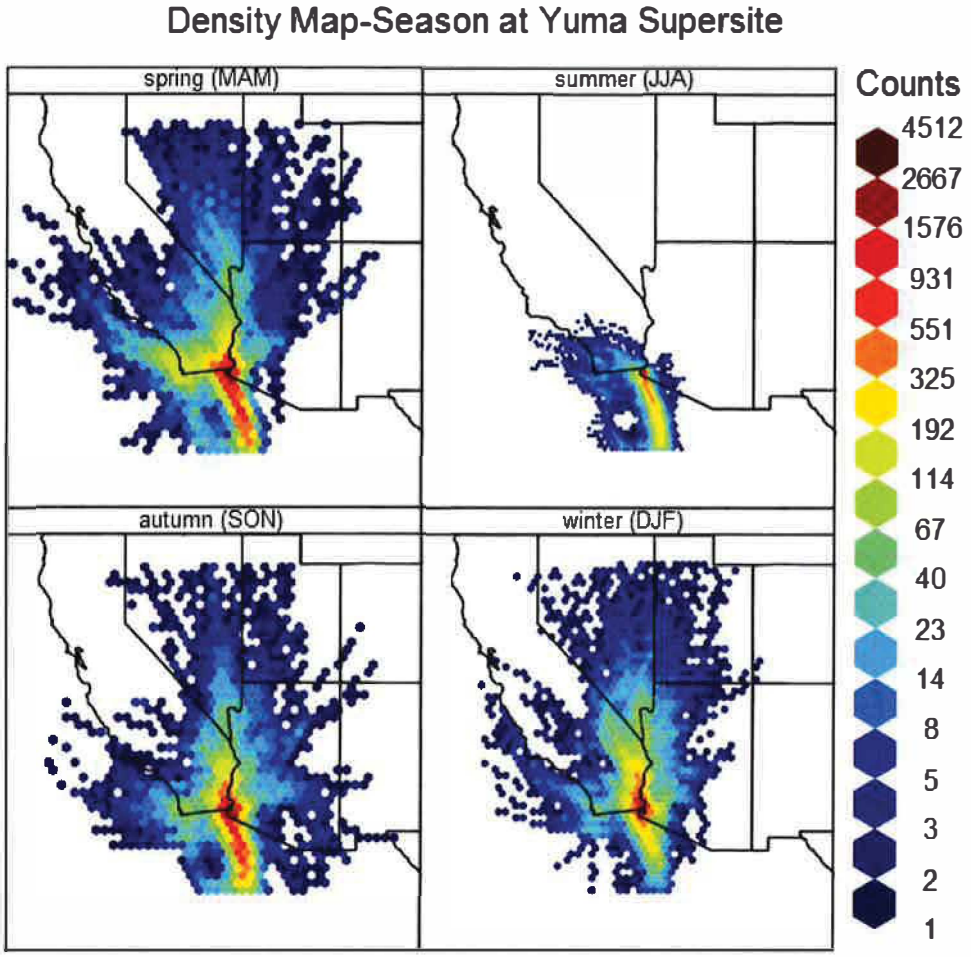
Figure 4-13 below is a diagram representing HYSPLIT 24 hour back trajectories. A trajectory is drawn to represent every third hour in a two year period (2013-2014), and color-coded by concentration. The image is provided in order to give an overall contextual picture of modeled incoming meteorology over the course of a year. Note that during 2013 and 2014, Yuma Supersite did not report monitoring values for November through February.

Figure 4-13 Yuma Supersite Seasonal Ozone Concentration Specific HYSPLIT Trajectory Map



In Figure 4-14 below, see a back-trajectory density analysis showing how frequently modeled wind trajectories passed through gridded area sections on their way to the Yuma Supersite monitor between 2013 and 2014. A 24 hour trajectory is drawn to represent every third hour in a two year period (2013-2014)

Figure 4-14 Yuma Supersite Seasonal HYSPLIT Density Map



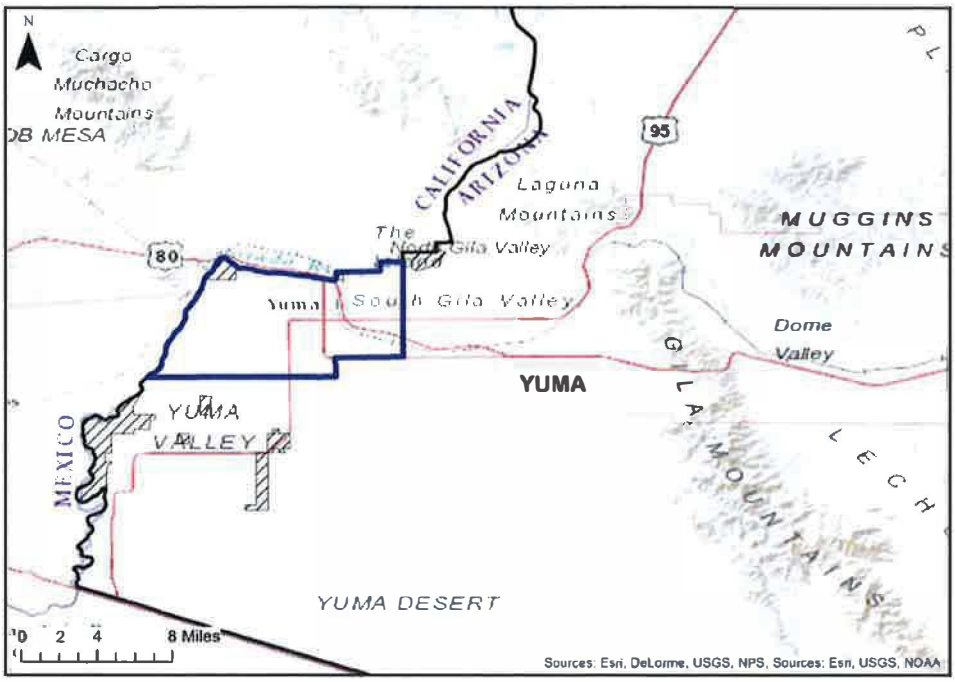
For methodology and additional HYSPLIT model results please see Appendix A, section 3 and Exhibit A1, Section 16.

4.4 Topography

Yuma is located along the Interstate 8, where the Gila River meets the Colorado River, in the Yuma Desert, which is a low elevation section of the Sonoran Desert in the southwestern most corner of Arizona. The Yuma Desert has several masses of sand dunes, south and southeast of the city and near the border, which house very little vegetation. However, much of the land in the City of Yuma area, I-8 corridor, and continuing into both Mexico and California is used for agricultural purposes. Yuma is bordered by California to the west and Mexico to the south. The area is bordered by the Colorado River to the west, the Gila Mountain Range to the east and the Laguna Mountain to the northeast. 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 are bordered on the west by the Colorado River. See an overall topographic view of the area in Figure 4-15.

Figure 4-15 Yuma Area Topography



4.5 Jurisdiction

Yuma Metropolitan Planning Organization (YMPO) is the MPO for the Yuma region. YMPO is designated as a bi-state MPO because the region includes all of Yuma County, Arizona and the community of Winterhaven in Imperial County, California (Figure 4-16). ADEQ has sole air quality planning, permitting, and enforcement authority in Yuma County at this time, except on tribal land. There are two points of entry south of the City of Yuma in San Luis,[78] both of which facilitate border traffic to and from Mexico. Both point of entries are manned by U.S. Customs and Border Protection. The City of Yuma and the I-8 corridor is sandwiched between vast U.S. military occupied lands: Yuma Proving Grounds to the north and east and the Barry M. Goldwater Range Air Force Base to the south and east (Figure 4-17). The southeast corner of Yuma County houses the Cabeza Prieta National Wildlife Refuge (adjacent to and below the Goldwater Range).[79]

[78] One point of entry facilitates general border traffic only, and the other facilitates commercial traffic only.
[79] Not shown in Figure 4-17. The refuge is further south of the Goldwater Range.

Figure 4-16 Yuma Area Jurisdiction and Tribal

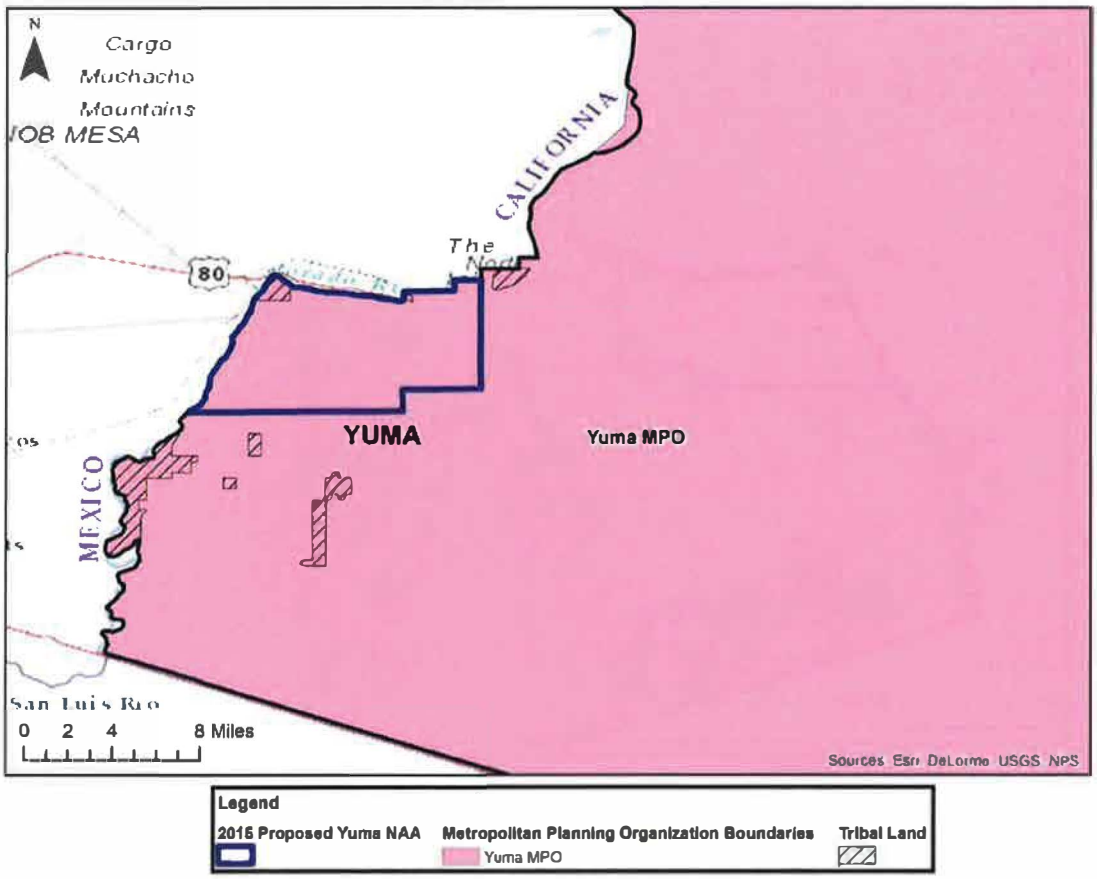
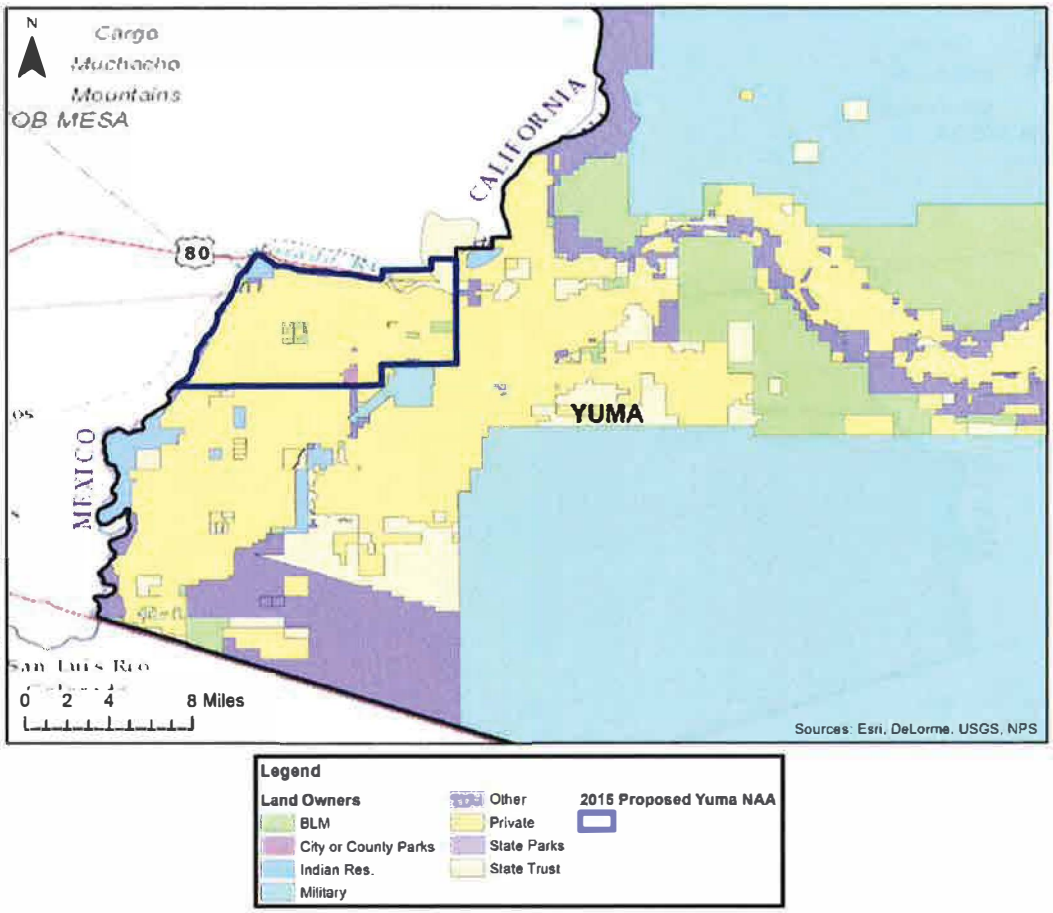


Figure 4-17 Yuma Area Land Owners



4.6 Weight of Evidence Analysis and Recommendation Summary

The Boundary Guidance's recommended five factors may inform the boundary of the nonattainment area, but Yuma is not an urban area that substantially contributes to its own nonattainment.[80] The Yuma area does not likely contribute to its own nonattainment on high ozone days and for this reason, ADEQ recommends a smaller nonattainment boundary.

There are few permanent point sources of ozone precursors in Yuma, and few controllable sources otherwise. Much of the emissions in Yuma are likely transported in, given the above HYSPLIT analyses in Section 4.3.2 and EPA modeling. Approximately 27% of the concentration at the monitor is attributable to emissions from California and Mexico according to EPA's transport modeling as compared to only 6% of monitor impacts being attributable to anthropogenic

[80] EPA's model indicates that Arizona state's contribution to ozone concentrations at the Yuma monitor is 6%, compared to an estimated average 39% from Arizona manmade contribution to monitors in Maricopa County. *EPA's Transport Modeling, supra* note 73.

Arizona emissions.[81] Not only are much of the emissions affecting Yuma's high concentrations transported in, almost all nonpoint VOC emission are attributable to biogenic emissions. Also, a significant chunk of the annual onroad emissions, which are approximately 50% of overall NOx in the area and the highest source of NOx in the Yuma area, are likely most attributable to transient traffic (as opposed to local traffic) because Yuma is a port city. There is no way to control Mexican car emissions locally or federally. Additionally, as stated above, Yuma's highest traffic volumes occur in the winter, and not during ozone season.

While ADEQ can appreciate the five factor analysis as a valuable tool for many areas with controllable and local sources, ADEQ does not believe the factors can be reasonably applied and weighed in the Yuma area. Instead, ADEQ finds it reasonable that the area be drawn smaller than might be drawn when strictly applying the five factors. The area should be reasonably limited to the highest populated area and include the existing major and possibly impactful point sources to the monitor. Given the recommended area, 45% of the county's population is captured, 19% of the total county VMT is captured, and the highest emitting and only real possibly contributing permitted point sources are captured.

To establish a larger area would not protect public health or the environment because there would be minimal benefits from future controls on what few emissions there are outside of the recommended boundary. It has been stated in the Regional Impact Analysis that even given "large regional NO_x and VOC reductions," the Yuma area shows a limited response.[82] This means that in the meantime, the area will be bumped up to higher nonattainment classifications in the future, and subject to limited economic development, through little fault of its own. If this is the case, then it is unreasonable to subject the Yuma area to more economic burdens than necessary. Therefore, as suggested in EPA's Background White Paper,[83] ADEQ recommends a smaller nonattainment boundary for the Yuma area because the Yuma monitor is likely minimally impacted by nearby sources on high ozone days, as substantiated by EPA's background modeling.

[81] *EPA's Transport Modeling, supra* note 73.
[82] *Background White Paper, supra* note 19 at 2; *see also* EPA, *Regulatory Impact Analysis of the Final Revisions to the NAAQS for Ground-Level Ozone*, p. 2A-33 - 2A-34 (2015), *available at* https://www3.epa.gov/ttnecas1/ria.html.
[83] *Background White Paper, supra* note 19 at 12 ("At monitor locations exceeding the 70 ppb standard where there are no or few nearby permanent sources of O3 precursors, or where nearby sources are shown to be unlikely contributors on days with high O3, states can recommend, and EPA may be able to finalize, a nonattainment area boundary that includes a limited area associated with a reasonable jurisdictional boundary, for example, a park boundary for a monitor located in a national park.").

5 Attainment/Unclassifiable Areas in Arizona

5.1 Attainment/Unclassifiable Areas (Including Mohave County)

All other areas within the state that are not otherwise discussed in Sections 3 and 4 above and which are under Arizona's jurisdiction (e.g. excluding tribal land areas) are recommended as attainment/unclassifiable areas.

Recommended attainment areas meet the NAAQS for ozone. Unclassifiable areas are those areas for which ADEQ does not have enough information to designate as either attainment or nonattainment. The rest of the state of Arizona not recommended for nonattainment is recommended as attainment/unclassifiable,[84] including the following:

- Remainder of Maricopa, Pinal, Gila, and Yuma Counties
- Apache County
- Cochise County
- Coconino County
- Greenlee County
- Graham County
- La Paz County
- Mohave County
- Navajo County
- Pima County
- Santa Cruz County
- Yavapai County

Should monitors in any of the above counties become nonattaining monitors given future design values, ADEQ will revise these recommendations to reflect the appropriate boundary.

5.2 Mohave Specific Attainment/Unclassifiable Discussion

ADEQ does not believe that any part of Mohave County should be designated nonattainment. According to EPA guidance, EPA may examine nearby areas that are in the same Combined Statistical Area (CSA) or in the same Core Based Statistical Area (CBSA) (i.e. metropolitan statistical areas (MSA) or micropolitan statistical areas) for possible inclusion in a nonattainment area. Mohave County encompasses the Lake Havasu City-Kingman, AZ MSA, while Clark County encompasses the Las Vegas-Henderson-Paradise, NV MSA. Both MSAs are contained within the Office of Management and Budget delineated Las Vegas-Henderson, NV-AZ CSA. However, just

[84] For more information see Appendix A (2015 Ozone Boundary Recommendation TSD), Section A2.1: Ozone Design Values.

because the counties are in the same CSA, does not mean that Mohave County is contributing to nonattainment in Clark County, or vice versa.

First, despite being 67% larger in area, emissions from Mohave County are much lower than those from Clark County (except for biogenic emissions). See Table 5-1 and Table 5-2 for 2011 NEI information.

Table 5-1 Clark County, Nevada Emissions Totals

Clark County, Nevada (TPY)					
	Point	*Nonpoint*	*Onroad*	*Nonroad*	*Total*
NOx	8,676	3,870	28,965	10,179	51,690
VOC	967	162,177	12,176	8,368	183,688

Table 5-2 Mohave County, Arizona Emissions Totals

Mohave County, Arizona (TPY)					
	Point	*Nonpoint*	*Onroad*	*Nonroad*	*Total*
NOx	376	5,057	8,920	1,406	15,760
	94	229,299	3,374	5,023	237,790

Table 5-3 below represents Mohave County emissions as a percentage of Clark County emissions. In the nonpoint VOC emissions category, biogenics are much higher in Mohave County than Clark County. However, when excluding biogenic emissions, VOC emissions in Mohave County are actually 30% of Clark County VOC emissions.

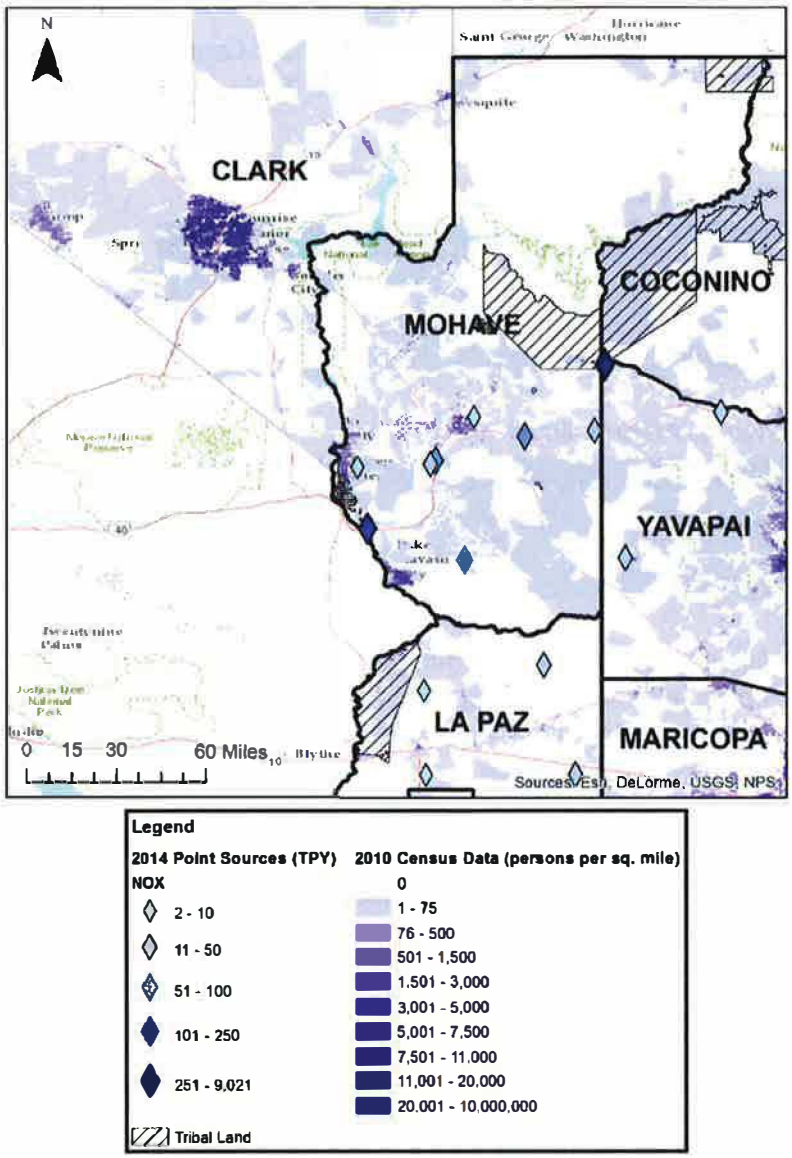
Table 5-3 Mohave County Emissions as Percentage of Clark County Emissions

Mohave County as Percentage of Clark County Emissions					
	Point	*Nonpoint*	*Onroad*	*Nonroad*	*Total*
NOx	4%	131%	31%	14%	30%
	10%	141%	28%	60%	129%

Second, population centers of Mohave County are located in the middle and the southwestern portion of the county, near Lake Havasu City, Bullhead City/Laughlin area, and Kingman (see Figure 5-1). None of the population centers are located physically nearby the Las Vegas area in Clark County. Further, the 2010 population in Mohave County is 200,186 people, compared to 1,951,269 people in Clark County. Hence, Mohave County population is about 10% of Clark County's population.

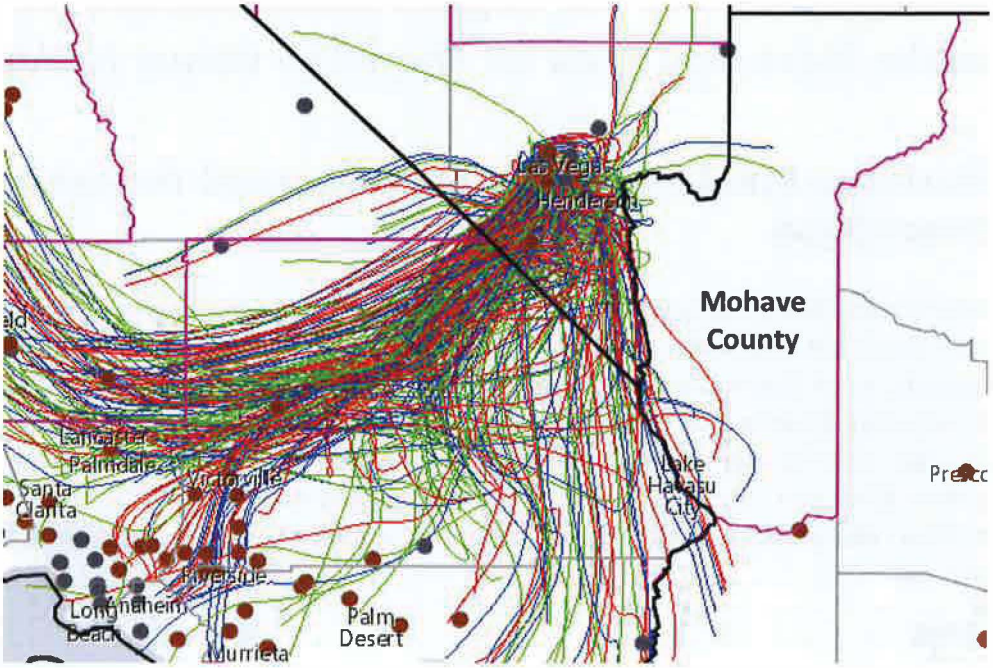
As for the county's few emitting permitted point sources, most of those are also located in the center and southwestern areas of the county (see Figure 5-1), and none are physically nearby the Las Vegas area.

Figure 5-1 Mohave County 2010 Population Density and 2014 Permitted NOx Point Sources



In addition, because Arizona did not run any HYSPLITs for the Clark County area, ADEQ referred to EPA's Mapping Tool for HYSPLITs from the Clark County area (see Figure 5-2). The exceedance day HYSPLIT back trajectories stem from California and not Arizona. All of these facts indicate that none of the Mohave area should be considered nonattainment with the Las Vegas area, even if it is in the same Office of Management and Budget delineated statistical area.

Figure 5-2 Las Vegas Monitor HYSPLITs from EPA Mapping Tool



6 Alternative Data Contingent Nonattainment Areas in the Maricopa Area for the 2015 Ozone NAAQS

6.1 Maricopa-Pinal Alternative Boundary and Township Description

If, given future ozone design values, Pinal County's Queen Valley ozone monitor violates and Gila County's Tonto National Monument ozone monitor attains the 2015 Ozone NAAQS, then Arizona suggests, as an alternative to its recommendation, that the 2008 Phoenix-Mesa Ozone Nonattainment Area boundary be expanded by an additional section of Pinal County to include the Queen Valley monitor and San Tan Valley. Figure 6-1 below shows the recommended boundary alternative, and Figure 6-2 shows the recommended boundary alternative in the context of other relevant data. Table 6-1 provides the township and range description of this alternative area.

Figure 6-1 Alternative Maricopa-Pinal Nonattainment Area

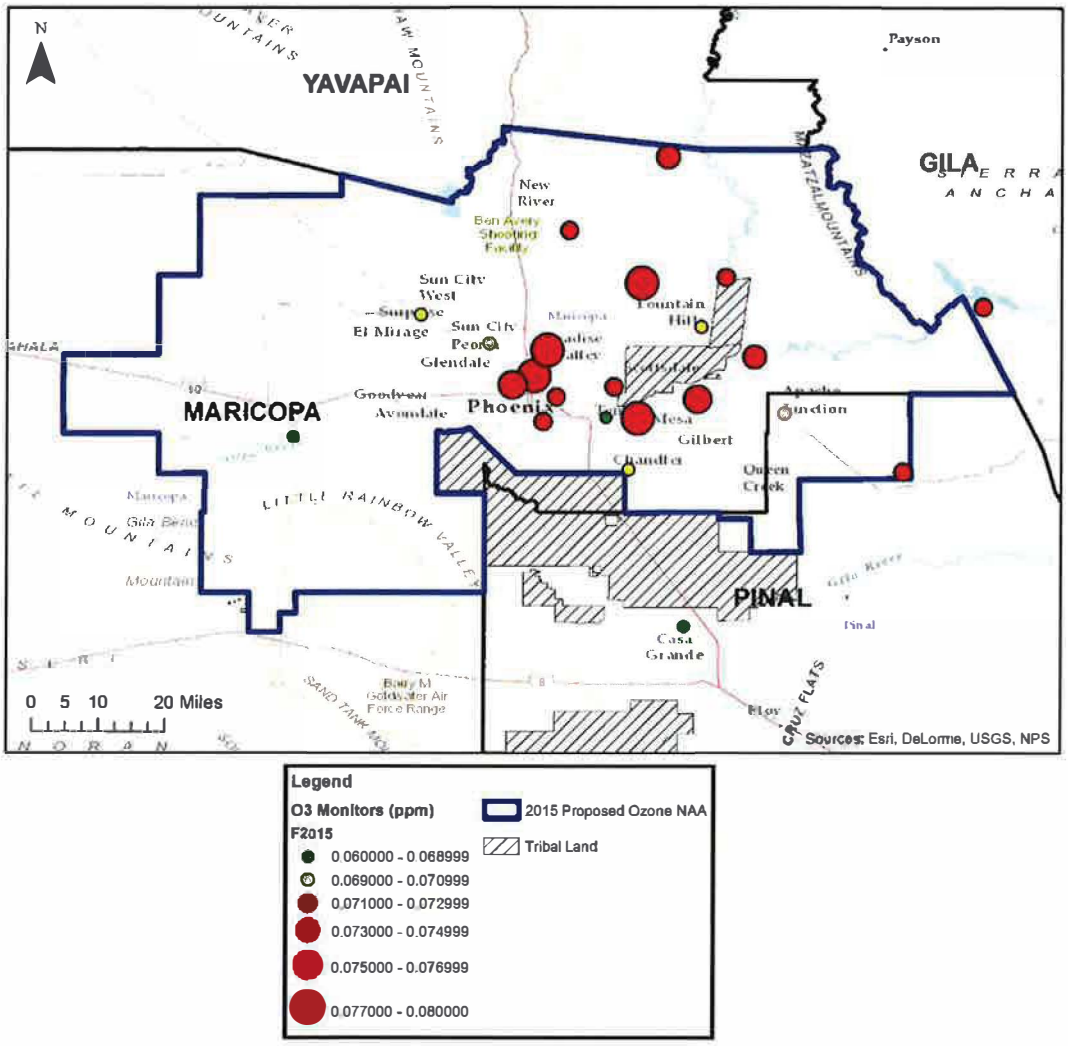


Figure 6-2 Alternative Maricopa-Pinal Nonattainment Area with Relevant Data

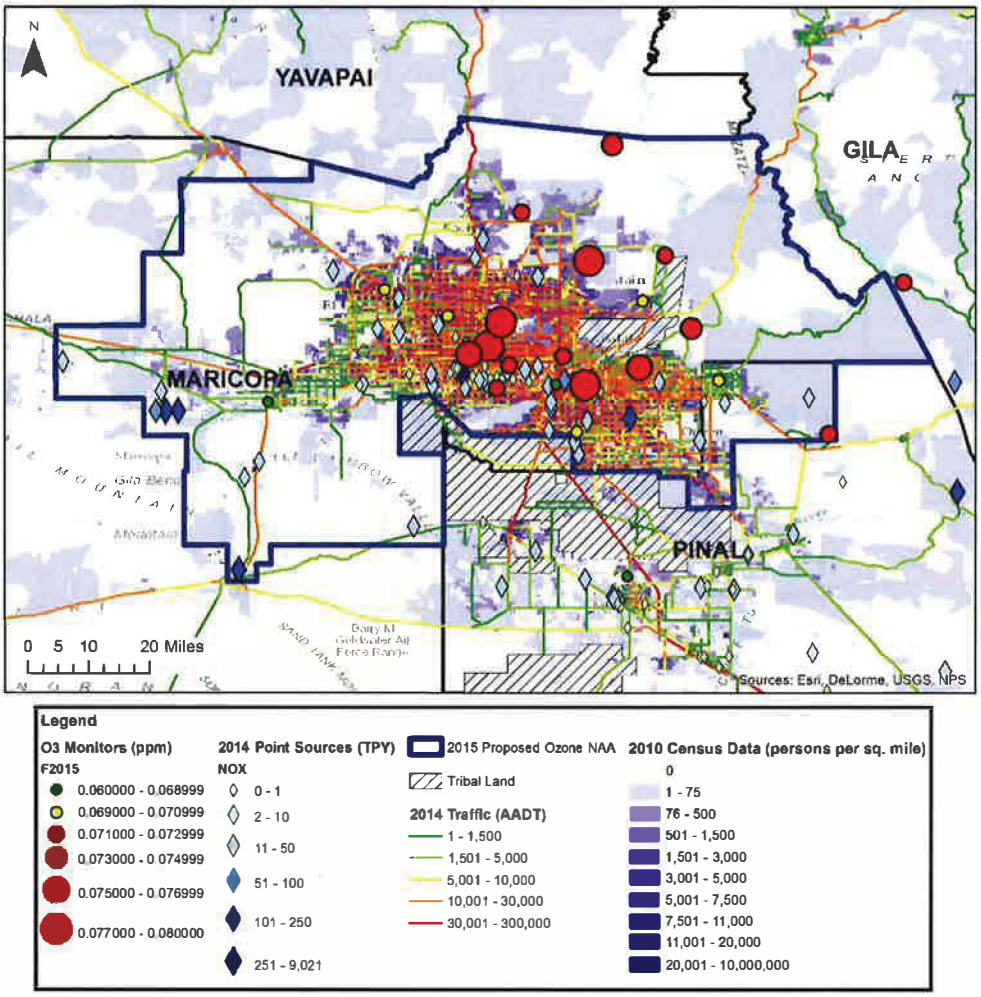


Table 6-1 Township and Range Description for Alternative Maricopa-Pinal Nonattainment Area

Designated Area[85]	Designation Type
Phoenix Area: Maricopa County (part)..... T1N, R1E (except that portion in Indian Country) T1N, R2E T1N, R3E T1N, R4E (except that portion in Indian Country)	Nonattainment

[85] All Arizona recommended areas exclude Indian Country.

Designated Area[85]	Designation Type
T1N, R5E (except that portion in Indian Country)	
T1N, R6E	
T1N, R7E	
T1N, R1W	
T1N, R2W	
T1N, R3W	
T1N, R4W	
T1N, R5W	
T1N, R6W	
T1N, R7W	
T1N, R8W	
T2N, R1E	
T2N, R2E	
T2N, R3E	
T2N, R4E	
T2N, R6E (except that portion in Indian Country)	
T2N, R7E (except that portion in Indian Country)	
T2N, R8E	
T2N, R9E	
T2N, R10E	
T2N, R11E	
T2N, R12E (except that portion in Gila County)	
T2N, R13E (except that portion in Gila County)	
T2N, R1W	
T2N, R2W	
T2N, R3W	
T2N, R4W	
T2N, R5W	
T2N, R6W	
T2N, R7W	
T2N, R8W	
T3N, R1E	
T3N, R2E	
T3N, R3E	
T3N, R4E	
T3N, R5E (except that portion in Indian Country)	
T3N, R6E (except that portion in Indian Country)	
T3N, R7E (except that portion in Indian Country)	
T3N, R8E	
T3N, R9E	
T3N, R10E (except that portion in Gila County)	
T3N, R11E (except that portion in Gila County)	
T3N, R12E (except that portion in Gila County)	

Designated Area[85]	Designation Type
T3N, R1W T3N, R2W T3N, R3W T3N, R4W T3N, R5W T3N, R6W T4N, R1E T4N, R2E T4N, R3E T4N, R4E T4N, R5E T4N, R6E (except that portion in Indian Country) T4N, R7E (except that portion in Indian Country) T4N, R8E T4N, R9E T4N, R10E (except that portion in Gila County) T4N, R11E (except that portion in Gila County) T4N, R12E (except that portion in Gila County) T4N, R1W T4N, R2W T4N, R3W T4N, R4W T4N, R5W T4N, R6W T5N, R1E T5N, R2E T5N, R3E T5N, R4E T5N, R5E T5N, R6E T5N, R7E T5N, R8E T5N, R9E (except that portion in Gila County) T5N, R10E (except that portion in Gila County) T5N, R1W T5N, R2W T5N, R3W T5N, R4W T5N, R5W T6N, R1E (except that portion in Yavapai County) T6N, R2E T6N, R3E	

Designated Area[85]	Designation Type
T6N, R4E T6N, R5E T6N, R6E T6N, R7E T6N, R8E T6N, R9E (except that portion in Gila County) T6N, R10E (except that portion in Gila County) T6N, R1W (except that portion in Yavapai County) T6N, R2W T6N, R3W T6N, R4W T6N, R5W T7N, R1E (except that portion in Yavapai County) T7N, R2E (except that portion in Yavapai County) T7N, R3E T7N, R4E T7N, R5E T7N, R6E T7N, R7E T7N, R8E T7N, R9E (except that portion in Gila County) T7N, R1W (except that portion in Yavapai County) T7N, R2W (except that portion in Yavapai County) T8N, R2E (except that portion in Yavapai County) T8N, R3E (except that portion in Yavapai County) T8N, R4E (except that portion in Yavapai County) T8N, R5E (except that portion in Yavapai County) T8N, R6E (except that portion in Yavapai County) T8N, R7E (except that portion in Yavapai County) T8N, R8E (except that portion in Yavapai and Gila Counties) T8N, R9E (except that portion in Yavapai and Gila Counties) T1S, R1E (except that portion in Indian Country) T1S, R2E (except that portion in Pinal County and in Indian Country) T1S, R3E T1S, R4E T1S, R5E T1S, R6E T1S, R7E T1S, R1W T1S, R2W T1S, R3W	

Designated Area[85]	Designation Type
T1S, R4W T1S, R5W T1S, R6W T2S, R1E (except that portion in Indian Country) T2S, R5E T2S, R6E T2S, R7E T2S, R1W T2S, R2W T2S, R3W T2S, R4W T2S, R5W T3S, R1E T3S, R1W T3S, R2W T3S, R3W T3S, R4W T3S, R5W T4S, R1E T4S, R1W T4S, R2W T4S, R3W T4S, R4W T4S, R5W T5S, R4W (Sections 1 through 22 and 27 through 34)	
Pinal County (part) ..... T1N, R8E T1N, R9E T1N, R10E T1S, R8E T1S, R9E T1S, R10E T2S, R8E (Sections 1 through 10, 15 through 22, and 27 through 34) T2S, R9E (Sections 1 through 6) T2S, R10E (Sections 1 through 6)	Nonattainment

Designated Area[85]	Designation Type
T3S, R7E (Sections 1 through 6, 11 through 14, 23 through 26, and 35 through 36) T3S, R8E (Sections 3 through 10, 15 through 22, and 27 through 34)	

6.2 Maricopa-Gila Alternative Boundary and Township Description

If, given future ozone design values, Gila County's Tonto National Monument ozone monitor violates the 2015 Ozone NAAQS and no other monitor in Pinal County (besides the Apache Junction monitor) violates the standard, then Arizona suggests, as an alternative to its recommendation, that the 2008 Phoenix-Mesa Ozone Nonattainment Area boundary be expanded by a small section of Gila County to include the Tonto National Monument monitor. Figure 6-3 below shows the suggested boundary alternative, and Figure 6-4 shows the suggested boundary alternative in the context of other relevant data. Table 6-2 provides the township and range description of this alternative area.

Figure 6-3 Alternative Maricopa-Gila Nonattainment Area

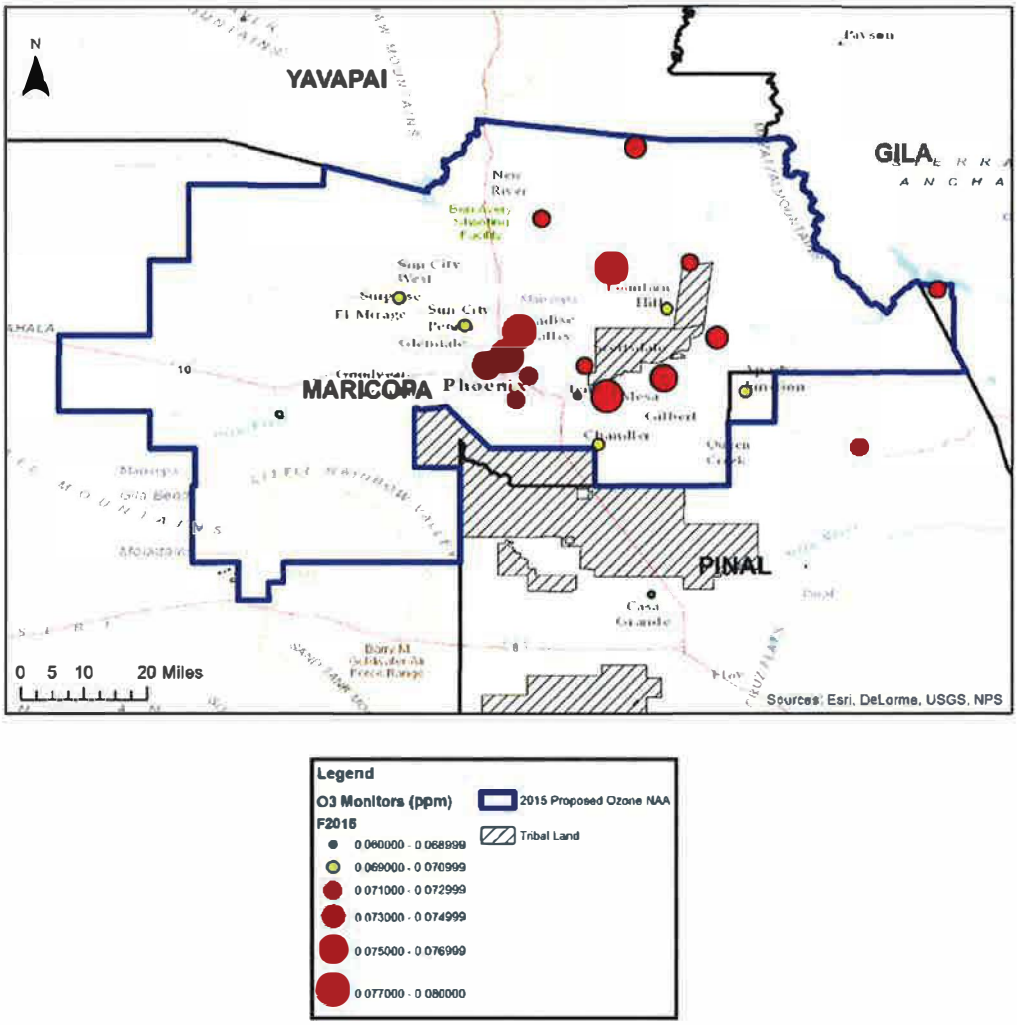


Figure 6-4 Alternative Maricopa-Gila Nonattainment Area with Relevant Data

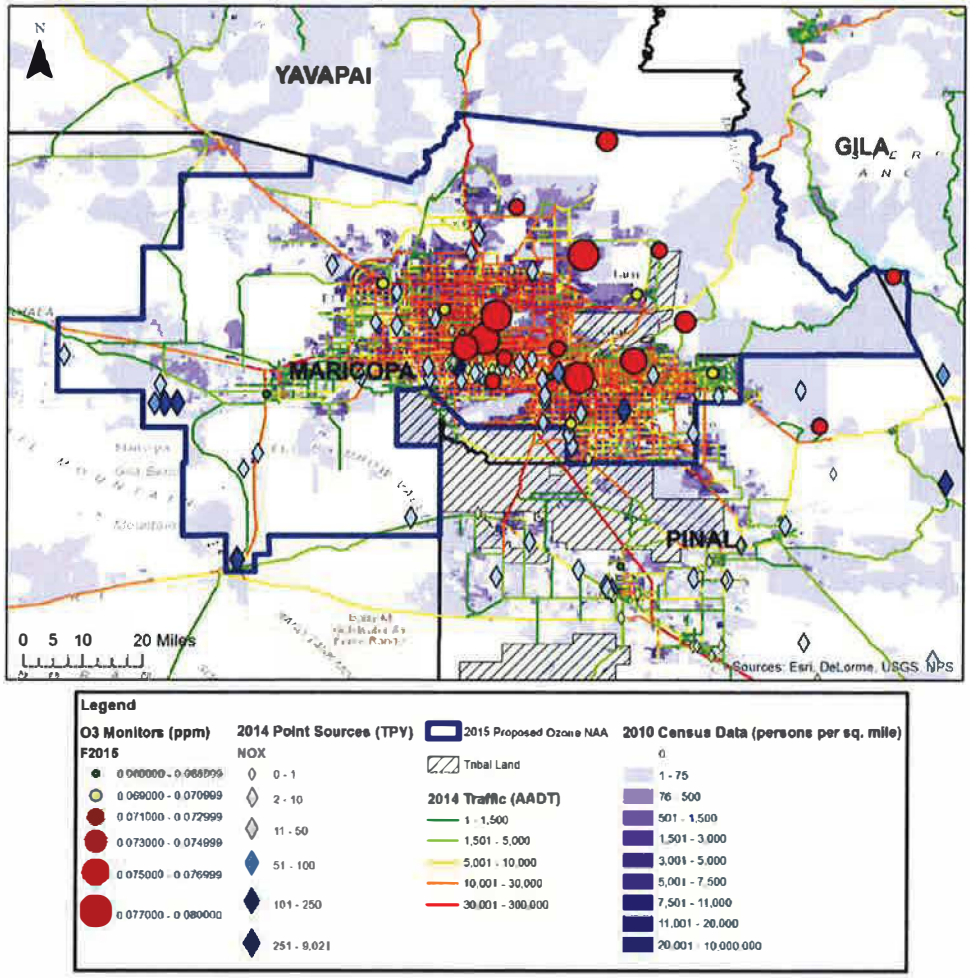


Table 6-2 Township and Range Description for Alternative Maricopa-Gila Nonattainment Area

Designated Area[86]	Designation Type
Phoenix Area: Gila County (part)..... T2N, R12E (except that portion in Maricopa County) T3N, R12E (except that portion in Maricopa County) T4N, R12E (Sections 25 through 29 (except those portions in Maricopa County) and 33 through 36 (except those potions in Maricopa County)	Nonattainment

[86] All Arizona recommended areas exclude Indian Country.

Designated Area[86]	Designation Type
Maricopa County (part).....	
T1N, R1E (except that portion in Indian Country)	
T1N, R2E	Nonattainment
T1N, R3E	
T1N, R4E (except that portion in Indian Country)	
T1N, R5E (except that portion in Indian Country)	
T1N, R6E	
T1N, R7E	
T1N, R1W	
T1N, R2W	
T1N, R3W	
T1N, R4W	
T1N, R5W	
T1N, R6W	
T1N, R7W	
T1N, R8W	
T2N, R1E	
T2N, R2E	
T2N, R3E	
T2N, R4E	
T2N, R6E (except that portion in Indian Country)	
T2N, R7E (except that portion in Indian Country)	
T2N, R8E	
T2N, R9E	
T2N, R10E	
T2N, R11E	
T2N, R12E (except that portion in Gila County)	
T2N, R13E (except that portion in Gila County)	
T2N, R1W	
T2N, R2W	
T2N, R3W	
T2N, R4W	
T2N, R5W	
T2N, R6W	
T2N, R7W	
T2N, R8W	
T3N, R1E	
T3N, R2E	
T3N, R3E	
T3N, R4E	
T3N, R5E (except that portion in Indian Country)	

Designated Area[86]	Designation Type
T3N, R6E (except that portion in Indian Country) T3N, R7E (except that portion in Indian Country) T3N, R8E T3N, R9E T3N, R10E (except that portion in Gila County) T3N, R11E (except that portion in Gila County) T3N, R12E (except that portion in Gila County) T3N, R1W T3N, R2W T3N, R3W T3N, R4W T3N, R5W T3N, R6W T4N, R1E T4N, R2E T4N, R3E T4N, R4E T4N, R5E T4N, R6E (except that portion in Indian Country) T4N, R7E (except that portion in Indian Country) T4N, R8E T4N, R9E T4N, R10E (except that portion in Gila County) T4N, R11E (except that portion in Gila County) T4N, R12E (except that portion in Gila County) T4N, R1W T4N, R2W T4N, R3W T4N, R4W T4N, R5W T4N, R6W T5N, R1E T5N, R2E T5N, R3E T5N, R4E T5N, R5E T5N, R6E T5N, R7E T5N, R8E T5N, R9E (except that portion in Gila County) T5N, R10E (except that portion in Gila County) T5N, R1W T5N, R2W	

Designated Area[86]	Designation Type
T5N, R3W T5N, R4W T5N, R5W T6N, R1E (except that portion in Yavapai County) T6N, R2E T6N, R3E T6N, R4E T6N, R5E T6N, R6E T6N, R7E T6N, R8E T6N, R9E (except that portion in Gila County) T6N, R10E (except that portion in Gila County) T6N, R1W (except that portion in Yavapai County) T6N, R2W T6N, R3W T6N, R4W T6N, R5W T7N, R1E (except that portion in Yavapai County) T7N, R2E (except that portion in Yavapai County) T7N, R3E T7N, R4E T7N, R5E T7N, R6E T7N, R7E T7N, R8E T7N, R9E (except that portion in Gila County) T7N, R1W (except that portion in Yavapai County) T7N, R2W (except that portion in Yavapai County) T8N, R2E (except that portion in Yavapai County) T8N, R3E (except that portion in Yavapai County) T8N, R4E (except that portion in Yavapai County) T8N, R5E (except that portion in Yavapai County) T8N, R6E (except that portion in Yavapai County) T8N, R7E (except that portion in Yavapai County) T8N, R8E (except that portion in Yavapai and Gila Counties) T8N, R9E (except that portion in Yavapai and Gila Counties) T1S, R1E (except that portion in Indian Country) T1S, R2E (except that portion in Pinal County and in Indian Country) T1S, R3E	

Designated Area[86]	Designation Type
T1S, R4E T1S, R5E T1S, R6E T1S, R7E T1S, R1W T1S, R2W T1S, R3W T1S, R4W T1S, R5W T1S, R6W T2S, R1E (except that portion in Indian Country) T2S, R5E T2S, R6E T2S, R7E T2S, R1W T2S, R2W T2S, R3W T2S, R4W T2S, R5W T3S, R1E T3S, R1W T3S, R2W T3S, R3W T3S, R4W T3S, R5W T4S, R1E T4S, R1W T4S, R2W T4S, R3W T4S, R4W T4S, R5W T5S, R4W (Sections 1 through 22 and 27 through 34) Pinal County (part) ..... T1N, R8E T1S, R8E (Sections 1 through 12)	Nonattainment

6.3 2008 Maricopa-Pinal Alternative Boundary and Township Description

If, given future ozone design values, neither Pinal County's Queen Valley ozone monitor or Gila County's Tonto National Monument ozone monitor violate the 2015 Ozone NAAQS, and no other monitor in Pinal County (besides the Apache Junction monitor) violates the standard, then Arizona suggests, as an alternative to its recommendation, that the 2008 Phoenix-Mesa Ozone Nonattainment Area boundary continue to be the nonattainment boundary for the 2015 Ozone NAAQS. Figure 6-5 below shows the suggested boundary alternative, and Figure 6-6 shows the suggested boundary alternative in the context of other relevant data. Table 6-3 provides the township and range description of this alternative area.

Figure 6-5 Alternative 2008 Maricopa-Pinal Nonattainment Area

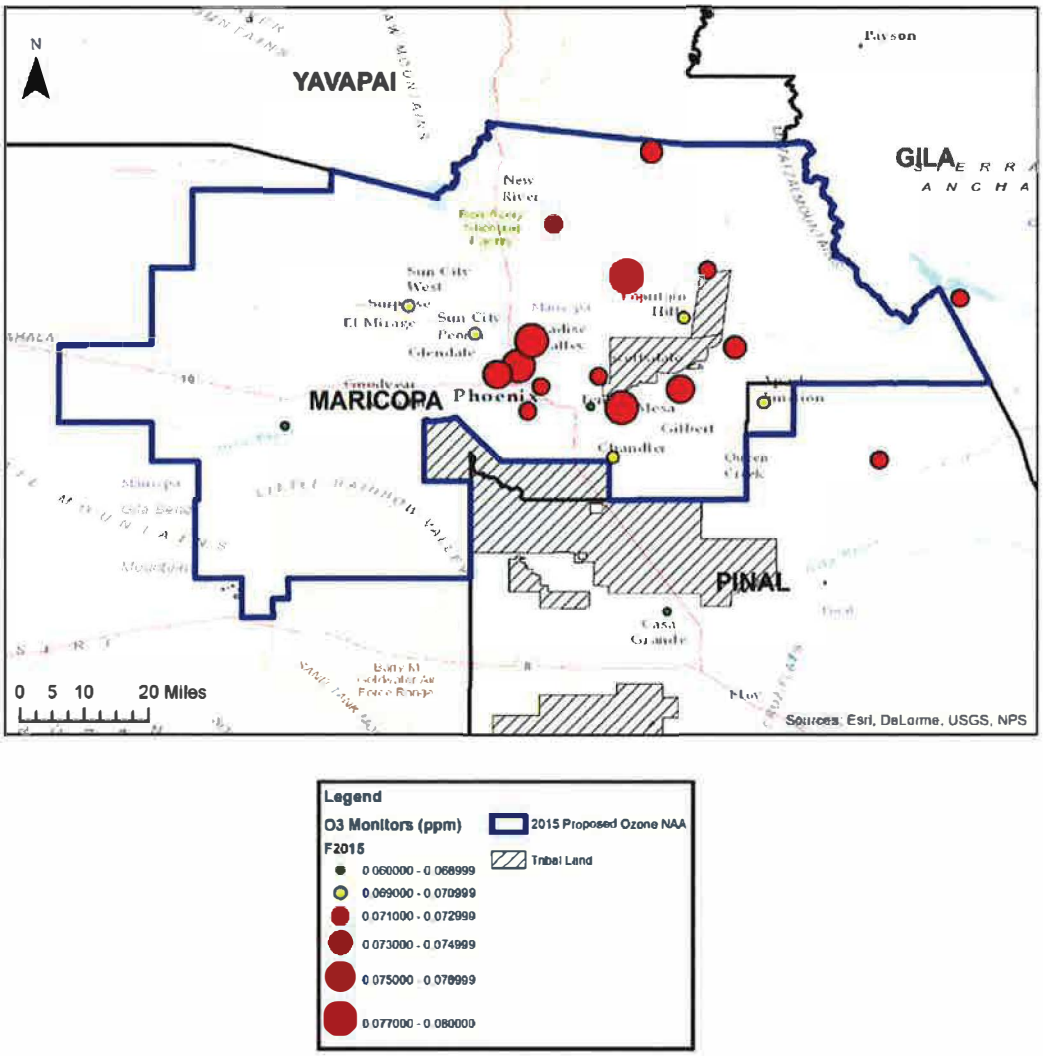


Figure 6-6 Alternative 2008 Maricopa-Pinal Nonattainment Area with Relevant Data

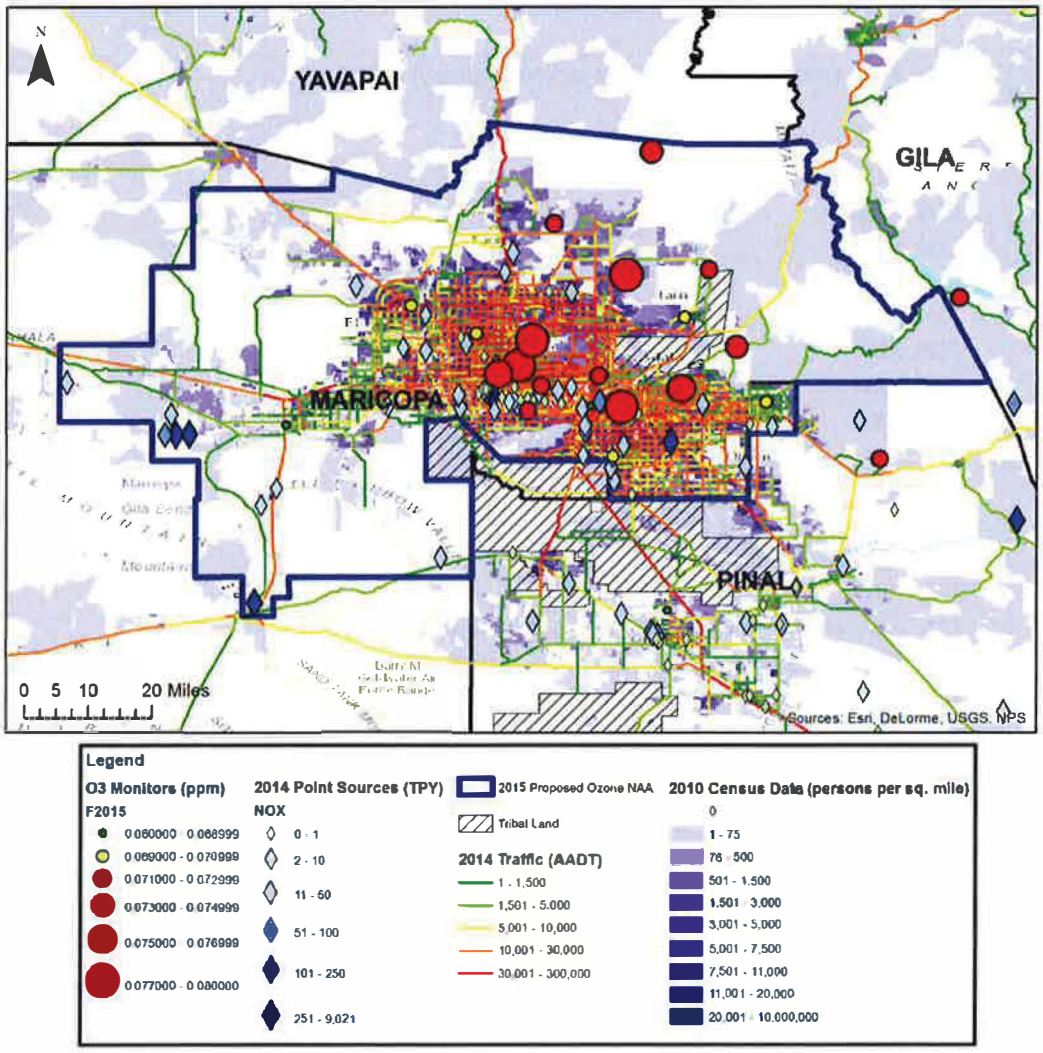


Table 6-3 Township and Range Description for Alternative 2008 Maricopa-Pinal Nonattainment Area

Designated Area[87]	Designation Type
Phoenix Area: Maricopa County (part)..... T1N, R1E (except that portion in Indian Country) T1N, R2E T1N, R3E T1N, R4E (except that portion in Indian Country)	Nonattainment

[87] All Arizona recommended areas exclude Indian Country.

Designated Area[87]	Designation Type
T1N, R5E (except that portion in Indian Country)	
T1N, R6E	
T1N, R7E	
T1N, R1W	
T1N, R2W	
T1N, R3W	
T1N, R4W	
T1N, R5W	
T1N, R6W	
T1N, R7W	
T1N, R8W	
T2N, R1E	
T2N, R2E	
T2N, R3E	
T2N, R4E	
T2N, R6E (except that portion in Indian Country)	
T2N, R7E (except that portion in Indian Country)	
T2N, R8E	
T2N, R9E	
T2N, R10E	
T2N, R11E	
T2N, R12E (except that portion in Gila County)	
T2N, R13E (except that portion in Gila County)	
T2N, R1W	
T2N, R2W	
T2N, R3W	
T2N, R4W	
T2N, R5W	
T2N, R6W	
T2N, R7W	
T2N, R8W	
T3N, R1E	
T3N, R2E	
T3N, R3E	
T3N, R4E	
T3N, R5E (except that portion in Indian Country)	
T3N, R6E (except that portion in Indian Country)	
T3N, R7E (except that portion in Indian Country)	
T3N, R8E	
T3N, R9E	
T3N, R10E (except that portion in Gila County)	
T3N, R11E (except that portion in Gila County)	
T3N, R12E (except that portion in Gila County)	

Designated Area[87]	Designation Type
T3N, R1W T3N, R2W T3N, R3W T3N, R4W T3N, R5W T3N, R6W T4N, R1E T4N, R2E T4N, R3E T4N, R4E T4N, R5E T4N, R6E (except that portion in Indian Country) T4N, R7E (except that portion in Indian Country) T4N, R8E T4N, R9E T4N, R10E (except that portion in Gila County) T4N, R11E (except that portion in Gila County) T4N, R12E (except that portion in Gila County) T4N, R1W T4N, R2W T4N, R3W T4N, R4W T4N, R5W T4N, R6W T5N, R1E T5N, R2E T5N, R3E T5N, R4E T5N, R5E T5N, R6E T5N, R7E T5N, R8E T5N, R9E (except that portion in Gila County) T5N, R10E (except that portion in Gila County) T5N, R1W T5N, R2W T5N, R3W T5N, R4W T5N, R5W T6N, R1E (except that portion in Yavapai County) T6N, R2E T6N, R3E	

Designated Area[87]	Designation Type
T6N, R4E T6N, R5E T6N, R6E T6N, R7E T6N, R8E T6N, R9E (except that portion in Gila County) T6N, R10E (except that portion in Gila County) T6N, R1W (except that portion in Yavapai County) T6N, R2W T6N, R3W T6N, R4W T6N, R5W T7N, R1E (except that portion in Yavapai County) T7N, R2E (except that portion in Yavapai County) T7N, R3E T7N, R4E T7N, R5E T7N, R6E T7N, R7E T7N, R8E T7N, R9E (except that portion in Gila County) T7N, R1W (except that portion in Yavapai County) T7N, R2W (except that portion in Yavapai County) T8N, R2E (except that portion in Yavapai County) T8N, R3E (except that portion in Yavapai County) T8N, R4E (except that portion in Yavapai County) T8N, R5E (except that portion in Yavapai County) T8N, R6E (except that portion in Yavapai County) T8N, R7E (except that portion in Yavapai County) T8N, R8E (except that portion in Yavapai and Gila Counties) T8N, R9E (except that portion in Yavapai and Gila Counties) T1S, R1E (except that portion in Indian Country) T1S, R2E (except that portion in Pinal County and in Indian Country) T1S, R3E T1S, R4E T1S, R5E T1S, R6E T1S, R7E T1S, R1W T1S, R2W T1S, R3W	

Designated Area[87]	Designation Type
T1S, R4W T1S, R5W T1S, R6W T2S, R1E (except that portion in Indian Country) T2S, R5E T2S, R6E T2S, R7E T2S, R1W T2S, R2W T2S, R3W T2S, R4W T2S, R5W T3S, R1E T3S, R1W T3S, R2W T3S, R3W T3S, R4W T3S, R5W T4S, R1E T4S, R1W T4S, R2W T4S, R3W T4S, R4W T4S, R5W T5S, R4W (Sections 1 through 22 and 27 through 34)	
Pinal County (part) ..... T1N, R8E T1S, R8E (Sections 1 through 12)	Nonattainment

ADEQ
Arizona Department of Environmental Quality

Appendix A
2015 Ozone Boundary Recommendation Technical Support Document

Air Quality Division
August 30, 2016 Final

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A1 Data Sources

The tables below (Table A1-1, Table A1-2, Table A1-3, Table A1-4, and Table A1-5) list the data sets and sources of all data collected and used for the five factor analysis.

Table A1-1 Data Sources for Ambient Air Data

Air Quality Data			
Description	**Data Year**	**Data Source**	**Downloaded**
Ozone Design Values for All Sites in Arizona	1995-2015	EPA Air Quality System (AQS) Design Value Reports	03/31/2016
Hourly Ozone Concentrations for All Sites in Arizona	2013-2015	EPA Air Quality System (AQS) Hourly Data Reports	03/31/2016

Table A1-2 Data Sources for Emissions and Emissions Related Data

Emissions and Emissions Related Data			
Description	**Data Year**	**Data Source**	**Downloaded**
County NOx and VOC Emissions	2011	EPA National Emissions Inventory (NEI) version 2 https://www.epa.gov/air-emissions-inventories/2011-national-emissions-inventory-nei-data	04-11-2016
Census Population by County	2000 and 2010	Arizona Department Of Administration (ADOA) – Intercensal Estimates https://population.az.gov/population-estimates	04-11-2016
CDP Level Census Population	2000 and 2010	U.S. Census Bureau - http://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_00_PL_GCTPL.ST10&prodType=table	03/04/2016
Arizona Population Estimates	2015	Arizona Department Of Administration (ADOA) - https://population.az.gov/population-estimates	03/04/2016
County to County Commuting Data	2009-2013	U.S. Census Commuting Patterns (American Community Survey) - http://www.census.gov/hhes/commuting/ YMPO Regional Transportation Plan MAG Regional Transportation Plan	04/11/2016
Arizona Prison Populations	2000 and 2010	Data provided by Arizona Department of Corrections	03/02/2016
EPA Transport Modeling Data	*2011 (base year) modeled forward to 2017	Air Quality Modeling TSD for the 2008 Ozone NAAQS Cross-State Air Pollution Rule Proposal and data files https://www.epa.gov/airmarkets/proposed-cross-state-air-pollution-update-rule	04/14/16
Traffic Data (Annual Average Daily Traffic)	2014	Data provided by Arizona Department of Transportation	11/02/2015

Census Block Level Population and # of Households	2000 and 2010	U.S. Census Bureau - ftp://ftp2.census.gov/geo/tiger/TIGER2010BLKPOPHU/	10/26/2015
ADEQ Point Source Data	2014	Major source data from SLEIS datasets.	10/26/2015
Maricopa County Point Source Data	2014	Maricopa County Air Quality Department provided a major and synthetic minor source list	02/04/2016
Pinal County Point Source Data	2014	Pinal County Air Quality Control District provided a major and synthetic minor source list	02/08/2016
Mexican Emissions Inventory data	2011	Eastern Research Group's Technical Documentation for Year 2015 Ozone Precursor Emission Inventory for U.S., Mexico, And Canada And Year 2011 Ozone Precursor Emission Inventory For Mexico - provided by the Maricopa Association of Governments	--
Southern California Counties' Point Source Data	2011	National Emissions Inventory (NEI) version 2 https://www.epa.gov/air-emissions-inventories/2011-national-emissions-inventory-nei-data	05/04/2016
Arizona Border Crossing Counts (Yuma and Nogales)	2013-2015	U.S. Department of Transportation - Bureau of Transportation Statistics http://transborder.bts.gov/programs/international/transborder/TBDR_BC/TBDR_BC_Index.html	05/04/2016

Table A1-3 Data Sources for Meteorological Data

Meteorological Data			
Description	**Data Year**	**Data Source**	**Downloaded**
Hourly Meteorological Data (Wind speed and wind direction) for 7 selected sites	2013-2015	Air Quality System (AQS) Hourly Data Reports and internal ADEQ data	04/28/2016

Table A1-4 Data Sources for Geographic and Topographic Data

Geography and Topography Data			
Description	**Data Year**	**Data Source**	**Downloaded**
Arizona Aerial Photography	2004-2013	ADEQ internal shapefiles	--
World Terrain Basemap	2009	Environmental Systems Research Institute (ESRI): http://goto.arcgisonline.com/maps/World_Terrain_Base	--
World Street Basemap	2016	Environmental Systems Research Institute (ESRI): http://goto.arcgisonline.com/maps/World_Street_Map	--

Table A1-5 Data Sources for Jurisdictional Boundary Data

Jurisdictional Boundary Data			
Description	**Data Year**	**Data Source**	**Downloaded**
CBSA/MSA Boundaries	2015	U.S. Census Bureau - http://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2015&layergroup=Core+Based+Statistical+Areas	10/26/2015
Arizona County Boundaries	2014	Arizona Land Resource Information System	10/26/2015
Arizona Tribal Boundaries	2013	Arizona Land Resource Information System	01/26/2016
Arizona Township, Range and Selection	2014	Arizona Land Resource Information System	01/26/2016
Arizona MPO Boundaries	2015	National Transportation Atlas Databases (NTAD) via USDOT - http://www.rita.dot.gov/bts/sites/rita.dot.gov.bts/files/publications/national_transportation_atlas_database/2015/polygon	10/26/2015
2008 Arizona 8-hour Ozone Boundary	2013	ADEQ internal shapefile	01/26/2016
Arizona Area A Boundary	2007	ADEQ internal shapefile	03/04/2016
Census Designated Places	2000 and 2010	U.S. Census Bureau - https://www.census.gov/geo/maps-data/data/cbf/cbf_place.html	03/04/2016
Public Land Ownership GIS layer	2012	Arizona Land Resource Information System	04/11/2016

A2 Ambient Air Data

A2.1 Ozone Design Values

Ambient ozone concentrations are monitored at numerous sites across Arizona. These monitoring sites are operated by the Arizona Department of Environmental Quality (ADEQ)[1], the Maricopa County Air Quality Department (MCAQD)[2], the Pima County Department of Environmental Quality (PCDEQ)[3], the Pinal County Air Quality Control District (PCAQCD)[4], and the Clean Air Status and Trends Network (CASTNET)[5]. Figure A2-1 below shows the locations of all of the ambient ozone monitors in Arizona. Table A2-1 below gives the site ID number, name, network, latitude, longitude, and the 2015 design value for all of the monitors in Arizona.

[1] Arizona Department of Environmental Quality. (2015, July 1). *State of Arizona Air Monitoring Network Plan for the Year 2015*. Retrieved from http://www.azdeq.gov/function/forms/download/air_monitoring_network_plan2015

[2] Maricopa County Air Quality Department. (2015, September). *2014 Air Monitoring Network Plan*. Retrieved from http://www.maricopa.gov/aq/divisions/monitoring/network.aspx

[3] Pima County Department of Environmental Quality. (2016). *2015 Ambient Air Monitoring Network Plan*. Retrieved from http://webcms.pima.gov/cms/one.aspx?portalId=169&pageId=61365

[4] Pinal County Air Quality Control District. (2015). *2015 Ambient Monitoring Network Plan and 2014 Data Summary*. Retrieved from http://pinalcountyaz.gov/AirQuality/Pages/MonitoringNetwork.aspx

[5] Clean Air Status and Trends Network (CASTNET). Retrieved from https://www.epa.gov/castnet

Figure A2-1 Arizona Ozone Monitoring Network

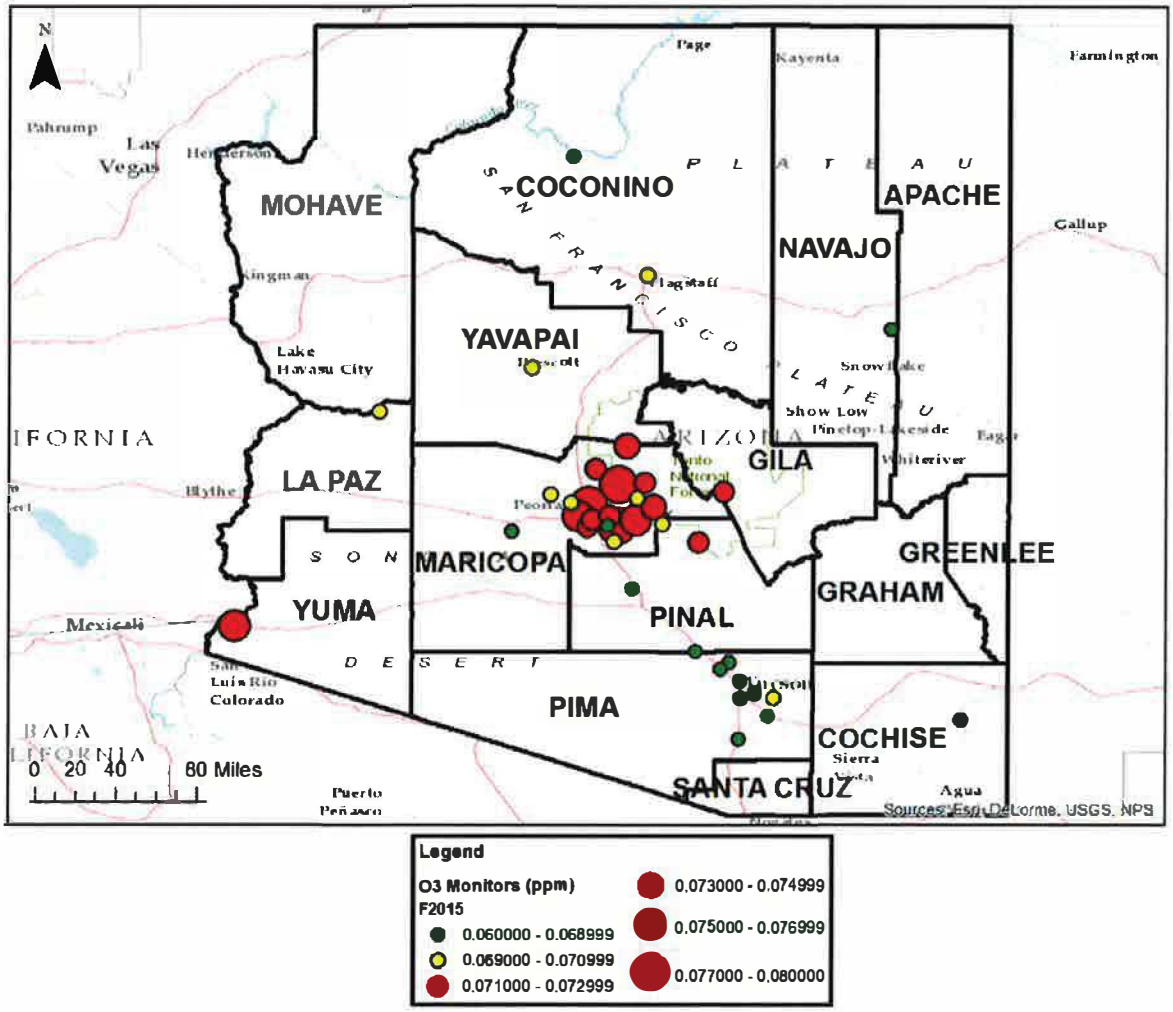


Table A2-1 Ozone Design Values

Site ID	Name	County	Network	Latitude	Longitude	2015 Design Value
04-003-8001	Chiricahua National Monument	Cochise	CASTNET	32.009405	-109.389058	0.068
04-005-1008	Flagstaff Middle School	Coconino	SLAMS	35.2061	-111.6528	0.070
04-005-8001	Grand Canyon National Park	Coconino	CASTNET	36.058642	-112.183575	0.068
04-007-0010	Tonto National Monument	Gila	SLAMS	33.6547	-111.1074	0.072
04-012-8000	Alamo Lake	La Paz	SLAMS	34.2439	-113.559	0.070
04-013-0019	West Phoenix	Maricopa	SLAMS	33.48385	-112.14257	0.075
04-013-1003	Mesa	Maricopa	SLAMS	33.41045	-111.86507	0.078
04-013-1004	North Phoenix	Maricopa	SLAMS	33.56033	-112.06626	0.077
04-013-1010	Falcon Field	Maricopa	SLAMS	33.45223	-111.73331	0.075
04-013-2001	Glendale	Maricopa	SLAMS	33.56936	-112.19153	0.070
04-013-2005	Pinnacle Peak	Maricopa	SLAMS	33.70655	-111.85557	0.078
04-013-3002	Central Phoenix	Maricopa	SLAMS	33.45793	-112.04601	0.072
04-013-3003	South Scottsdale	Maricopa	SLAMS	33.47968	-111.91721	0.071
04-013-4003	South Phoenix	Maricopa	SLAMS	33.40316	-112.07533	0.072
04-013-4004	West Chandler	Maricopa	SLAMS	33.29898	-111.88431	0.070
04-013-4005	Tempe	Maricopa	SLAMS	33.4124	-111.93473	0.064[6]
04-013-4008	Cave Creek	Maricopa	SLAMS	33.82169	-112.017	0.071
04-013-4010	Dysart	Maricopa	SLAMS	33.63713	-112.34184	0.070
04-013-4011	Buckeye	Maricopa	SLAMS	33.37005	-112.6207	0.060
04-013-9508	Humboldt Mountain	Maricopa	SLAMS	33.9828	-111.7987	0.073
04-013-9702	Blue Point	Maricopa	SLAMS	33.54549	-111.60925	0.074
04-013-9704	Fountain Hills	Maricopa	SLAMS	33.61103	-111.72529	0.069[7]
04-013-9706	Rio Verde	Maricopa	SLAMS	33.71881	-111.67183	0.071
04-013-9997	JLG Supersite	Maricopa	SLAMS	33.5038	-112.096	0.077
04-017-0119	Petrified Forest National Park	Navajo	CASTNET	34.822508	-109.892485	0.066
04-019-0021	Saguaro National Park	Pima	SLAMS	32.174538	-110.737116	0.069
04-019-1011	22nd & Craycroft	Pima	SLAMS	32.20442	-110.878067	0.063
04-019-1018	Tangerine	Pima	SPM	32.42525	-111.0635	0.065
04-019-1020	Fairgrounds	Pima	SPM	32.04768	-110.77435	0.066
04-019-1028	Children's Park NCore	Pima	SLAMS	32.29515	-110.9823	0.066
04-019-1030	Green Valley	Pima	SPM	31.87952	-110.99644	0.064
04-019-1032	Rose Elementary	Pima	SPM	32.173	-110.980115	0.065
04-019-1034	Coachline	Pima	SPM	32.38082	-111.12716	0.063
04-021-3001	Apache Junction Maint. Yard	Pinal	SLAMS	33.4214	-111.544	0.069
04-021-3003	Casa Grande Airport	Pinal	SLAMS	32.95436	-111.762	0.065
04-021-3007	Pinal Air Park	Pinal	SLAMS	32.50831	-111.308	0.065
04-021-8001	Queen Valley	Pinal	SLAMS	33.2938	-111.286	0.071
04-025-8033	Prescott College	Yavapai	SLAMS	34.5451	-112.477	0.069
04-027-8011	Yuma Supersite	Yuma	SLAMS	32.6903	-114.614	0.076

[6] Design value is not valid due to incomplete data from 2013-2015.
[7] Design value is not valid due to incomplete data from 2013-2015.

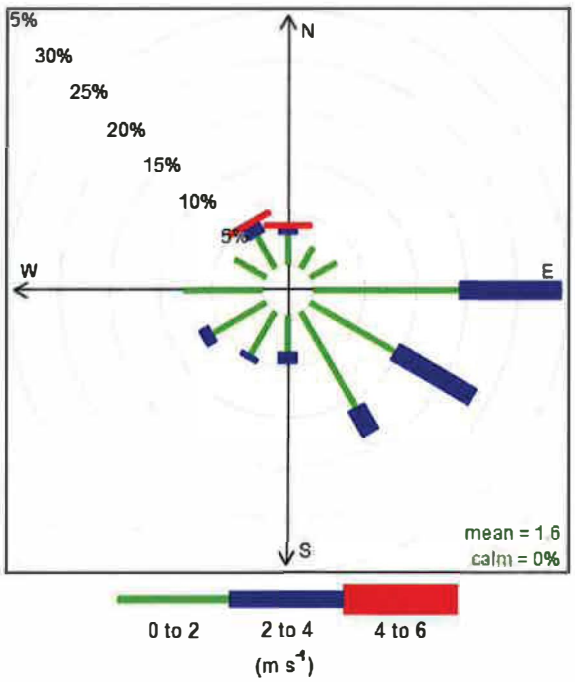
A3 Meteorological Analyses

A3.1 Wind Rose Analysis

Using 3 years of meteorological data for 2013-2015, ADEQ plotted wind roses to show the wind direction and wind speed for ambient ozone monitors, where meteorological data was available. Wind roses were plotted annually for each of the three years, as well as for the wind data for the ten highest monitored ozone days from 2013-2015.

For example, Figure A3-1 is the wind rose for the ten highest monitored ozone days at the JLG Supersite monitor in Phoenix, AZ for the 2013-2015 time period. This wind rose shows that around 25% of the winds are from the east, with an additional 35% from the southeast. For the winds from the east, around 15% of wind speeds are less than 2 m/s (about 4.5mph) and 10% are between 2 m/s and 4 m/s (about 4.5 to 9mph). The figure also shows that 0% of the winds are calm and that the average wind speed is 1.6 m/s (about 3.5mph).

Figure A3-1 JLG Supersite Wind Rose for the Ten Highest Ozone Days (2013-2015)



Frequency of counts by wind direction (%)

A3.2 HYSPLIT Analyses

A3.2.1 HYSPLIT Back Trajectory Analysis

The National Oceanic and Atmospheric Administration (NOAA) HYSPLIT model[8] was used to perform back trajectory analyses for the ozone monitoring sites in Arizona with design values above the 2015 NAAQS. Back trajectories were modeled for the ten highest ozone exceedance days from 2013-2015 for each of the violating monitoring sites. ADEQ elected to run an ensemble of back trajectories beginning at the end of the highest eight hour exceedance period for each of the ten highest exceedance days. Starting with the eighth hour of the exceedance, a new trajectory begins every preceding hour until all eight hours in the daily max ozone exceedance is represented with a 24 hour back trajectory.

The North American Mesoscale (NAM)[9] 12km meteorological model was selected for the initial meteorological input to the model. Also, ADEQ selected "model vertical velocity" as the method for computing vertical motion. To best represent surface conditions, a starting height for the model was selected at 100 meters above ground level (AGL), and the model was only run for 24 hours backward.

The above method accords with HYSPLIT method suggested in the EPA Guidance on the Area Designations for the 2015 Ozone National Ambient Air Quality Standards[10]. U.S. county borders, the default projection, vertical plot height units in meters AGL, and the six hour interval labels were all used for the display output.

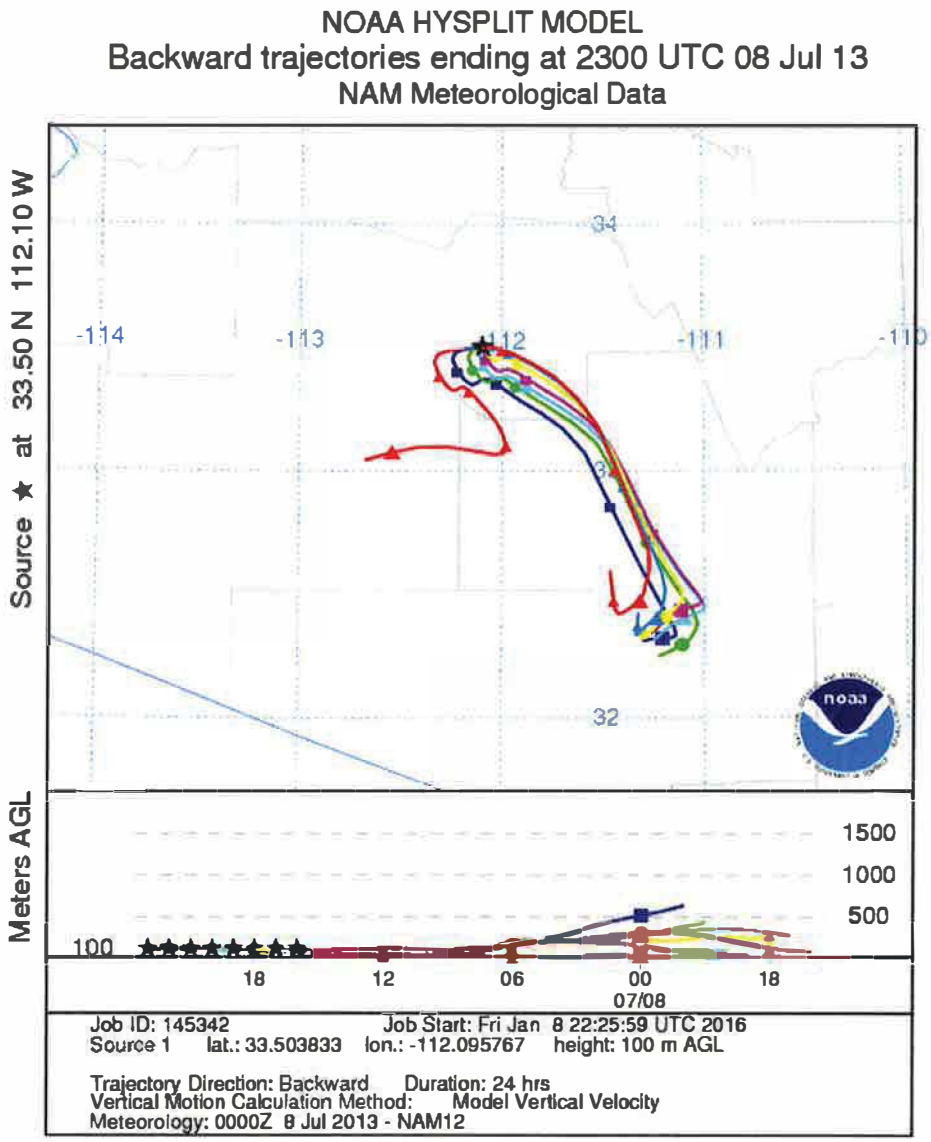
For example, Figure A3-2 is the HYSPLIT model output of back trajectories for the ozone exceedance at the JLG Supersite monitor on July 8th, 2013. The top half of the figure shows a different colored back-trajectory for each of the eight hours during the maximum 8-hour ozone exceedance and where it moves spatially in relation to the monitor (the star). This example shows that the majority of the back-trajectories came from the southeast. The bottom half of the image shows how the eight trajectories moved vertically in the atmosphere, with this example showing that only one of the eight trajectories reached an altitude of 500m above ground level.

[8] HYSPLIT - Hybrid Single Particle Lagrangian Integrated Trajectory Model. Retrieved from http://ready.arl.noaa.gov/HYSPLIT.php

[9] North American Mesoscale Forecast System (NAM). Retrieved from https://www.ncdc.noaa.gov/data-access/model-data/model-datasets/north-american-mesoscale-forecast-system-nam

[10] *Area Designations [Guidance] for the 2015 Ozone National Ambient Air Quality Standards*, Memorandum from Janet G. McCabe, Acting Assistant Administrator, to Regional Administrators, Regions 1-10, dated February 25, 2016.

Figure A3-2 JLG Supersite HYSPLIT Back Trajectory for July 8th, 2013



A3.2.2 Openair HYSPLIT Analysis

In addition to using the HYSPLIT model for trajectory analysis, Openair[11] was utilized in conjunction with HYSPLIT to perform additional trajectory analyses. Openair is an R programming language package for air quality data analysis.

Openair was utilized to run a HYSPLIT back trajectory analysis for two full years, 2013 and 2014. The model was run to calculate air mass trajectories in the preceding 24 hours starting at 0:00

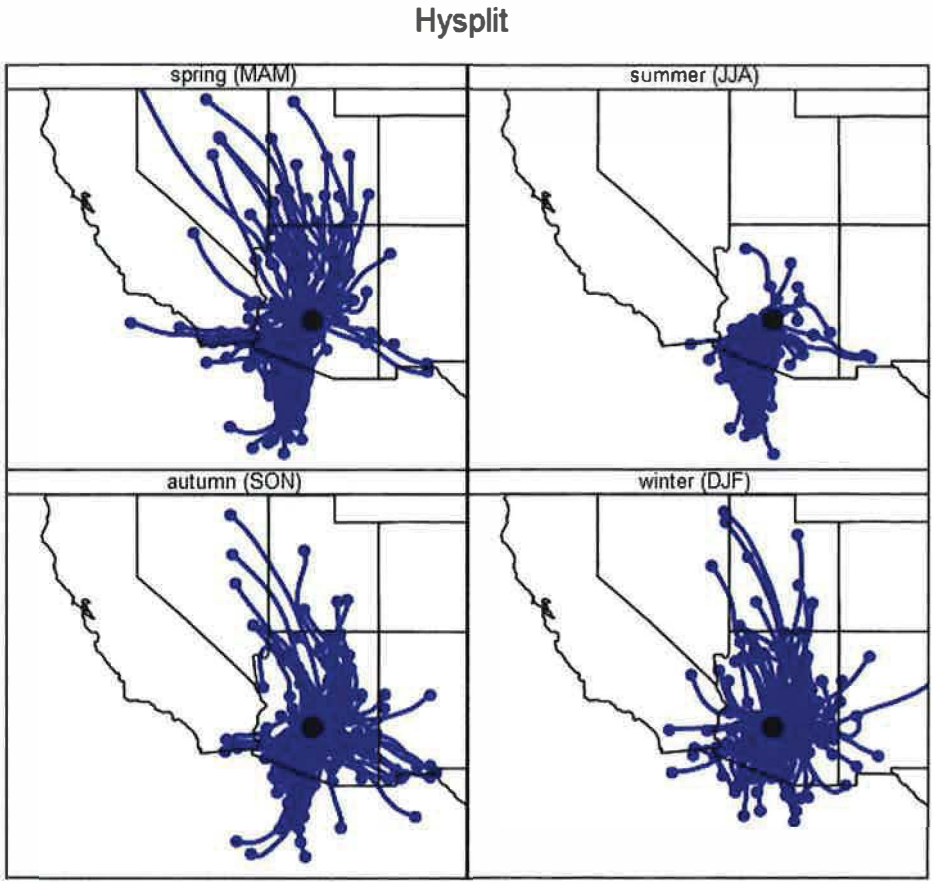
[11] Openair project: open-source tools for the analysis of air pollution data. NERC Knowledge Exchange Project. Retrieved from http://www.openair-project.org/Default.aspx

a.m. Arizona local time for each day in 2013 and 2014 at the receptor height (assumed to be 10 m). The HYSPLIT model was driven by the North American Regional Reanalysis[12] (NARR) meteorological dataset.

Seasonal variations were also plotted. For the season-specific ensembles, March, April and May were regarded as spring; June, July and August were treated as summer, September, October and November were treated as fall; December and the following January and February were regarded as winter.

Figure A3-3 below shows the back trajectory analysis for the JLG Supersite monitor in Phoenix. Every 24 hour back trajectory for every third hour in 2013 and 2014 is displayed by season, showing the general pattern of air-mass origin.

Figure A3-3 JLG Supersite Seasonal HYSPLIT Back Trajectories

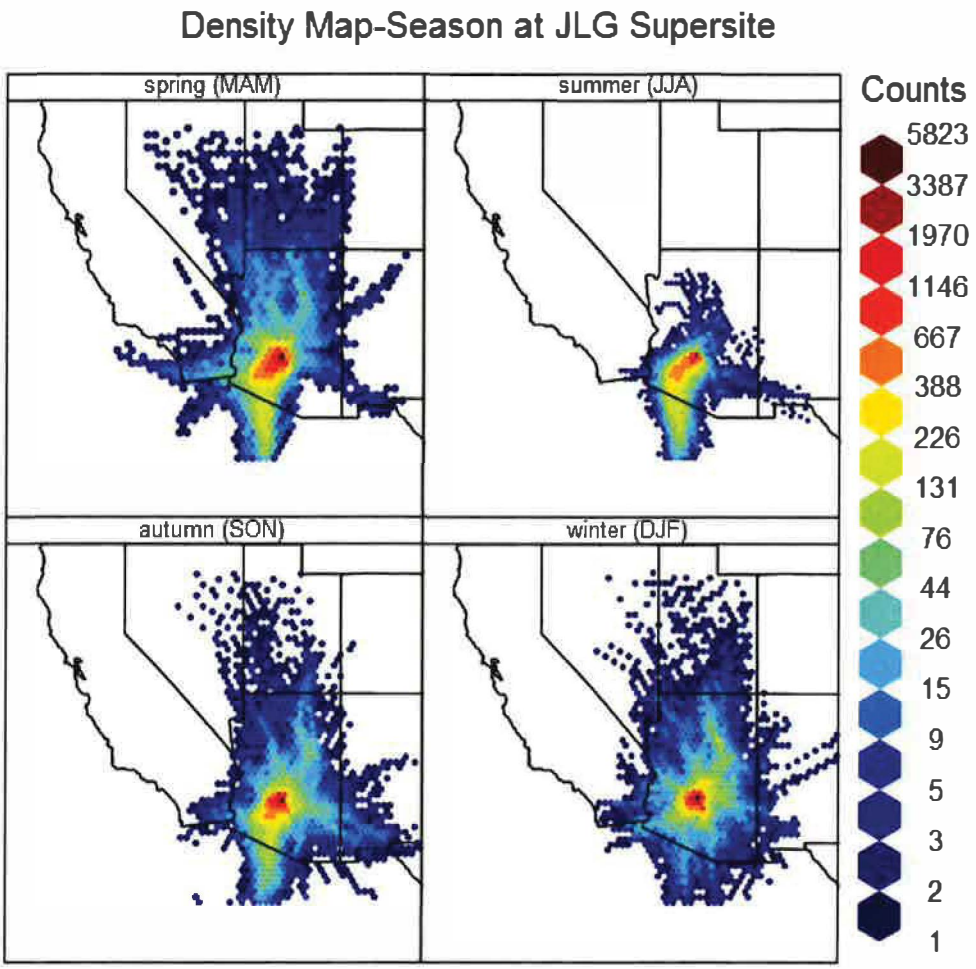


[12] North American Regional Reanalysis (NARR). Retrieved from https://www.ncdc.noaa.gov/data-access/model-data/model-datasets/north-american-regional-reanalysis-narr

A3.2.2.1 HYSPLIT Density Analysis

ADEQ created a HYSPLIT density map by using the latitude and longitude of the two-year modeling trajectories produced in the analysis above. Using the trajectories' positions and a hexagonal gridded domain in Openair, the number of trajectories that passed through each hexagonal area are shown in Figure A3-4.

Figure A3-4 JLG Supersite Seasonal HYSPLIT Density Map



A3.2.2.2 Concentration Bin HYSPLIT Analysis

ADEQ merged hourly ozone data with two year HYSPLIT results from above to investigate the potential area contributions to O_3 production in Phoenix area. The trajectories were labeled with the hourly ozone concentration at the monitor at the start time for the backwards trajectory, allowing each trajectory to be represented by the resulting ozone concentration.

In Figure A3-5 below, the concentration labeled trajectories were grouped into three ranges, concentrations below 0.05ppm, concentrations between 0.05 ppm and 0.07 ppm, and concentrations above 0.07 ppm. Each group is represented with a different color, to help visualize trajectories resulting in particularly higher ozone concentrations (above 0.07 ppm).

Figure A3-5 JLG Supersite Seasonal Ozone Concentration Specific HYSPLIT Trajectory Map

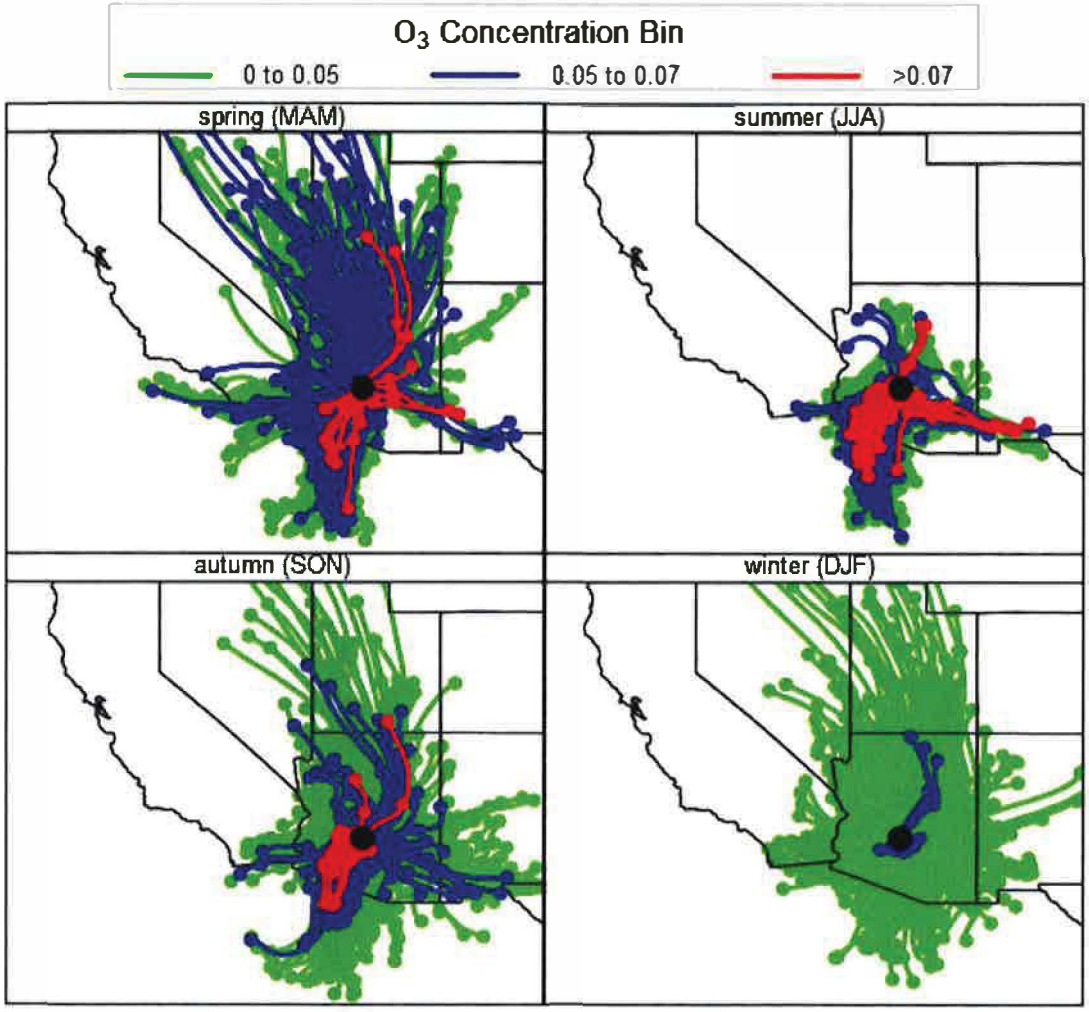
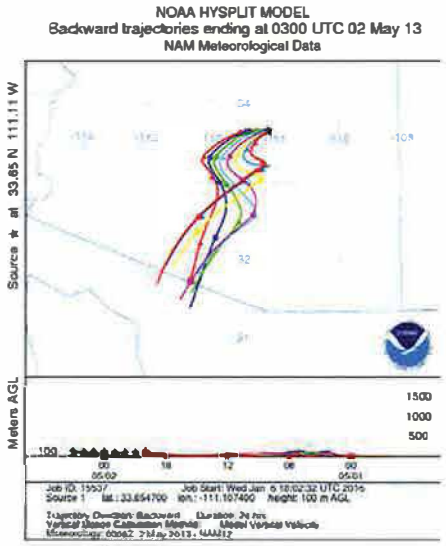
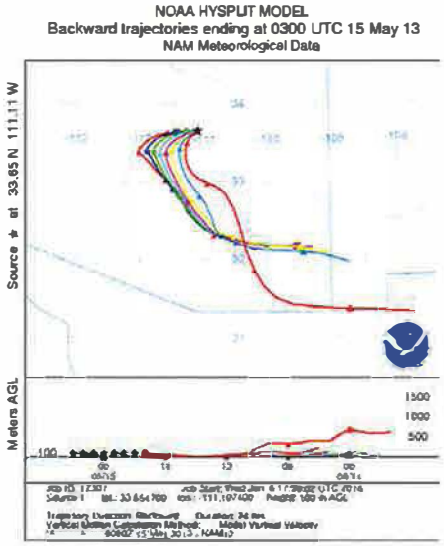
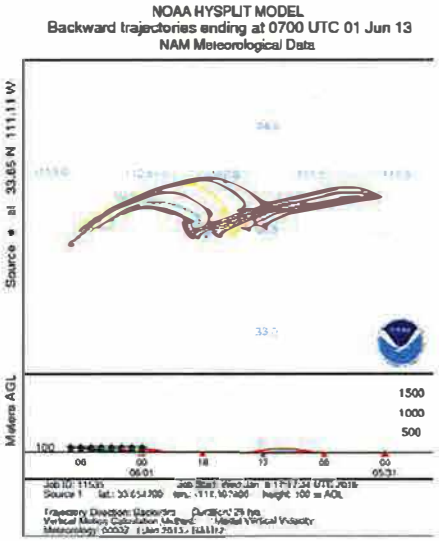


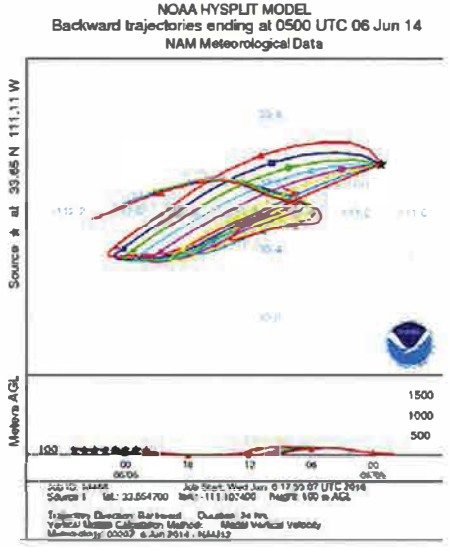
Exhibit AI – HYSPLIT Back Trajectories

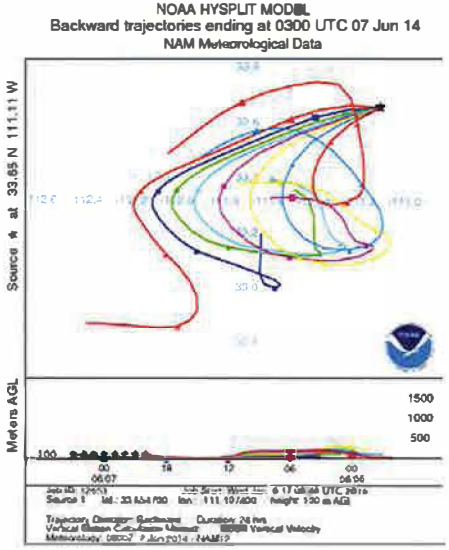
AI1 Tonto National Monument Monitor – Gila County (04-007-0010)

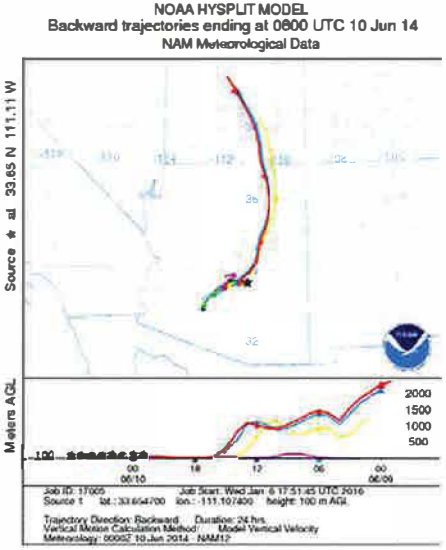


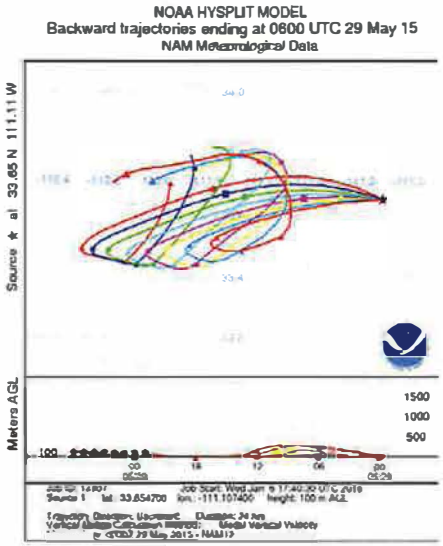











NOAA HYSPLIT MODEL
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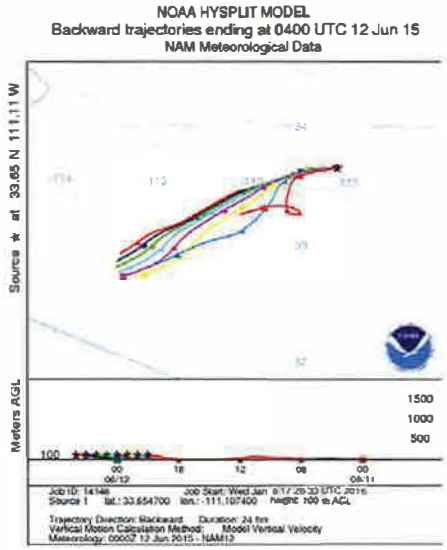
Meters AGL
1500
1000
500
100


NOAA HYSPLIT MODEL
Backward trajectories ending at 0400 UTC 12 Jun 15
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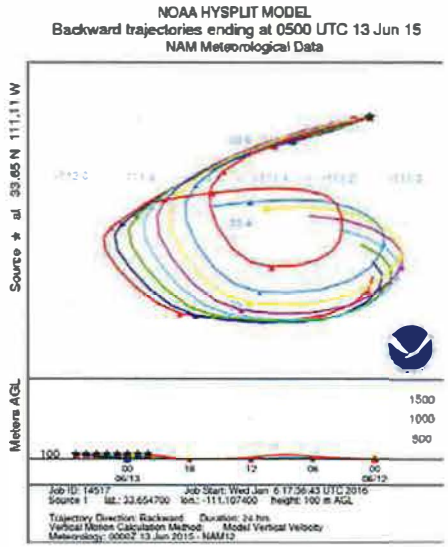
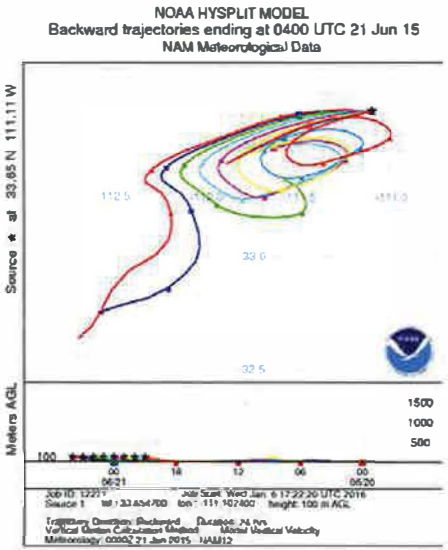
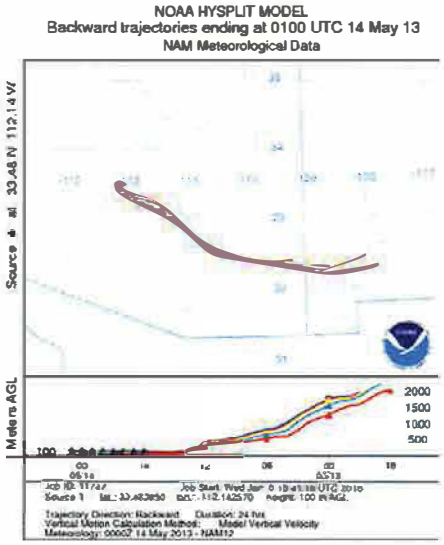
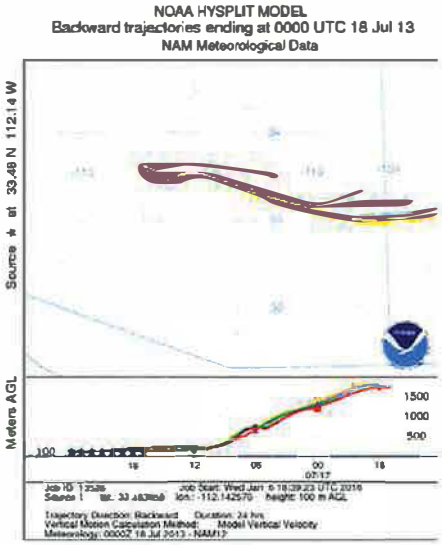
Source ★ at 33.65 N 111.11 W
Meters AGL
1500
1000
500
100

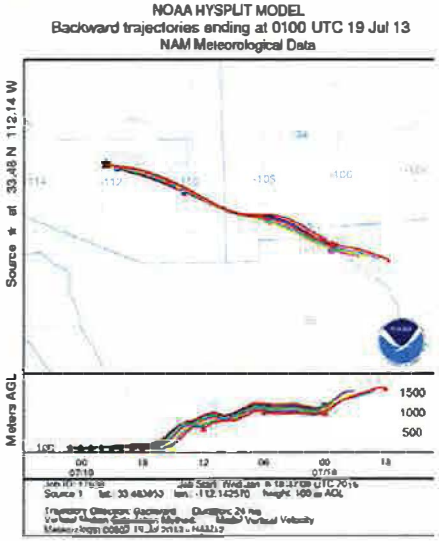

NOAA HYSPLIT MODEL
Backward trajectories ending at 0500 UTC 13 Jun 15
NAM Meteorological Data
Source ★ at 33.65 N 111.11 W
Meters AGL
1500
1000
500
100

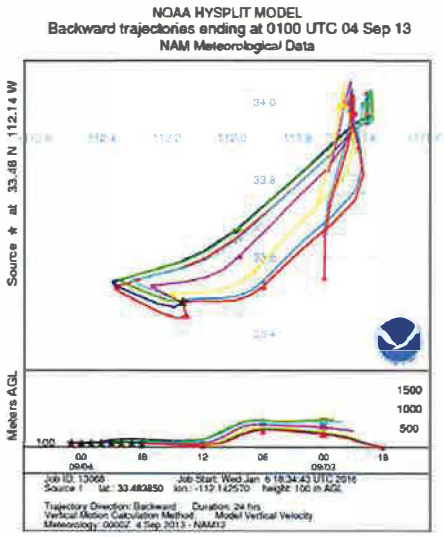

NOAA HYSPLIT MODEL
Backward trajectories ending at 0400 UTC 21 Jun 15
NAM Meteorological Data
Source ★ at 33.65 N 111.11 W
Meters AGL
1500
1000
500
100

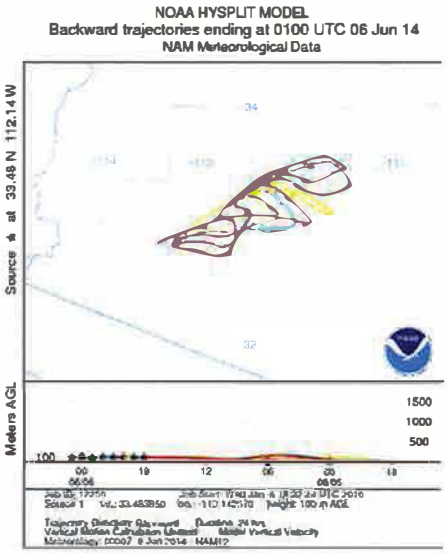
AI2 West Phoenix Monitor – Maricopa County (04-013-0019)

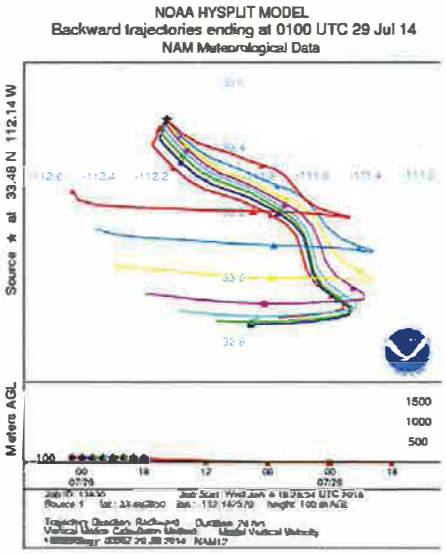


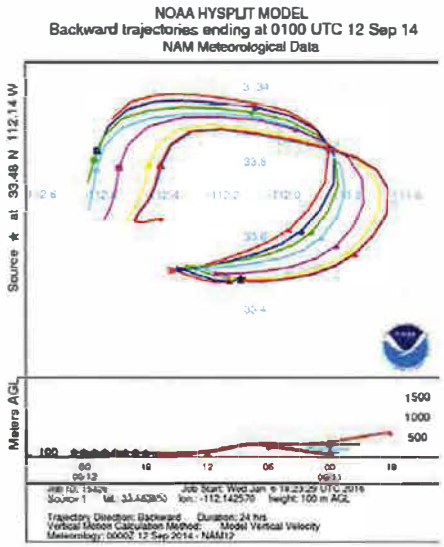











NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 12 Sep 14
NAM Meteorological Data
Source ★ at 33.48 N 112.14 W
Meters AGL
1500
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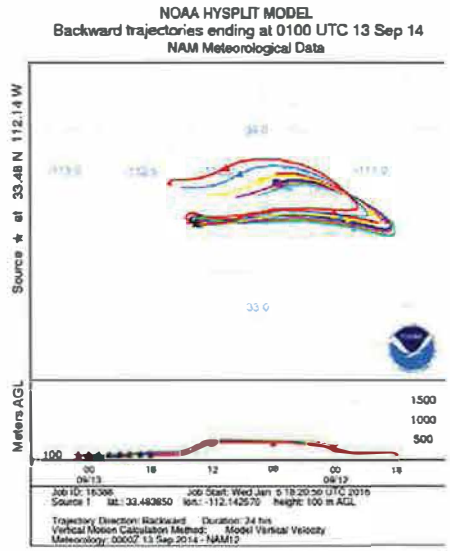
00
09/12
18
12
06
00
09/11
18


NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 13 Sep 14
NAM Meteorological Data
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Meters AGL
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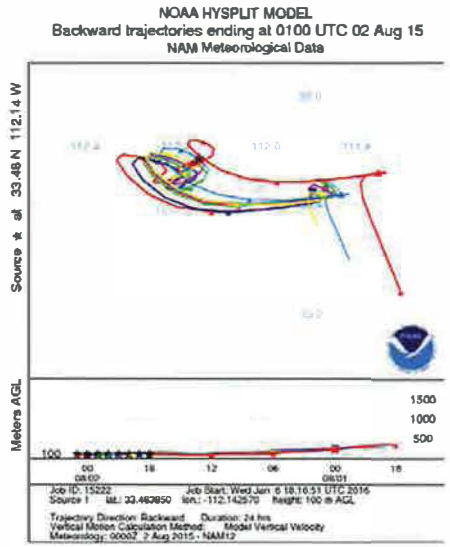
09/12
18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Backward trajectories ending at 0100 UTC 02 Aug 15
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Meters AGL
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00
08/02
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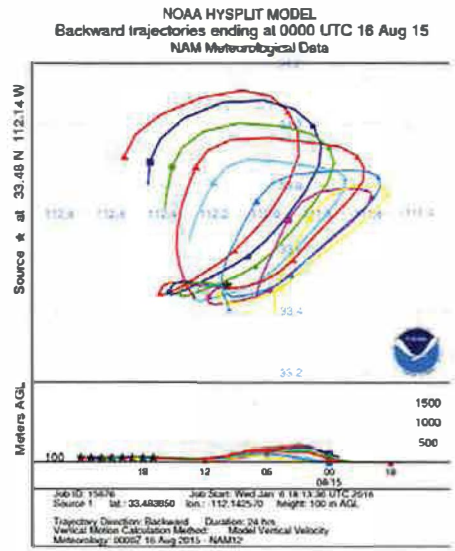
NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 16 Aug 15
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Meters AGL
1500
1000
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100
18
12
06
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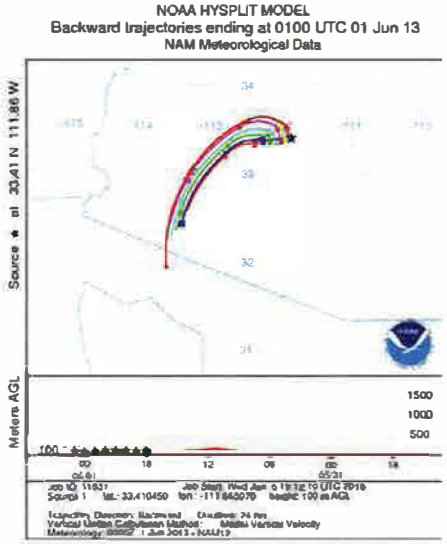
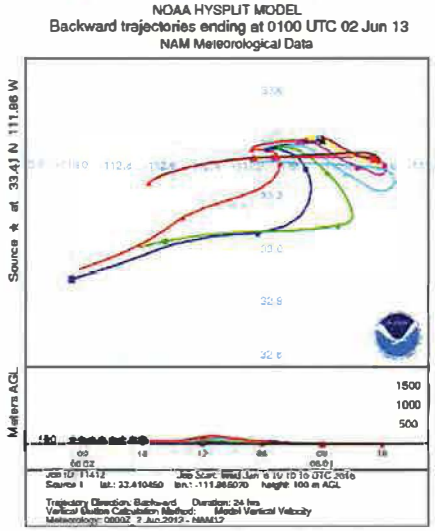
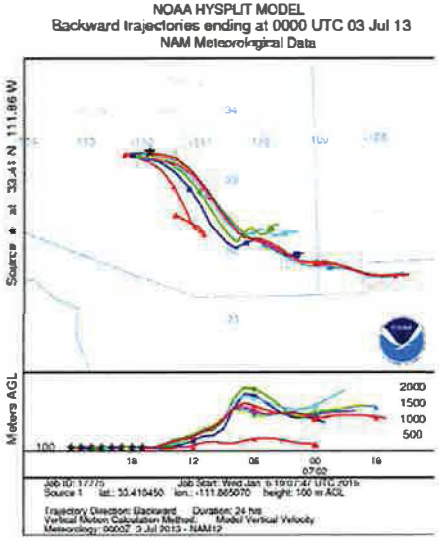
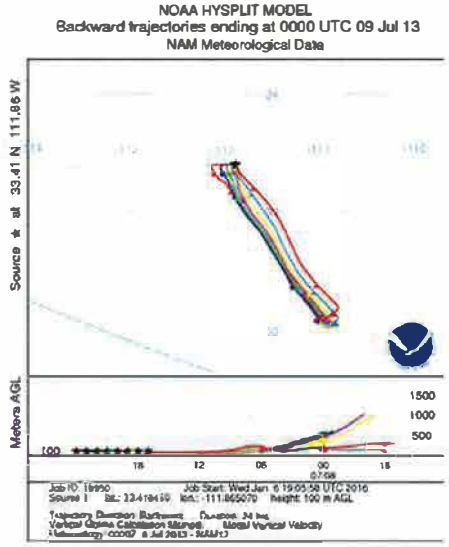
08/15
18

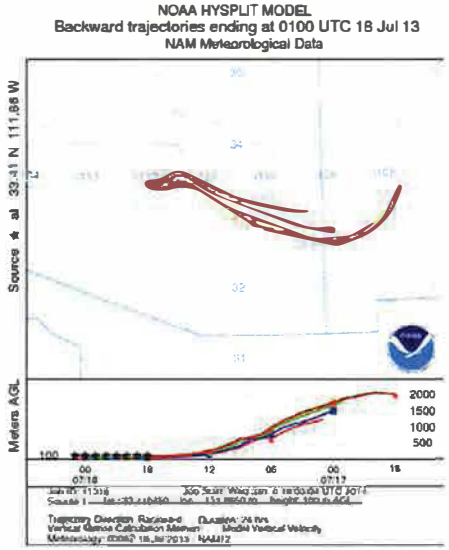
AI3 Mesa Monitor – Maricopa County (04-013-1003)

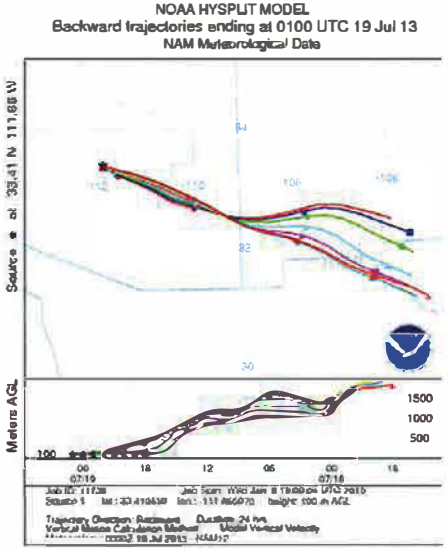


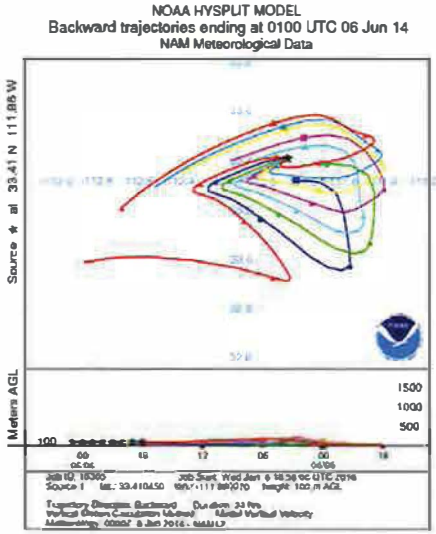


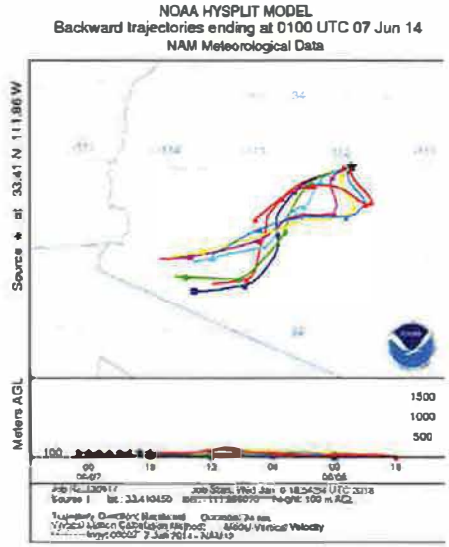


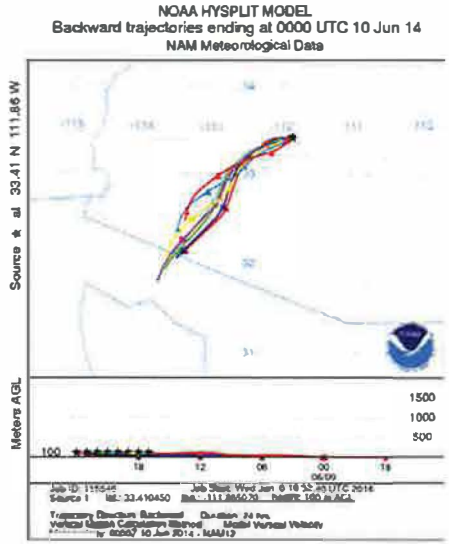


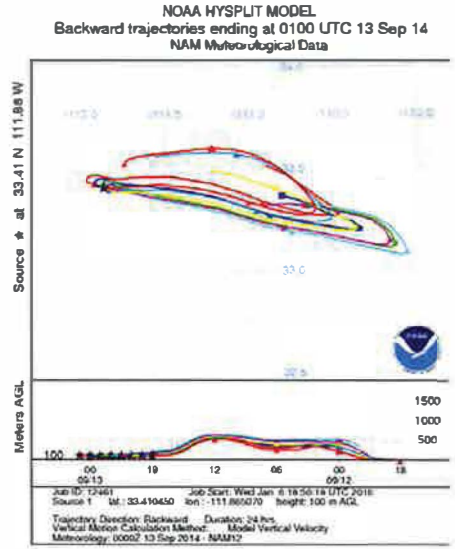





NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 06 Jun 14
NAM Meteorological Data
Source ★ at 33.41 N 111.86 W
Meters AGL
1500
1000
500
100

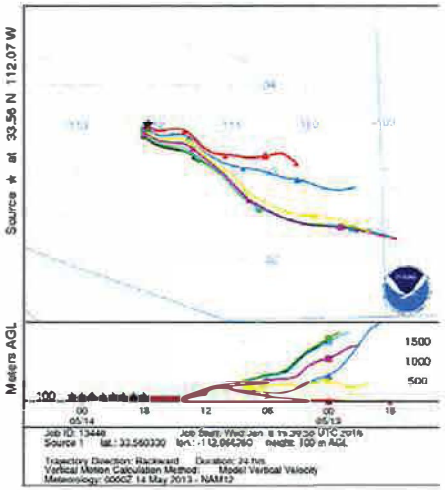

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 07 Jun 14
NAM Meteorological Data
Source ★ at 33.41 N 111.86 W
Meters AGL
1500
1000
500
100


NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 10 Jun 14
NAM Meteorological Data
Source ★ at 33.41 N 111.86 W
Meters AGL
1500
1000
500
100

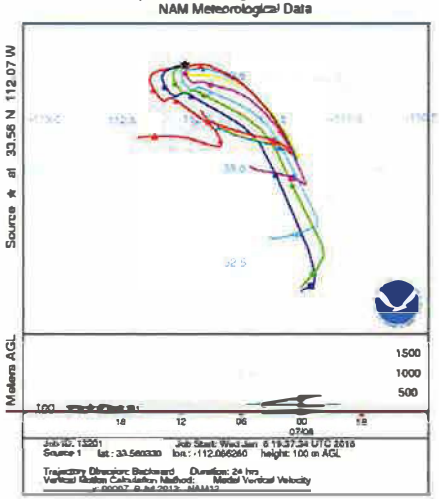

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 13 Sep 14
NAM Meteorological Data
Source ★ at 33.41 N 111.86 W
Meters AGL
1500
1000
500
100

AI4 North Phoenix Monitor – Maricopa County (04-013-1004)

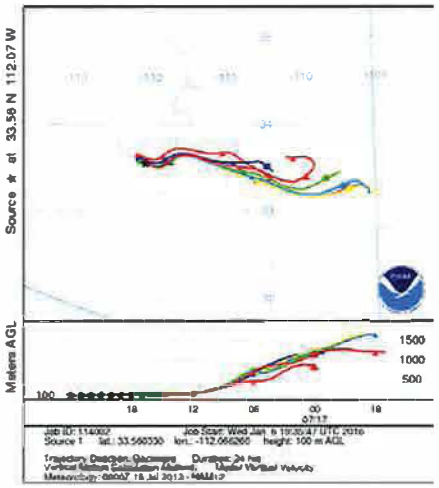
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 14 May 13
NAM Meteorological Data



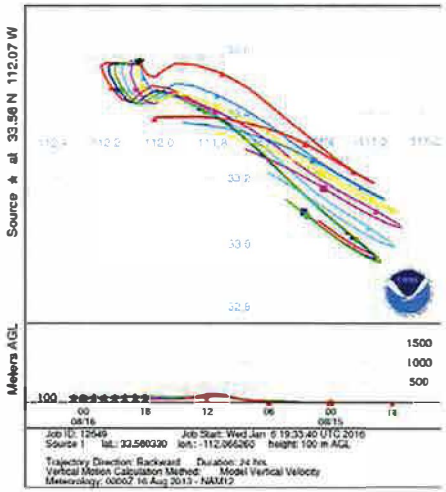
NOAA HYSPLIT MODEL
Backward trajectories ending at 2300 UTC 08 Jul 13
NAM Meteorological Data



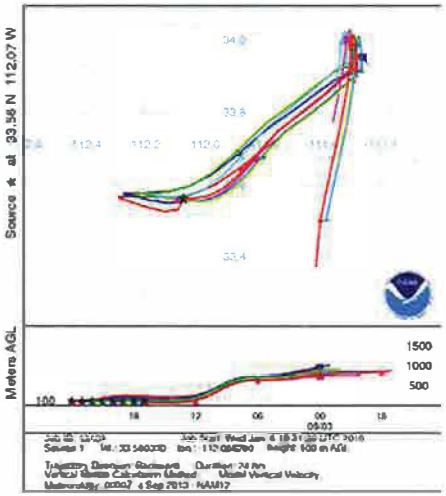
NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 18 Jul 13
NAM Meteorological Data



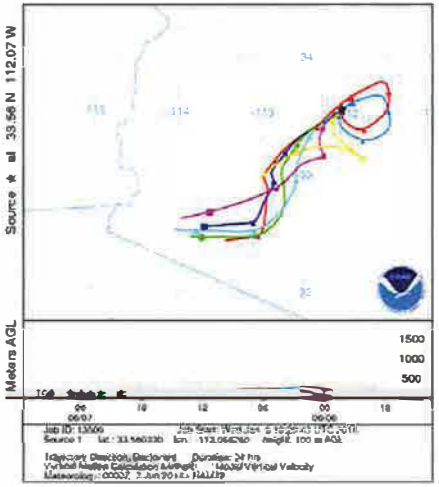
NOAA HYSPUT MODEL
Backward trajectories ending at 0100 UTC 16 Aug 13
NAM Meteorological Data

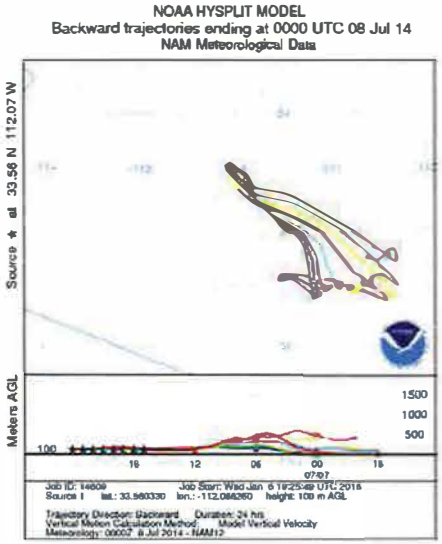


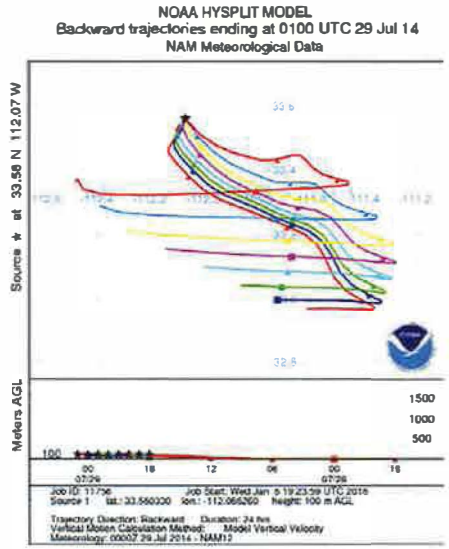
NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 04 Sep 13
NAM Meteorological Data

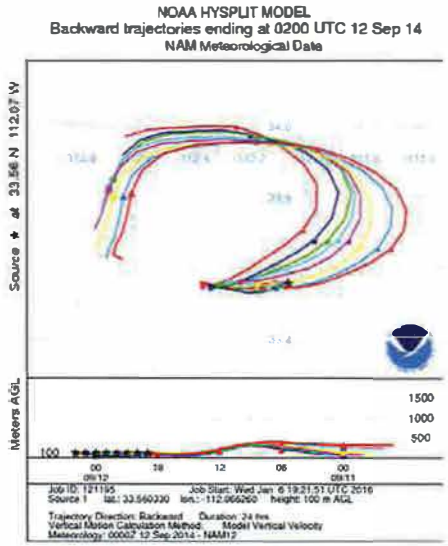


NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 07 Jun 14
NAM Meteorological Data




NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 08 Jul 14
NAM Meteorological Data
Source ★ at 33.56 N 112.07 W
Meters AGL
1500
1000
500
100
18
12
06
00
07/07


NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 29 Jul 14
NAM Meteorological Data
Source ★ at 33.56 N 112.07 W
Meters AGL
1500
1000
500
100
00
18
12
06
00
18
07/29
07/28


NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 12 Sep 14
NAM Meteorological Data
Source ★ at 33.56 N 112.07 W
Meters AGL
1500
1000
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100
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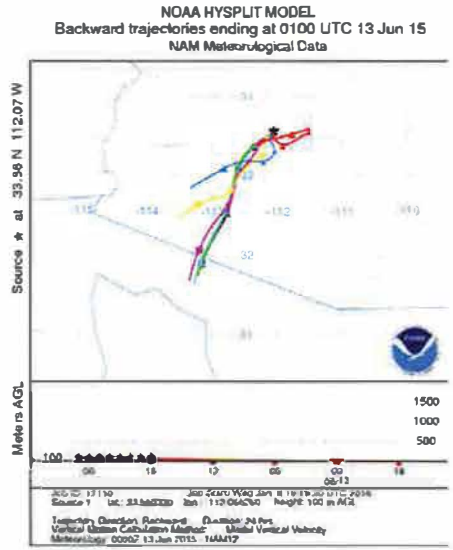
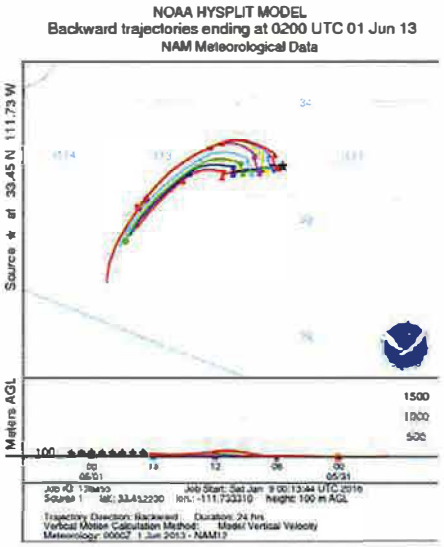
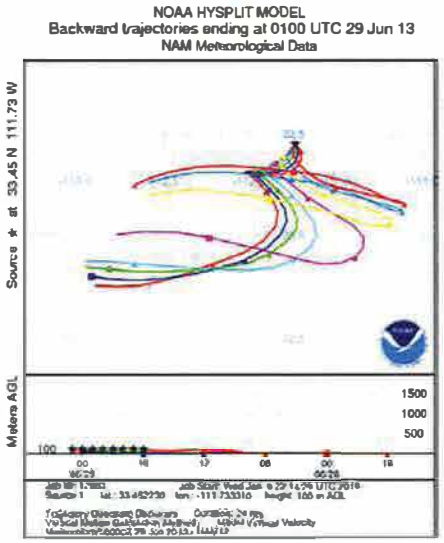
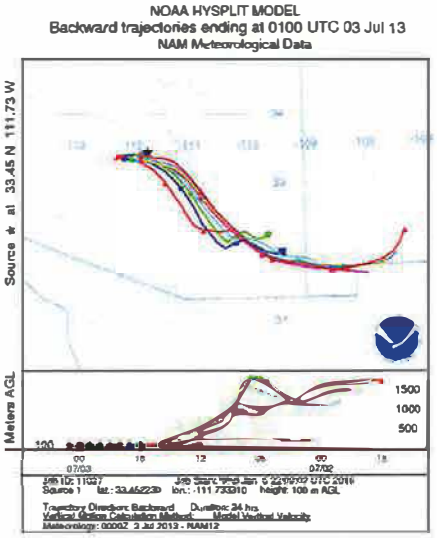
18
12
06
00
09/12
09/11

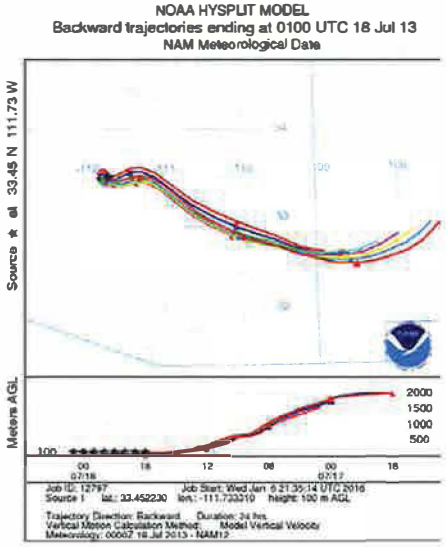

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 13 Jun 15
NAM Meteorological Data
Source ★ at 33.56 N 112.07 W
Meters AGL
1500
1000
500
100
00
18
12
06
00
06/13

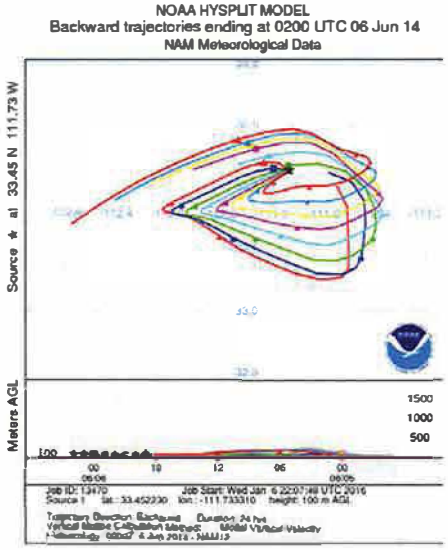
AI5 Falcon Field Monitor – Maricopa County (04-013-1010)

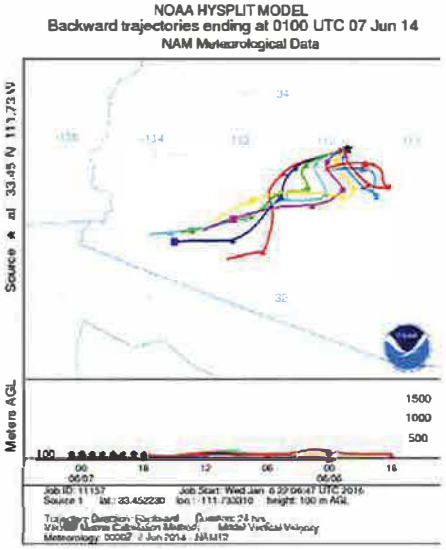


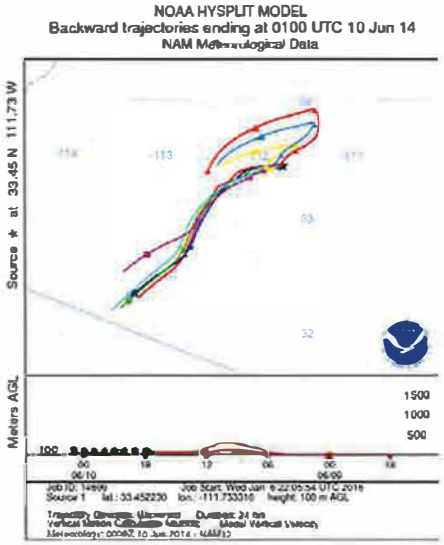


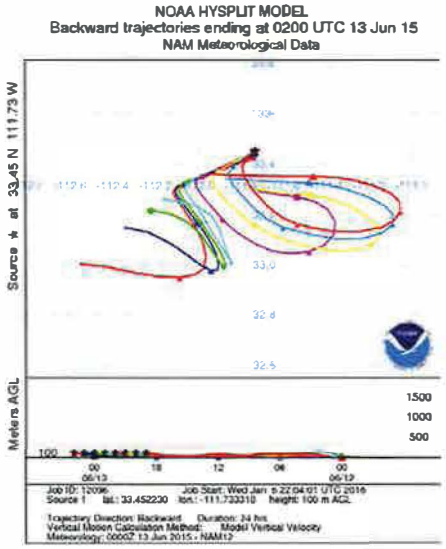


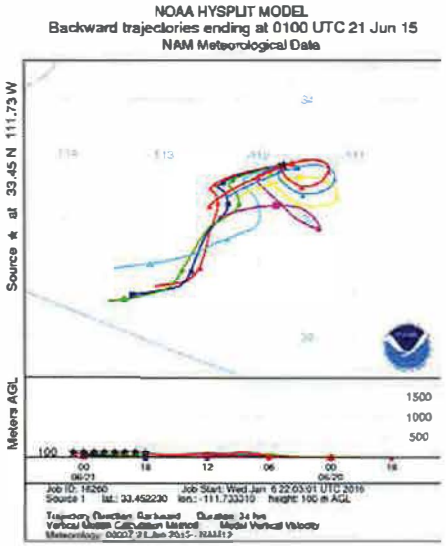


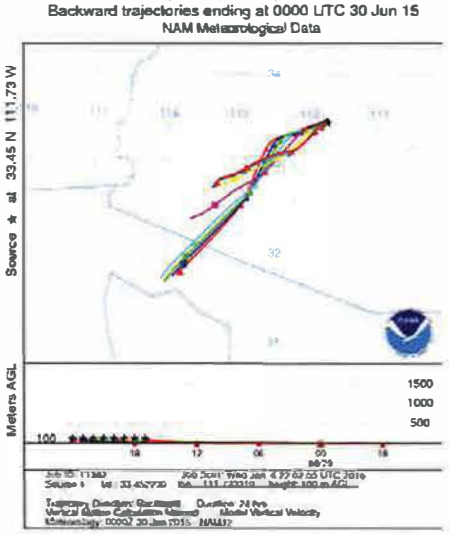





NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 10 Jun 14
NAM Meteorological Data
Source ★ at 33.45 N 111.73 W
Meters AGL
1500
1000
500
100

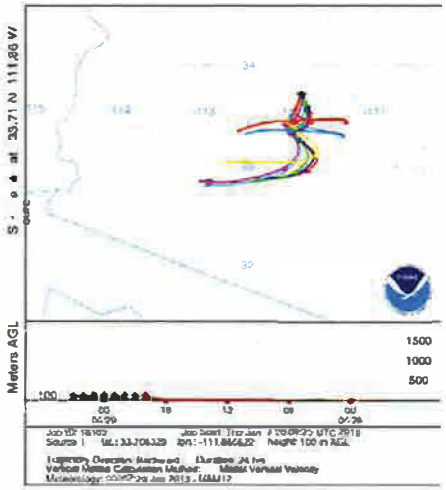

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 13 Jun 15
NAM Meteorological Data
Source ★ at 33.45 N 111.73 W
Meters AGL
1500
1000
500
100


NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 21 Jun 15
NAM Meteorological Data
Source ★ at 33.45 N 111.73 W
Meters AGL
1500
1000
500
100

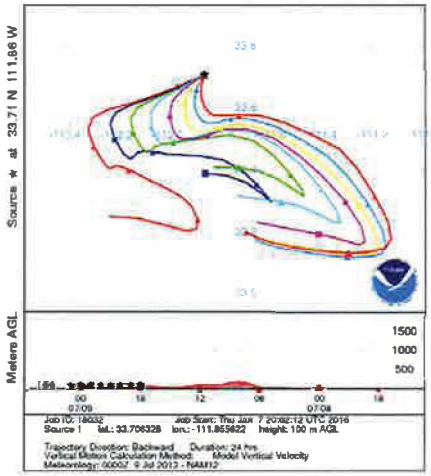

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 30 Jun 15
NAM Meteorological Data
Source ★ at 33.45 N 111.73 W
Meters AGL
1500
1000
500
100

AI6 Pinnacle Peak Monitor – Maricopa County (04-013-2005)

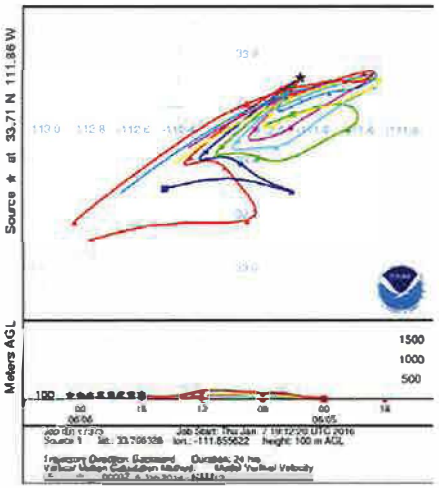
NOAA HYSPLIT MODEL
Backward trajectories ending at 0300 UTC 29 Jun 13
NAM Meteorological Data



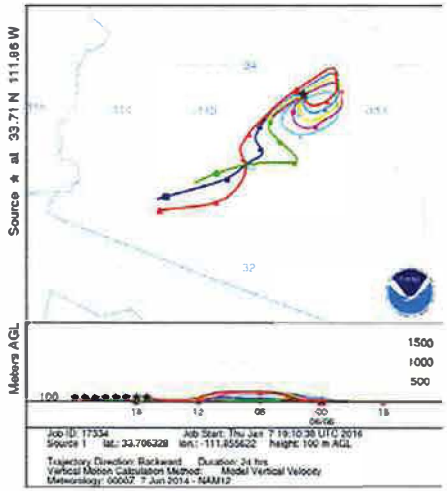
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 09 Jul 13
NAM Meteorological Data



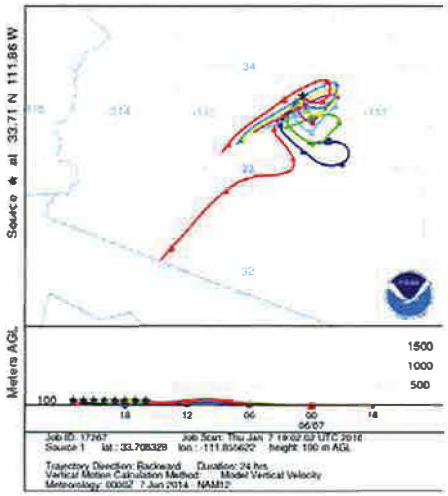
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 06 Jun 14
NAM Meteorological Data



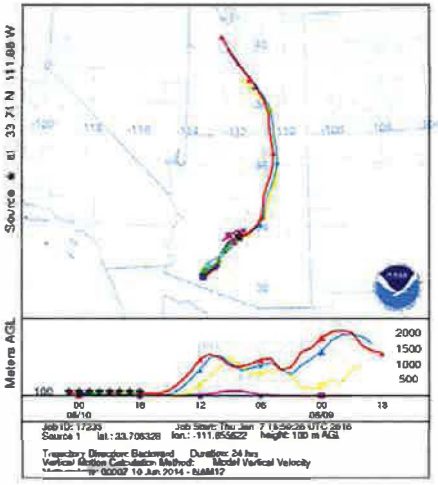
NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 07 Jun 14
NAM Meteorological Data

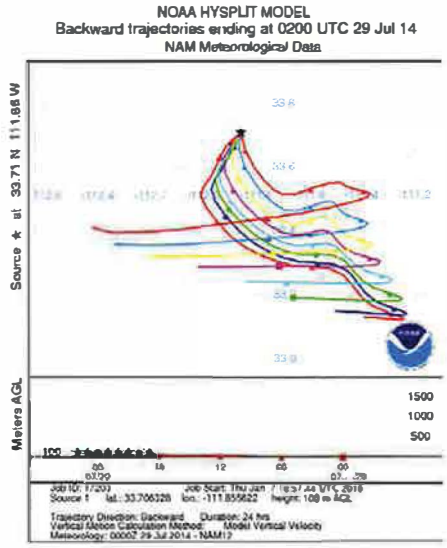


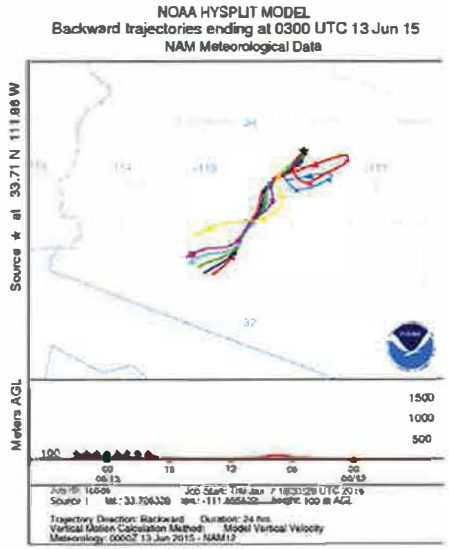
NOAA HYSPLIT MODEL
Backward trajectories ending at 2300 UTC 07 Jun 14
NAM Meteorological Data

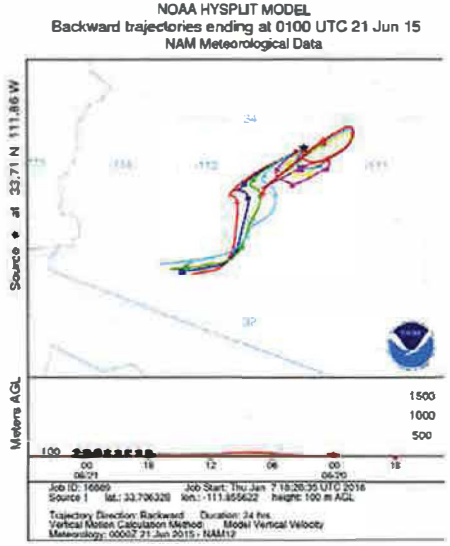


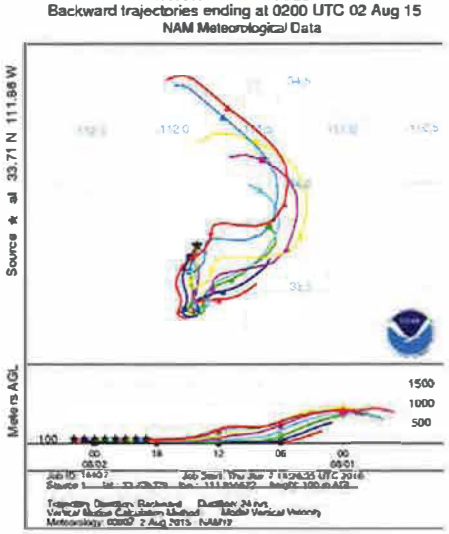
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 10 Jun 14
NAM Meteorological Data



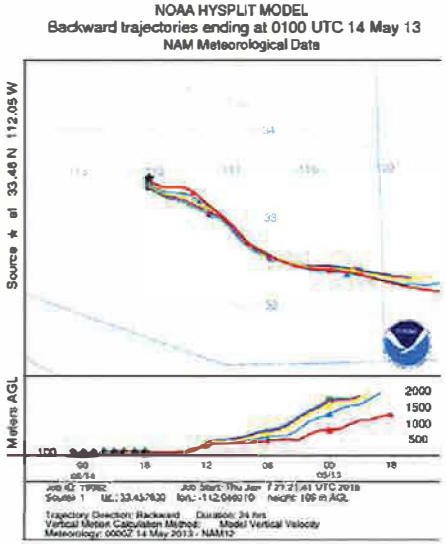

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 29 Jul 14
NAM Meteorological Data
Source ★ at 33.71 N 111.86 W
Meters AGL
1500
1000
500
100

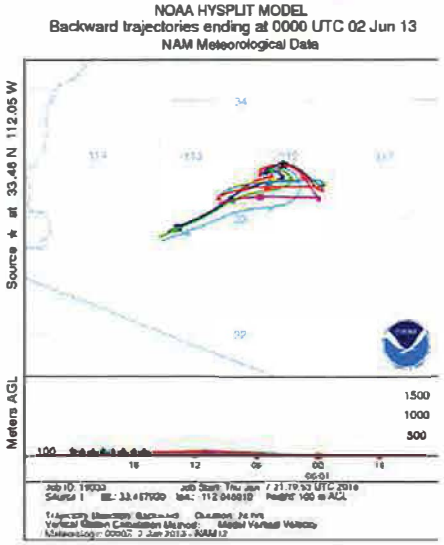

NOAA HYSPLIT MODEL
Backward trajectories ending at 0300 UTC 13 Jun 15
NAM Meteorological Data
Source ★ at 33.71 N 111.86 W
Meters AGL
1500
1000
500
100

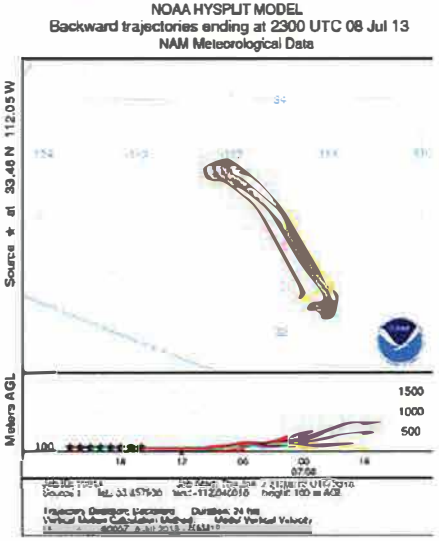

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 21 Jun 15
NAM Meteorological Data
Source ★ at 33.71 N 111.86 W
Meters AGL
1500
1000
500
100

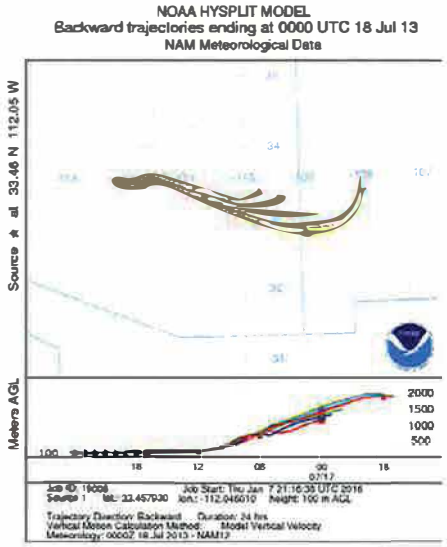

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 02 Aug 15
NAM Meteorological Data
Source ★ at 33.71 N 111.86 W
Meters AGL
1500
1000
500
100

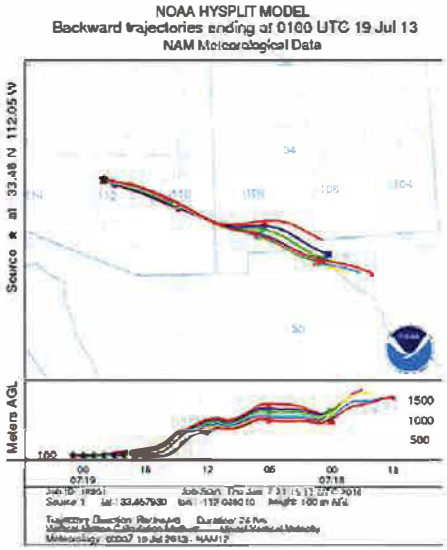
AI7 Central Phoenix Monitor – Maricopa County (04-013-3002)

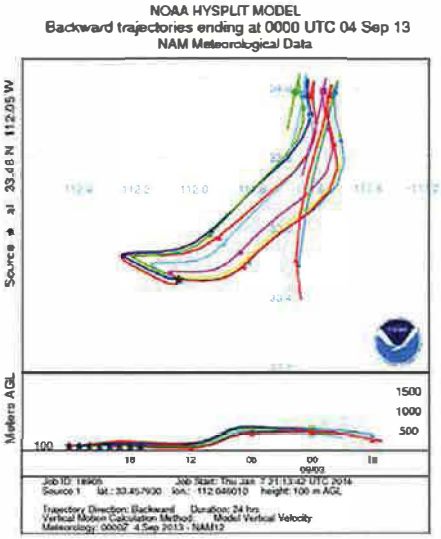




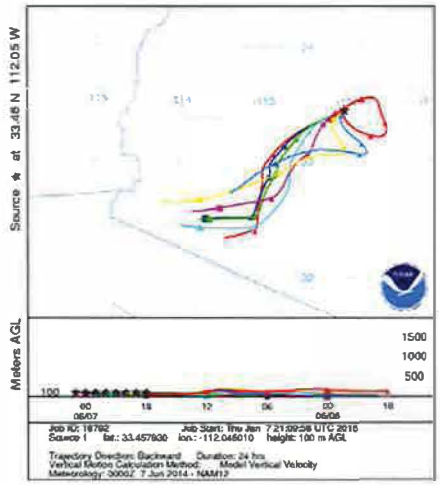




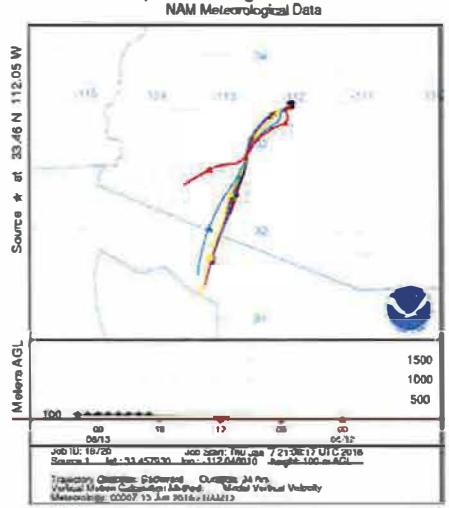




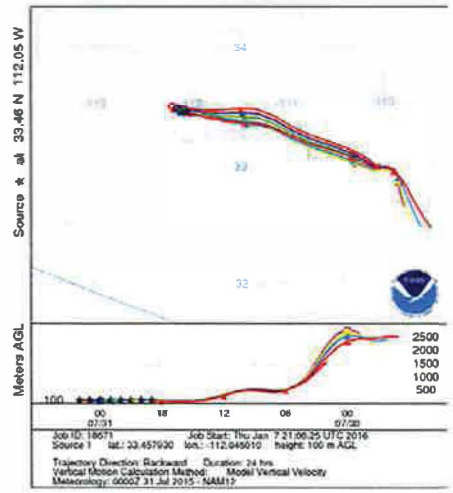
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 07 Jun 14
NAM Meteorological Data



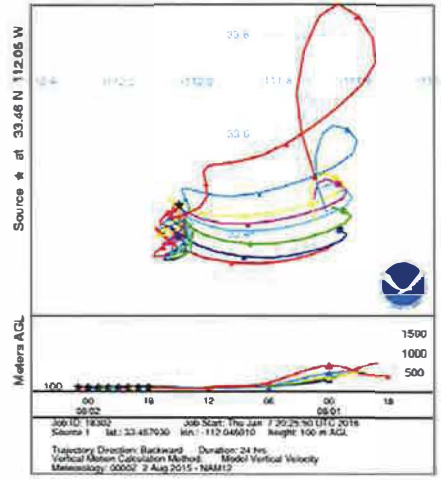
NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 13 Jun 15
NAM Meteorological Data



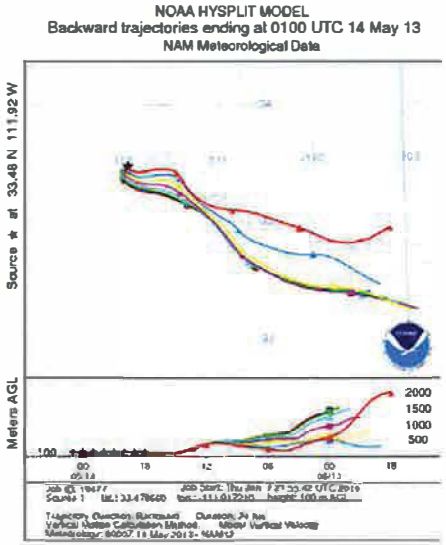
NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 31 Jul 15
NAM Meteorological Data

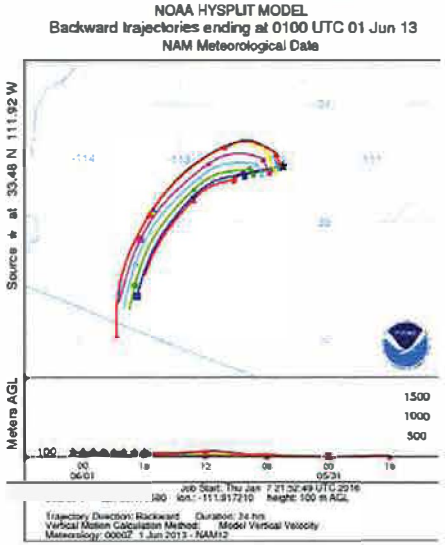


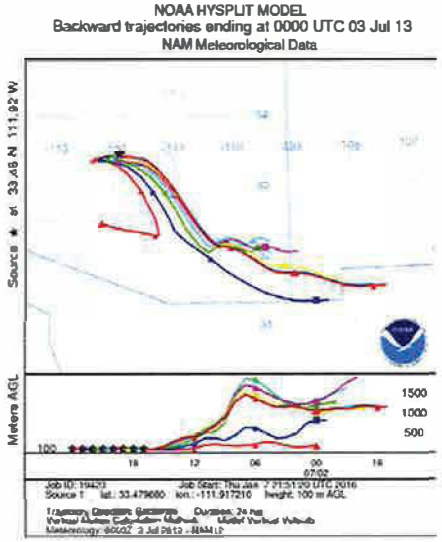
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 02 Aug 15
NAM Meteorological Data

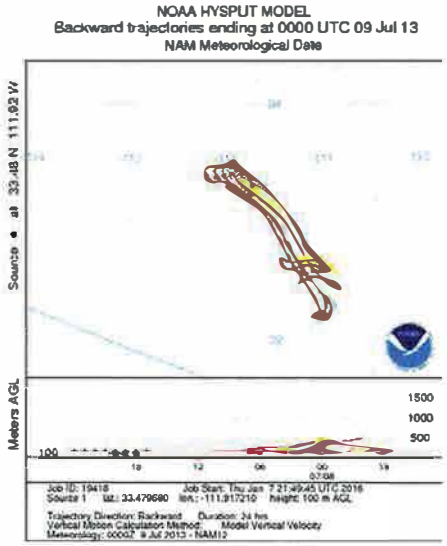


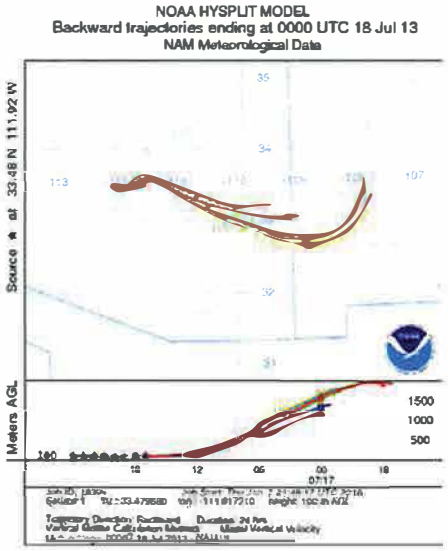
AI8 South Scottsdale Monitor – Maricopa County (04-013-3003)

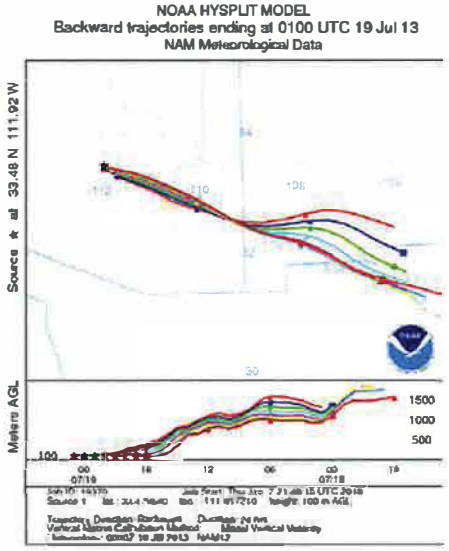


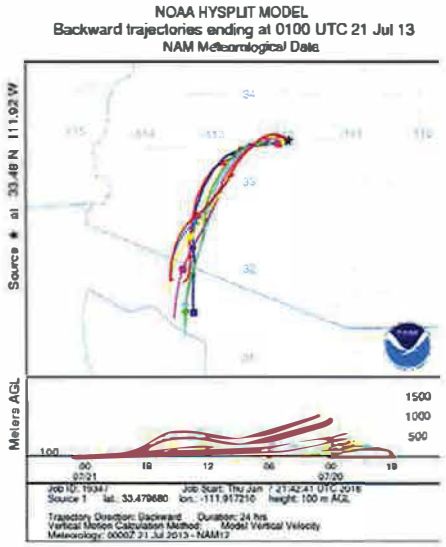


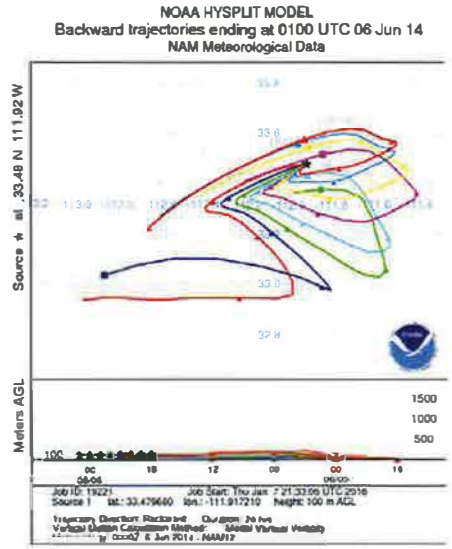


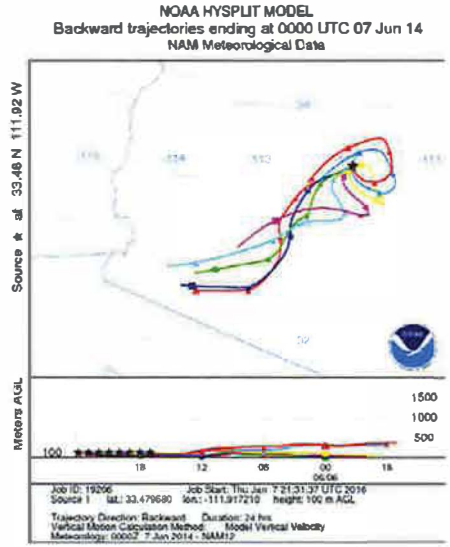


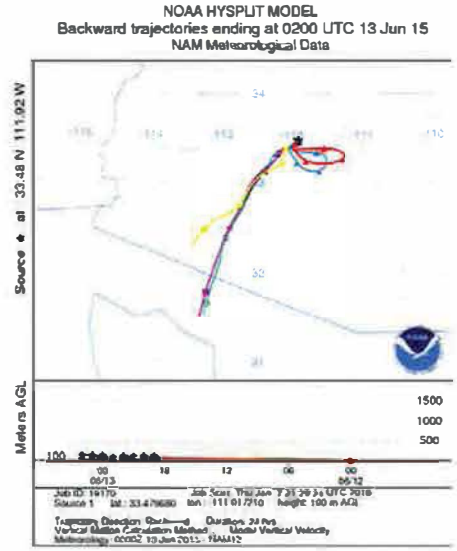




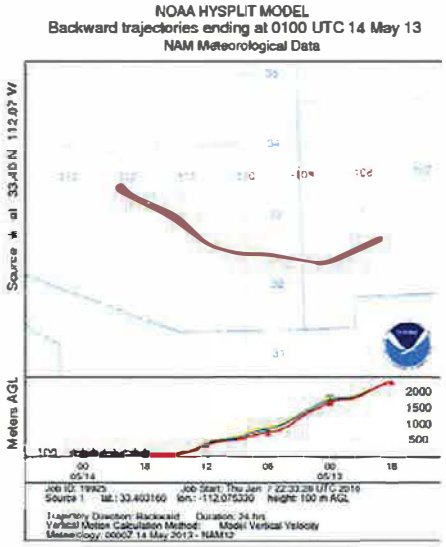

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 21 Jul 13
NAM Meteorological Data
Source ★ at 33.48 N 111.92 W
Meters AGL
1500
1000
500
100

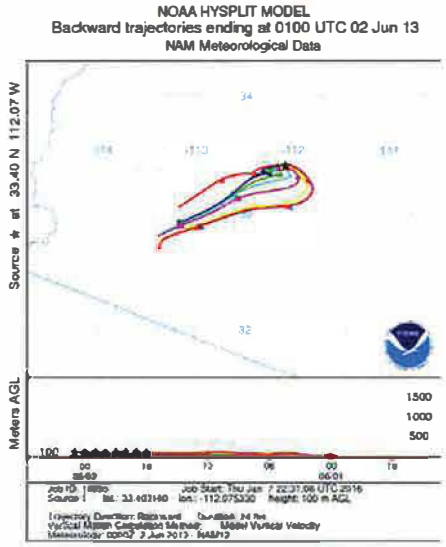

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 06 Jun 14
NAM Meteorological Data
Source ★ at 33.48 N 111.92 W
Meters AGL
1500
1000
500
100

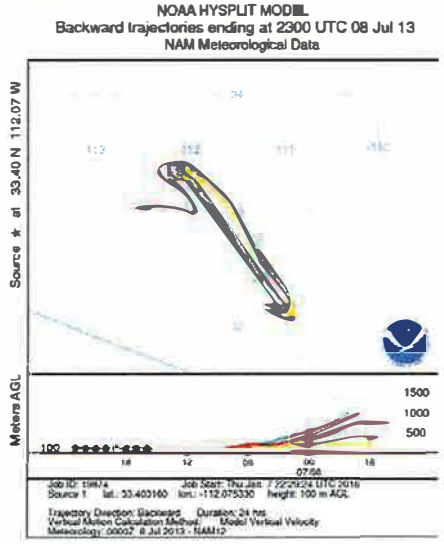

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 07 Jun 14
NAM Meteorological Data
Source ★ at 33.48 N 111.92 W
Meters AGL
1500
1000
500
100

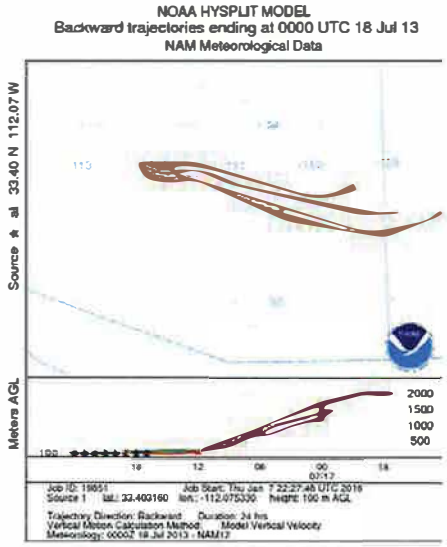

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 13 Jun 15
NAM Meteorological Data
Source ★ at 33.48 N 111.92 W
Meters AGL
1500
1000
500
100

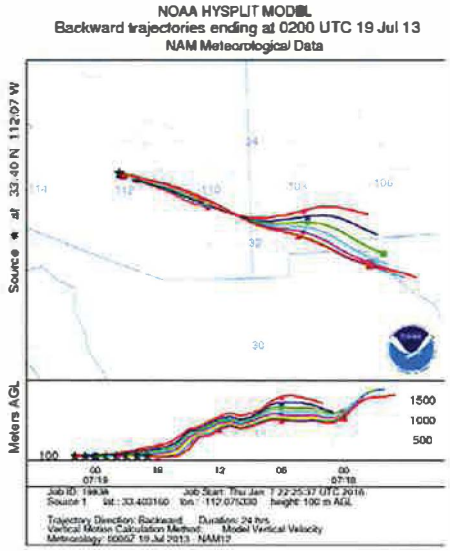
AI9 South Phoenix Monitor – Maricopa County (04-013-4003)

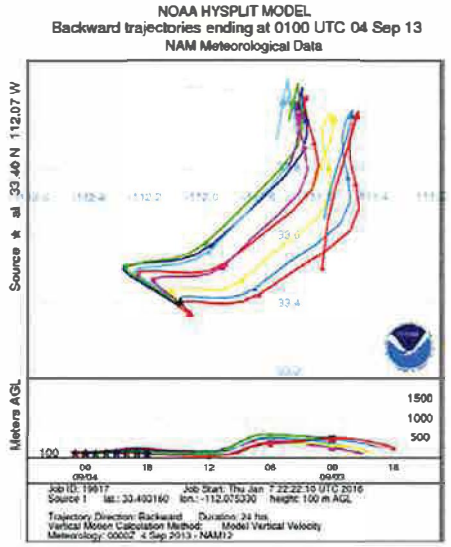


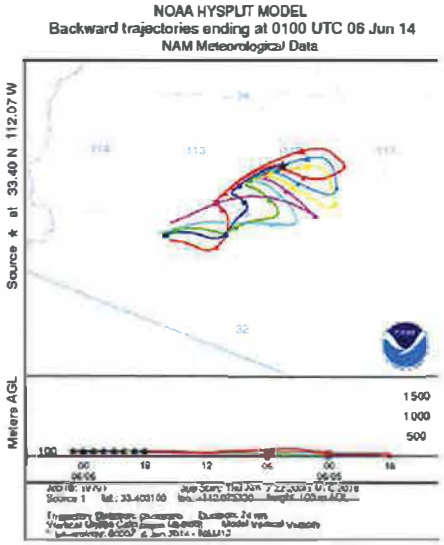


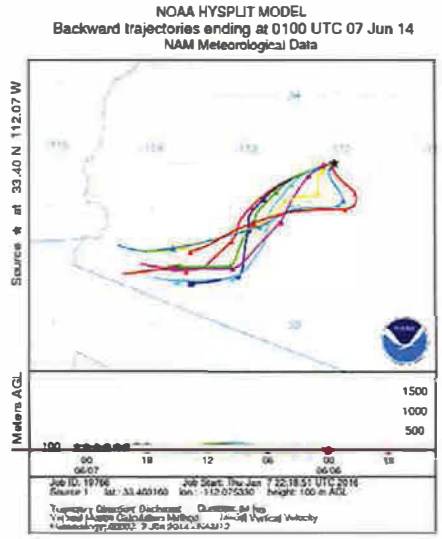


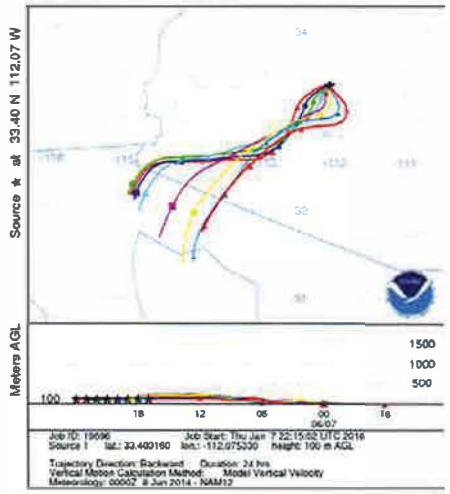


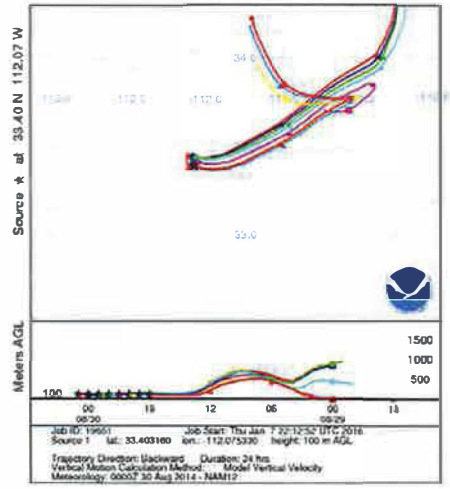




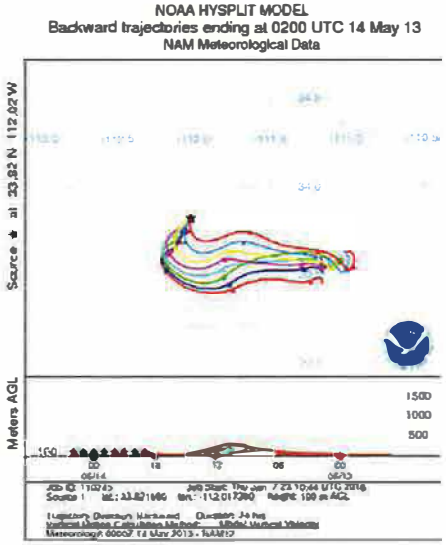

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 06 Jun 14
NAM Meteorological Data
Source ★ at 33.40 N 112.07 W
Meters AGL
1500
1000
500
100

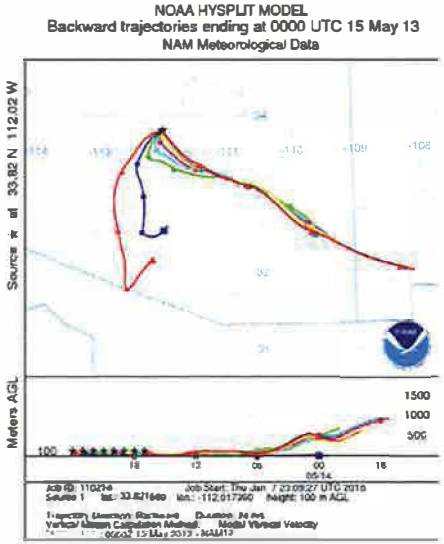

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 07 Jun 14
NAM Meteorological Data
Source ★ at 33.40 N 112.07 W
Meters AGL
1500
1000
500
100

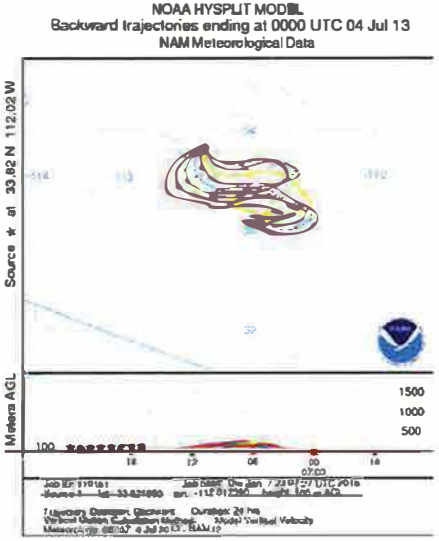

NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 08 Jun 14
NAM Meteorological Data
Source ★ at 33.40 N 112.07 W
Meters AGL
1500
1000
500
100

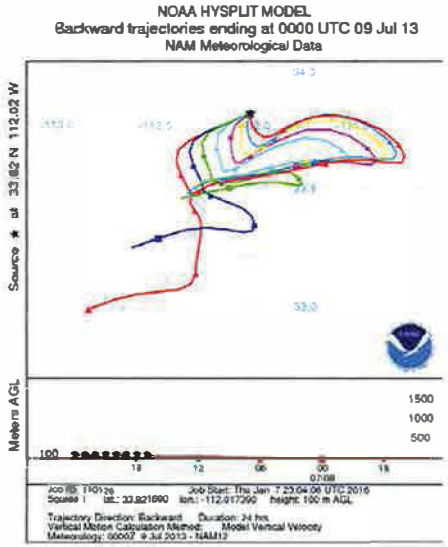

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 30 Aug 14
NAM Meteorological Data
Source ★ at 33.40 N 112.07 W
Meters AGL
1500
1000
500
100

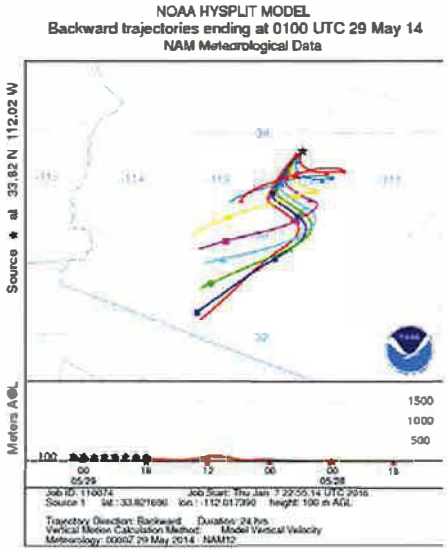
AI10 Cave Creek Monitor – Maricopa County (04-013-4008)

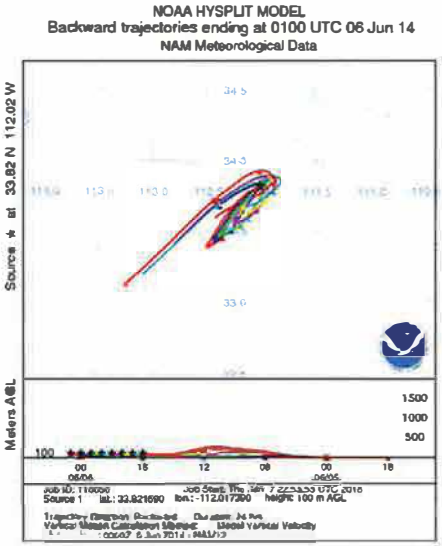




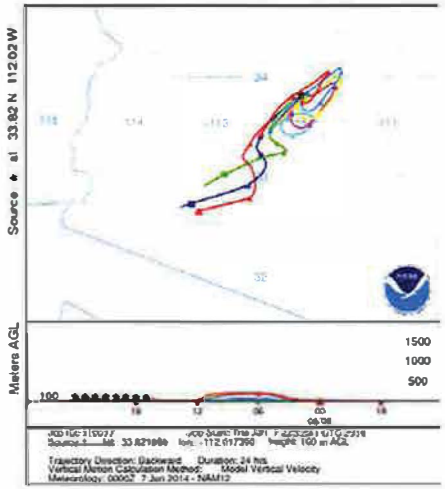




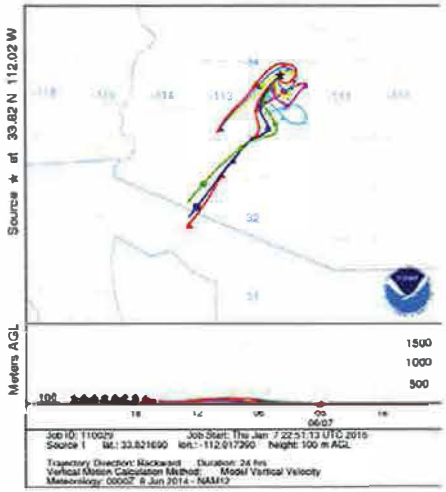




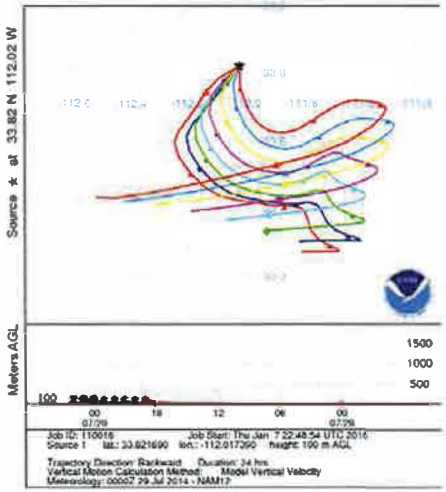
NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 07 Jun 14
NAM Meteorological Data



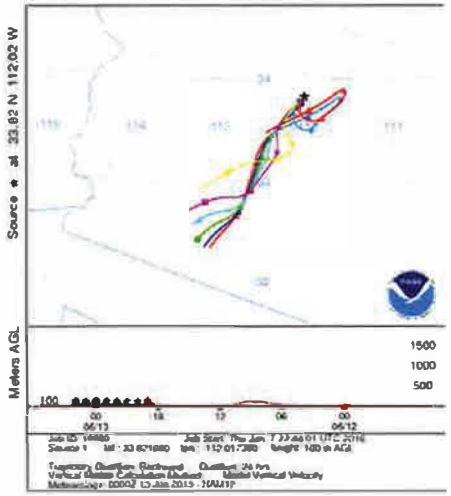
NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 08 Jun 14
NAM Meteorological Data



NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 29 Jul 14
NAM Meteorological Data

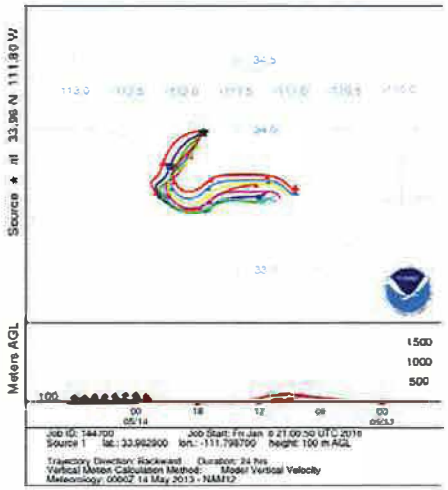


NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 13 Jun 15
NAM Meteorological Data

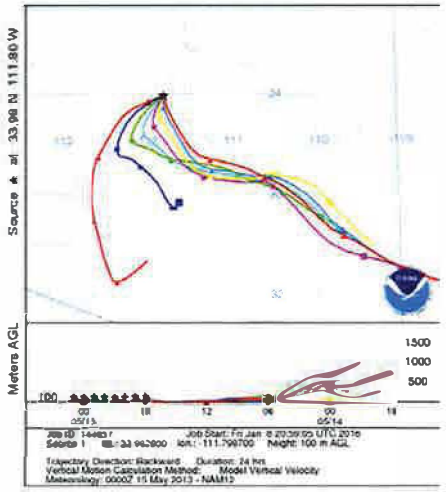


AI11 Humboldt Mountain Monitor – Maricopa County (04-013-9508)

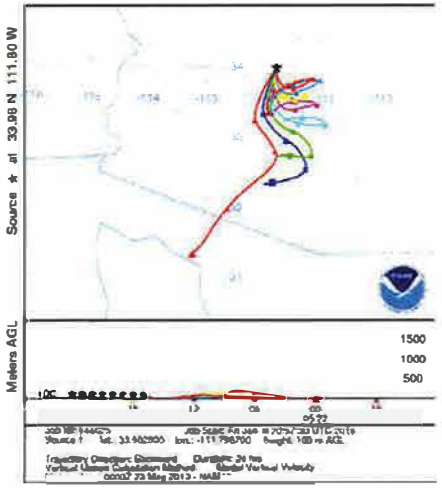
NOAA HYSPLIT MODEL
Backward trajectories ending at 0600 UTC 14 May 13
NAM Meteorological Data



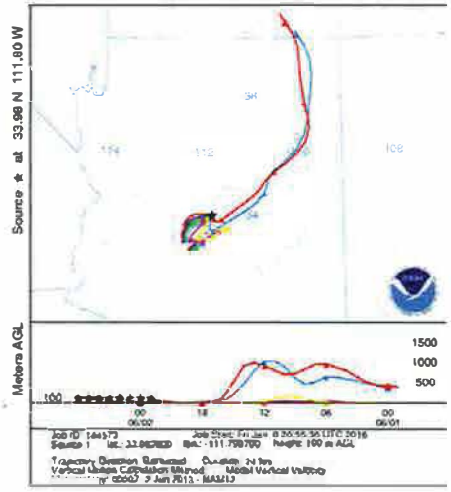
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 15 May 13
NAM Meteorological Data



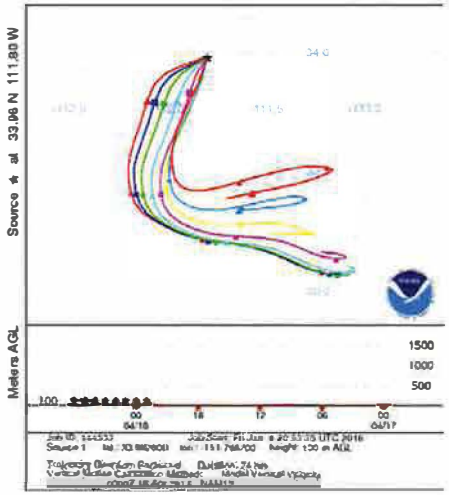
NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 23 May 13
NAM Meteorological Data



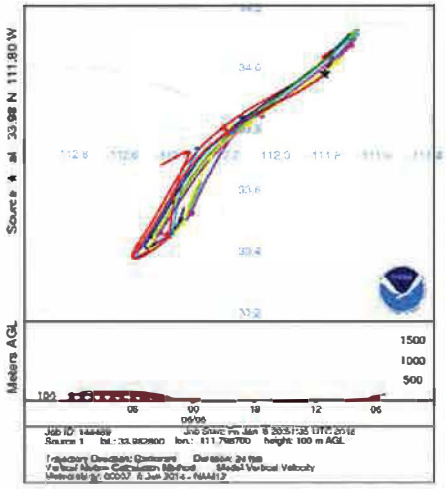
NOAA HYSPLIT MODEL
Backward trajectories ending at 0600 UTC 02 Jun 13
NAM Meteorological Data

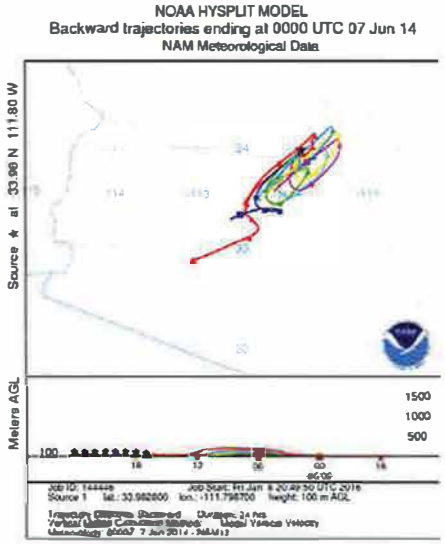


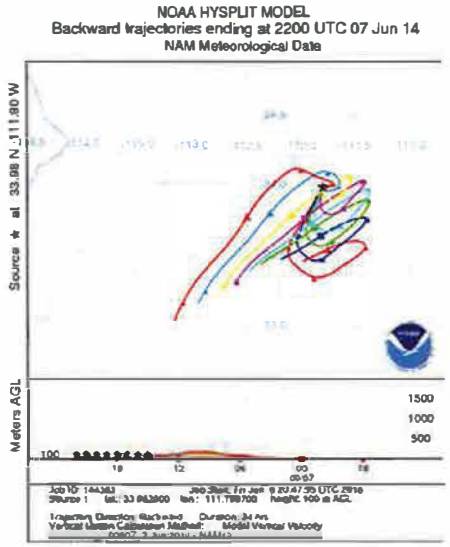
NOAA HYSPLIT MODEL
Backward trajectories ending at 0600 UTC 18 Apr 14
NAM Meteorological Data

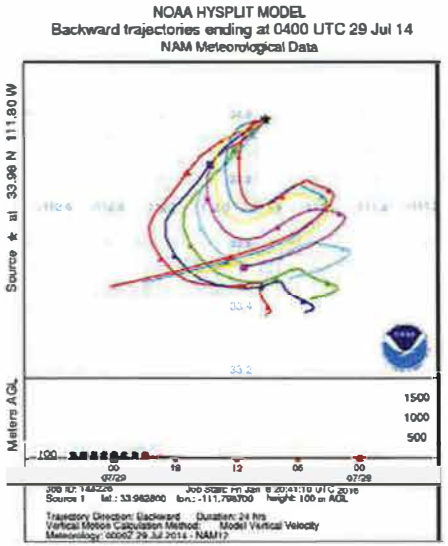


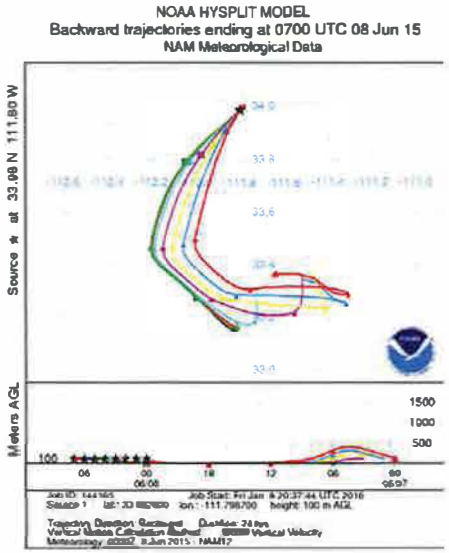
NOAA HYSPLIT MODEL
Backward trajectories ending at 1200 UTC 06 Jun 14
NAM Meteorological Data




NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 07 Jun 14
NAM Meteorological Data
Source ★ at 33.98 N 111.80 W
Meters AGL
1500
1000
500
100

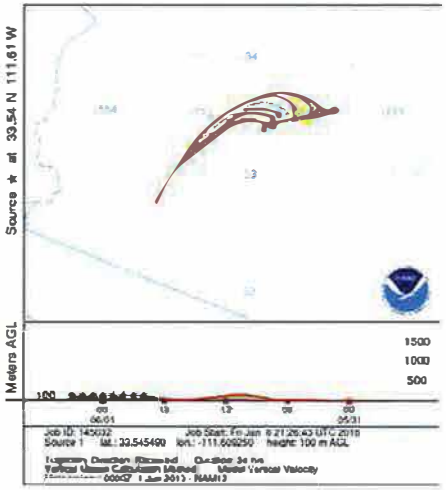

NOAA HYSPLIT MODEL
Backward trajectories ending at 2200 UTC 07 Jun 14
NAM Meteorological Data
Source ★ at 33.98 N 111.80 W
Meters AGL
1500
1000
500
100


NOAA HYSPLIT MODEL
Backward trajectories ending at 0400 UTC 29 Jul 14
NAM Meteorological Data
Source ★ at 33.98 N 111.80 W
Meters AGL
1500
1000
500
100

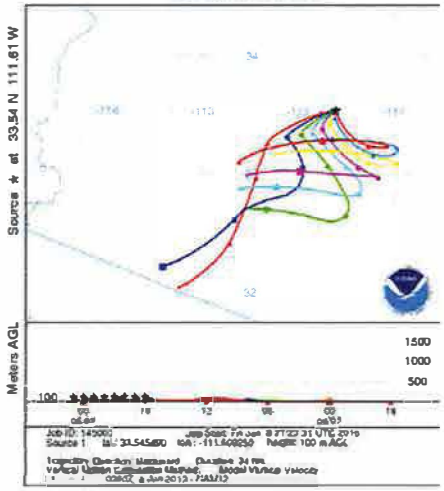

NOAA HYSPLIT MODEL
Backward trajectories ending at 0700 UTC 08 Jun 15
NAM Meteorological Data
Source ★ at 33.98 N 111.80 W
Meters AGL
1500
1000
500
100

AI12 Blue Point Monitor – Maricopa County (04-013-9702)

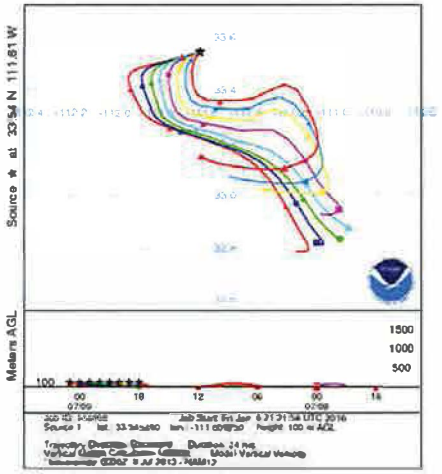
NOAA HYSPLIT MODEL
Backward trajectories ending at 0300 UTC 01 Jun 13
NAM Meteorological Data



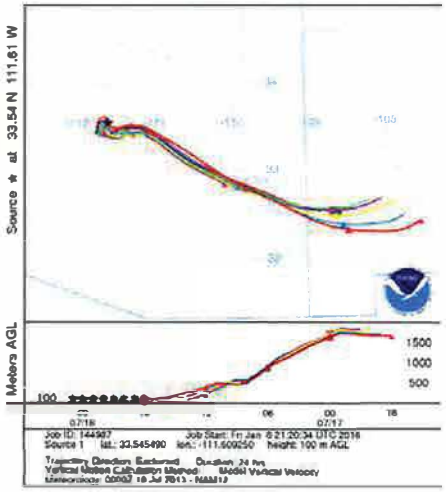
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 08 Jun 13
NAM Meteorological Data



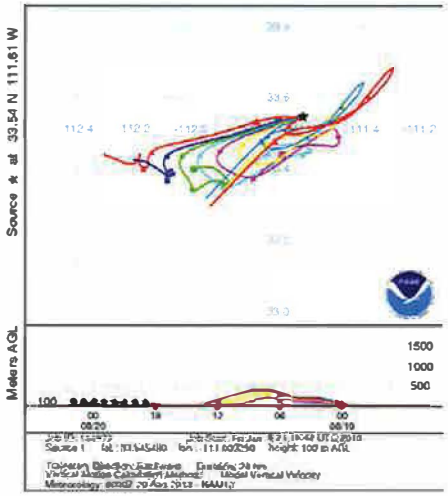
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 09 Jul 13
NAM Meteorological Data



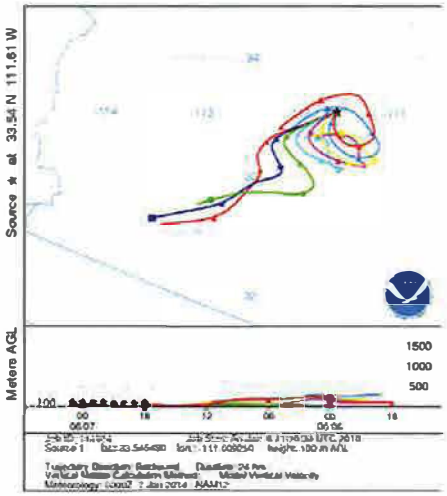
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 18 Jul 13
NAM Meteorological Data

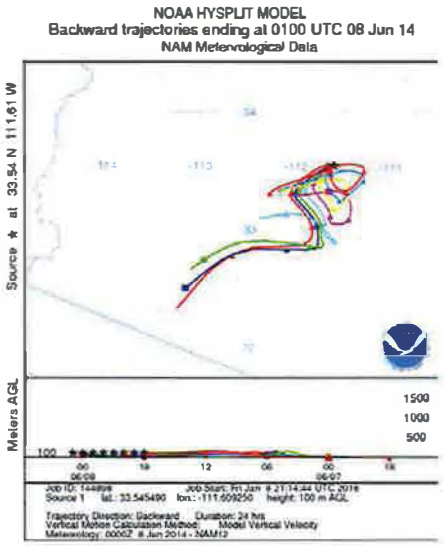


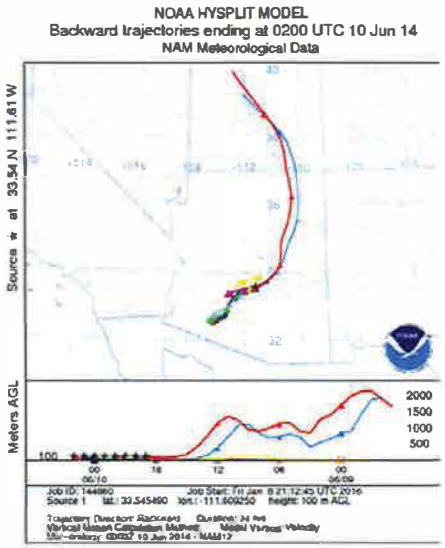
NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 20 Aug 13
NAM Meteorological Data



NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 07 Jun 14
NAM Meteorological Data




NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 08 Jun 14
NAM Meteorological Data
Source ★ at 33.54 N 111.61 W
Meters AGL
1500
1000
500
100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Backward trajectories ending at 0200 UTC 10 Jun 14
NAM Meteorological Data
Source ★ at 33.54 N 111.61 W
Meters AGL
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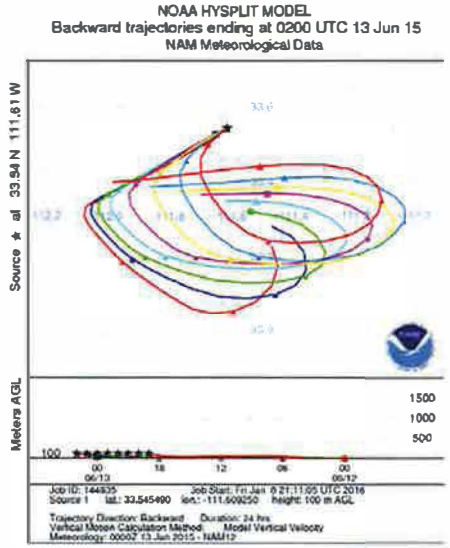
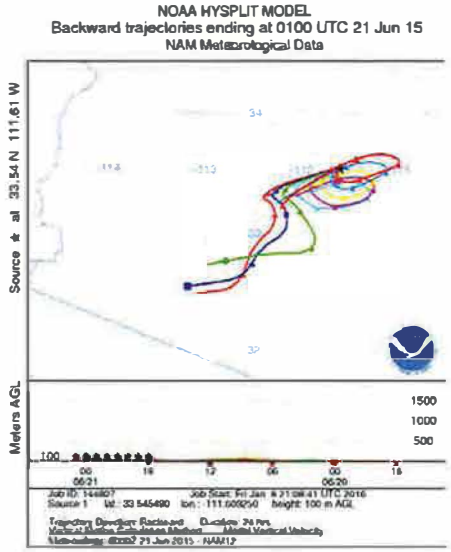
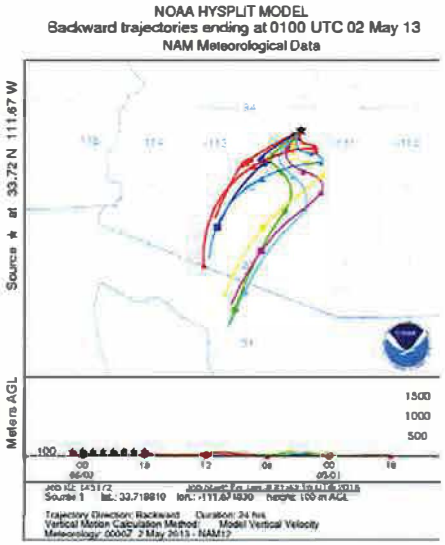
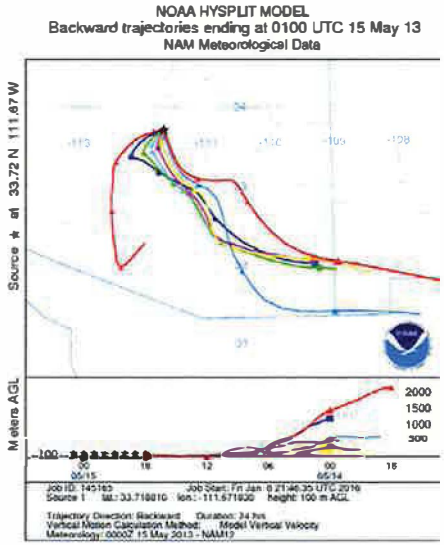
1500
1000
500
100

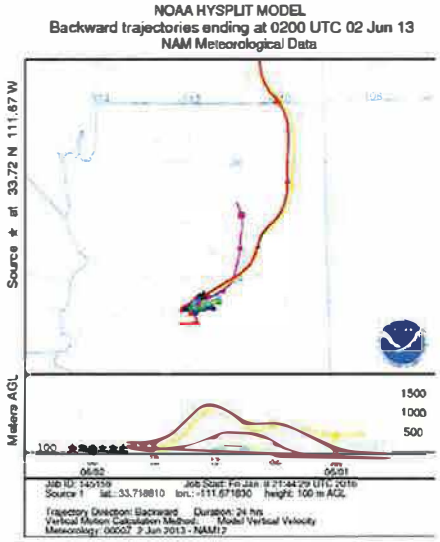

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 13 Jun 15
NAM Meteorological Data
Source ★ at 33.54 N 111.61 W
Meters AGL
1500
1000
500
100

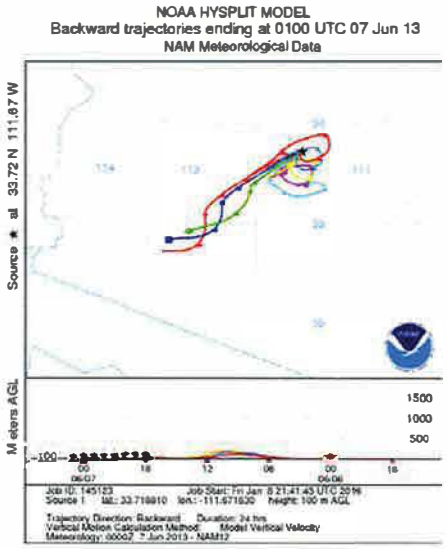

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 21 Jun 15
NAM Meteorological Data
Source ★ at 33.54 N 111.61 W
Meters AGL
1500
1000
500
100

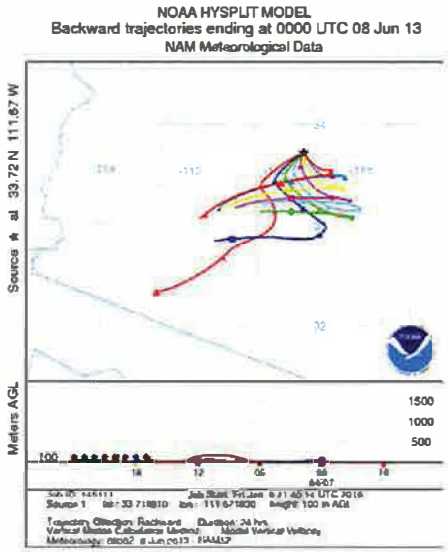
AI13 Rio Verde Monitor – Maricopa County (04-013-9706)

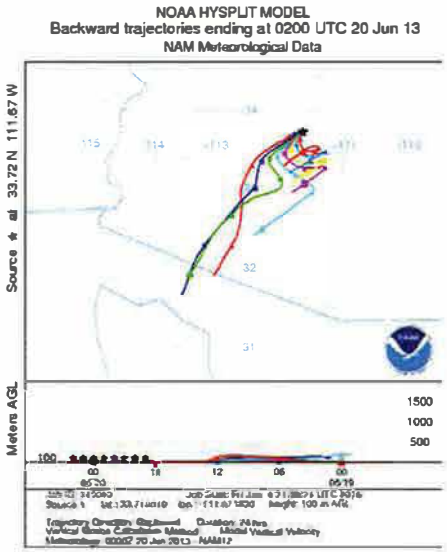




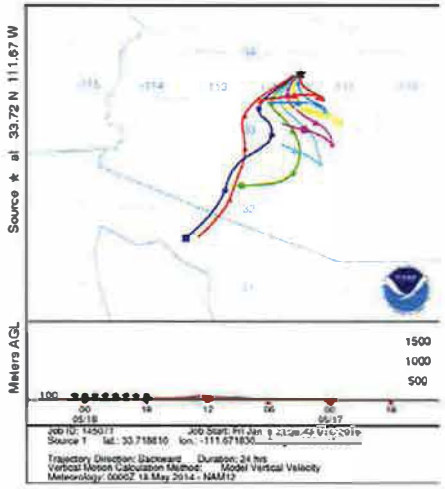




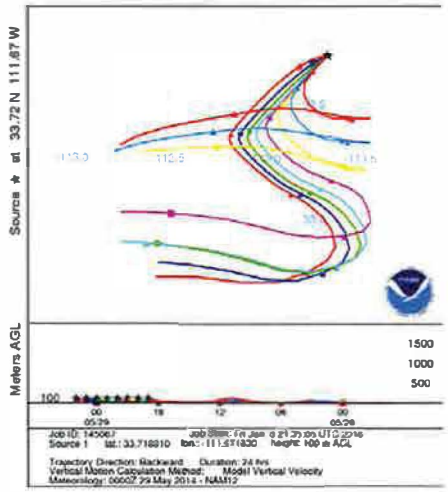




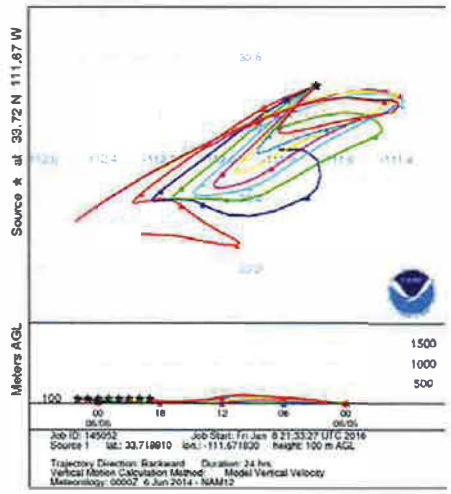
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 18 May 14
NAM Meteorological Data



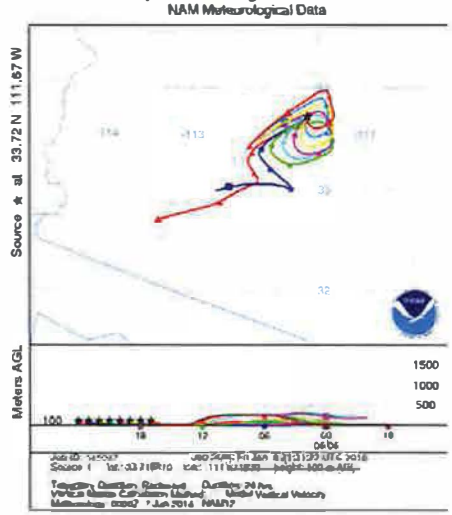
NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 29 May 14
NAM Meteorological Data



NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 06 Jun 14
NAM Meteorological Data

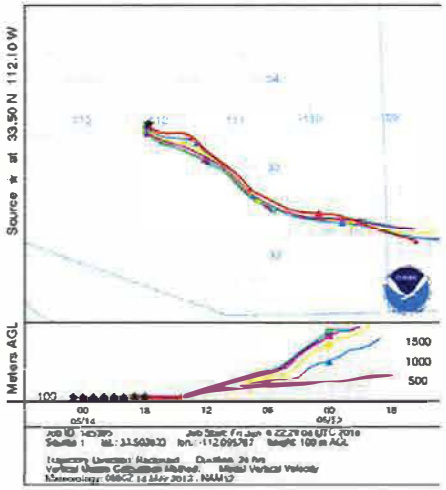


NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 07 Jun 14
NAM Meteorological Data

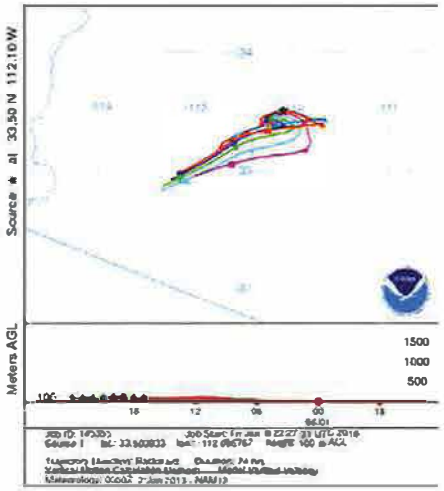


AI14 JLG Supersite Monitor – Maricopa County (04-013-9997)

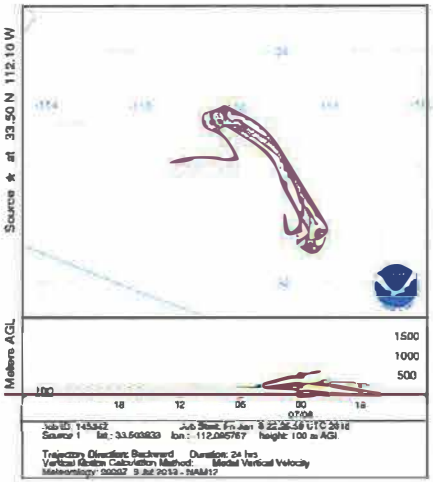
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 14 May 13
NAM Meteorological Data



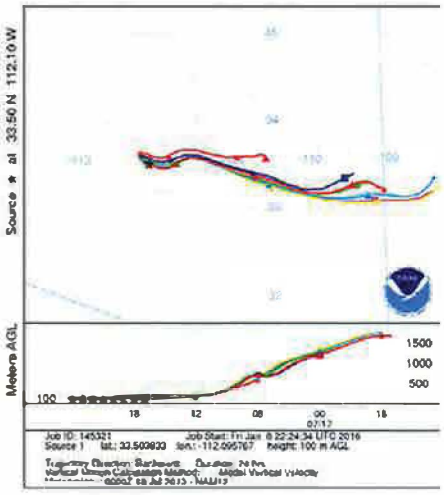
NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 02 Jun 13
NAM Meteorological Data



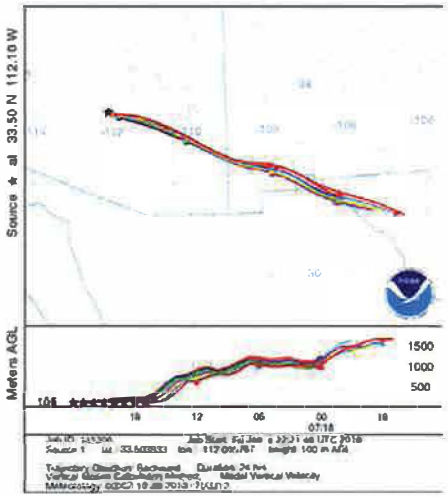
NOAA HYSPLIT MODEL
Backward trajectories ending at 2300 UTC 08 Jul 13
NAM Meteorological Data



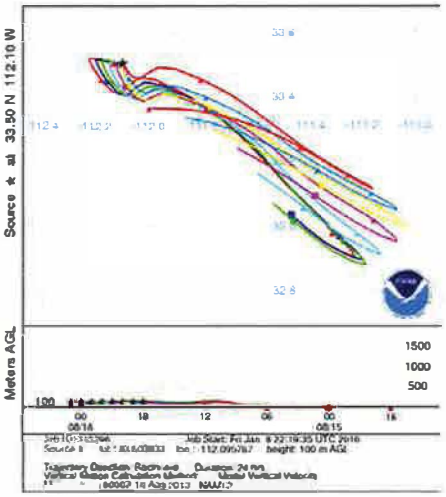
NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 18 Jul 13
NAM Meteorological Data

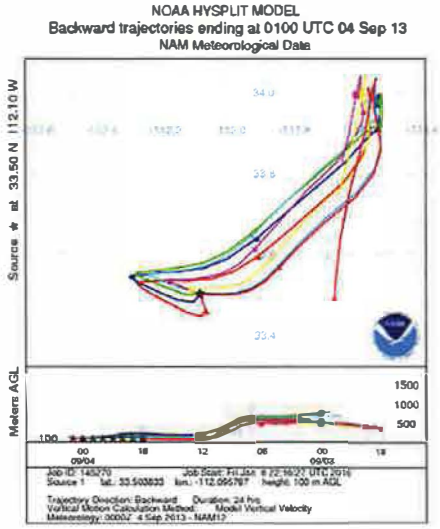


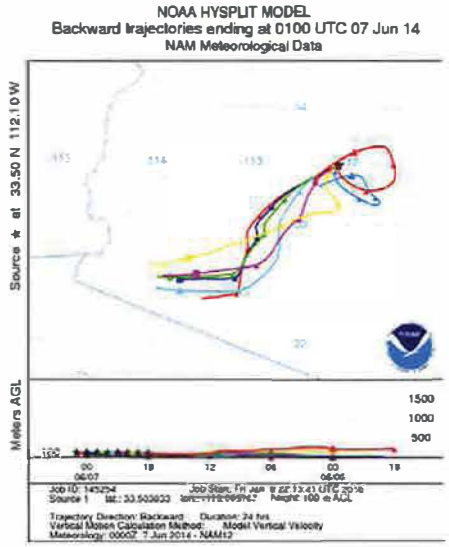
NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 19 Jul 13
NAM Meteorological Data

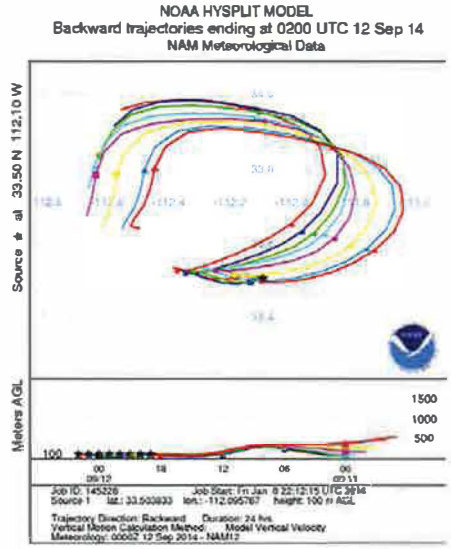


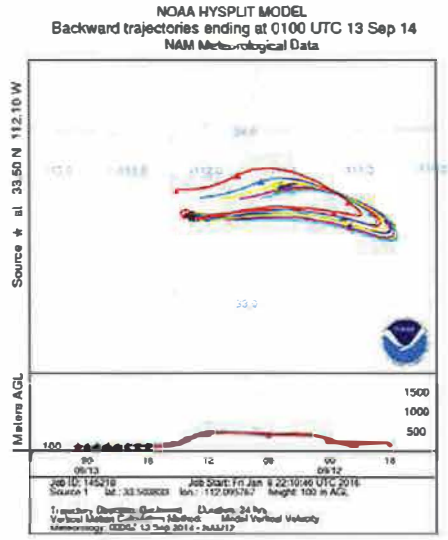
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 16 Aug 13
NAM Meteorological Data




NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 04 Sep 13
NAM Meteorological Data
Source ★ at 33.50 N 112.10 W
Meters AGL
1500
1000
500

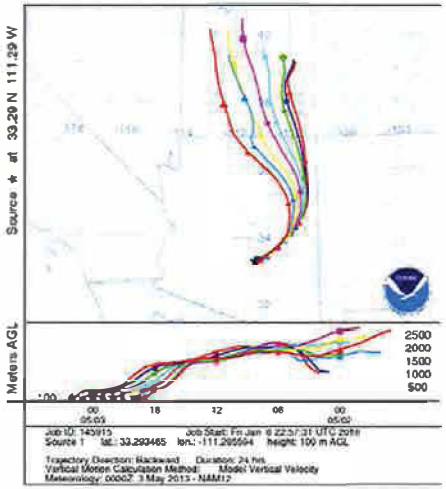

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 07 Jun 14
NAM Meteorological Data
Source ★ at 33.50 N 112.10 W
Meters AGL
1500
1000
500


NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 12 Sep 14
NAM Meteorological Data
Source ★ at 33.50 N 112.10 W
Meters AGL
1500
1000
500

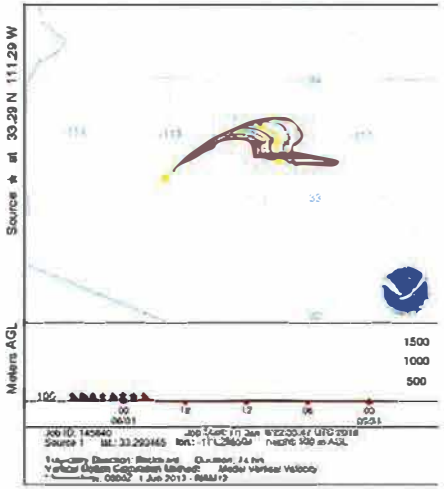

NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 13 Sep 14
NAM Meteorological Data
Source ★ at 33.50 N 112.10 W
Meters AGL
1500
1000
500

AI15 Queen Valley Monitor – Pinal County (04-021-8001)

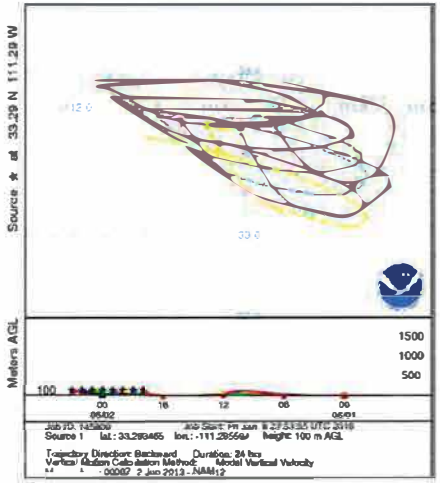
NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 03 May 13
NAM Meteorological Data



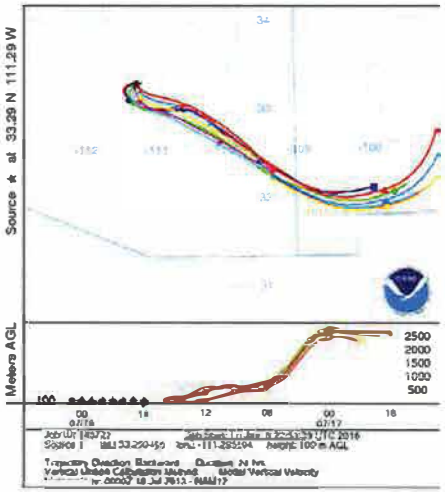
NOAA HYSPLIT MODEL
Backward trajectories ending at 0500 UTC 01 Jun 13
NAM Meteorological Data



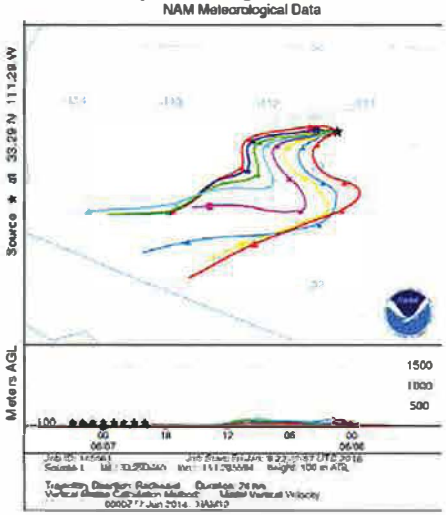
NOAA HYSPLIT MODEL
Backward trajectories ending at 0300 UTC 02 Jun 13
NAM Meteorological Data



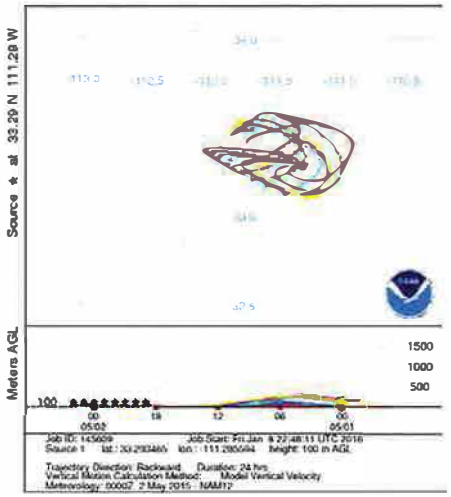
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 18 Jul 13
NAM Meteorological Data

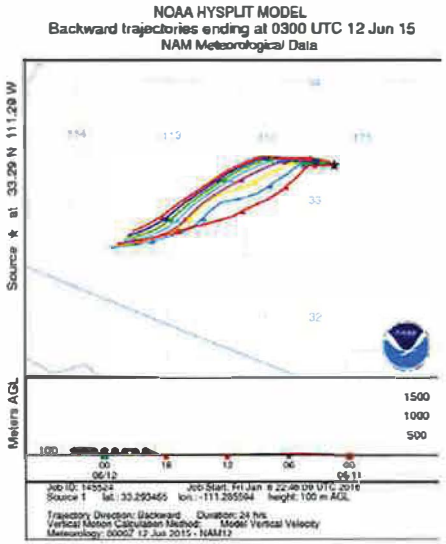


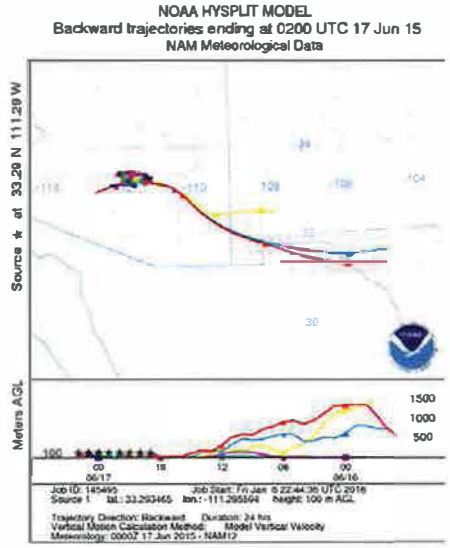
NOAA HYSPLIT MODEL
Backward trajectories ending at 0300 UTC 07 Jun 14
NAM Meteorological Data

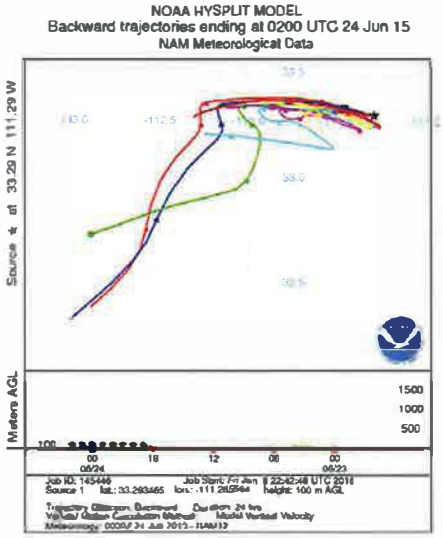


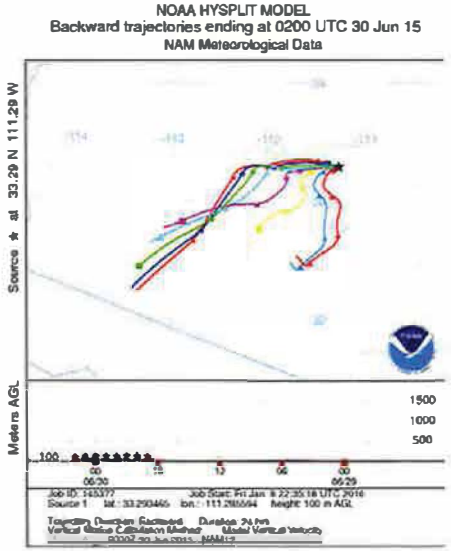
NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 02 May 15
NAM Meteorological Data



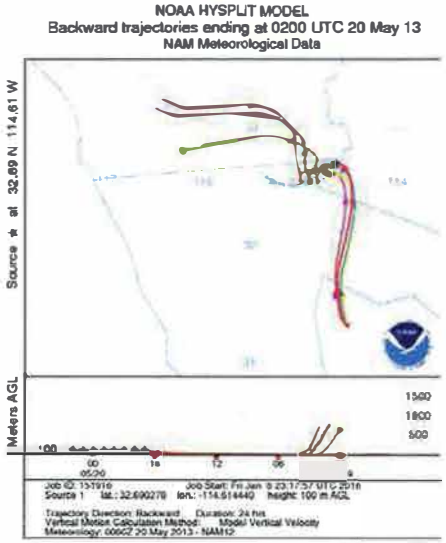

NOAA HYSPLIT MODEL
Backward trajectories ending at 0300 UTC 12 Jun 15
NAM Meteorological Data
Source ★ at 33.29 N 111.29 W
Meters AGL
1500
1000
500

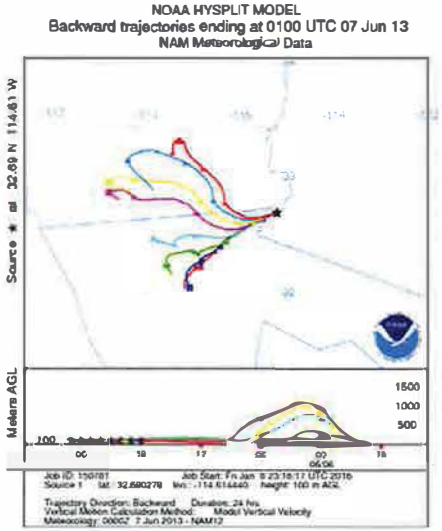

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 17 Jun 15
NAM Meteorological Data
Source ★ at 33.29 N 111.29 W
Meters AGL
1500
1000
500

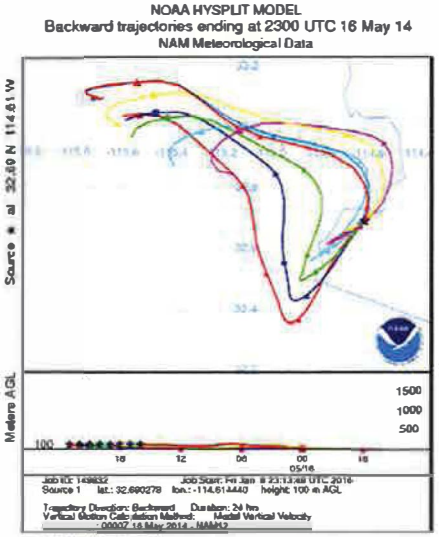

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 24 Jun 15
NAM Meteorological Data
Source ★ at 33.29 N 111.29 W
Meters AGL
1500
1000
500

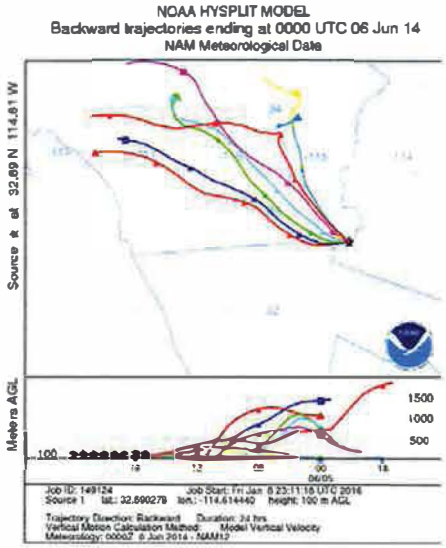

NOAA HYSPLIT MODEL
Backward trajectories ending at 0200 UTC 30 Jun 15
NAM Meteorological Data
Source ★ at 33.29 N 111.29 W
Meters AGL
1500
1000
500

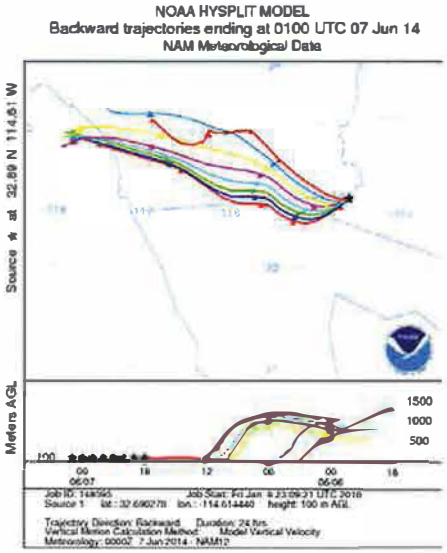
AI16 Yuma Supersite Monitor – Yuma County (04-027-8011)

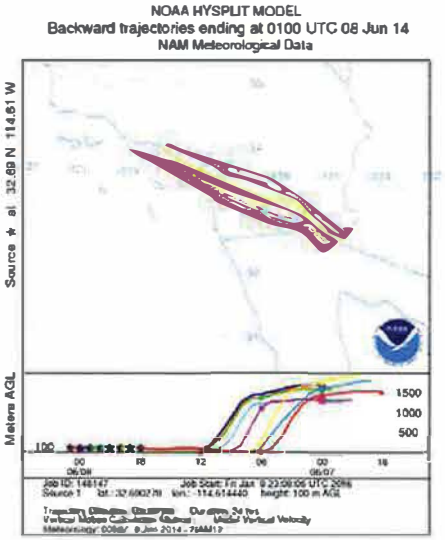




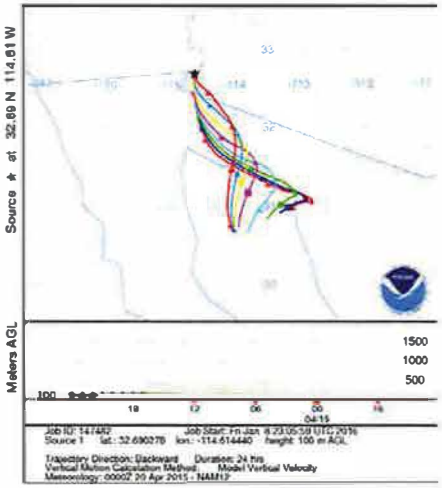




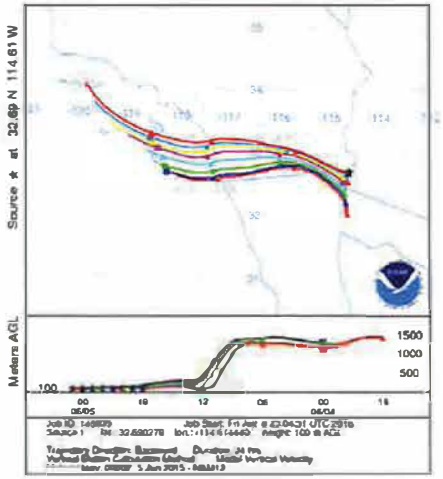




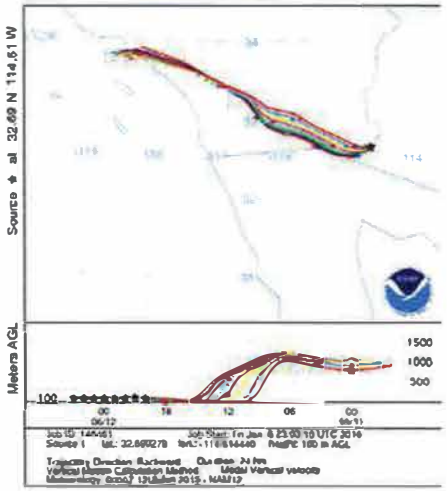
NOAA HYSPLIT MODEL
Backward trajectories ending at 0000 UTC 20 Apr 15
NAM Meteorological Data



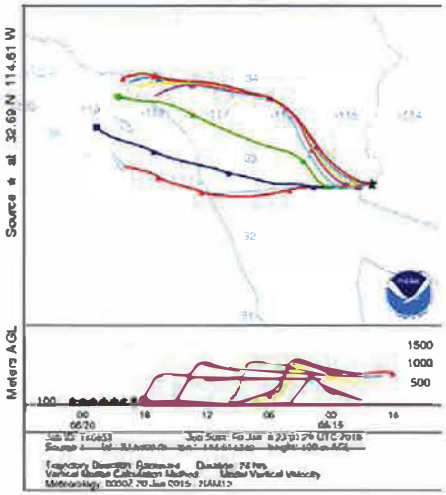
NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 05 Jun 15
NAM Meteorological Data



NOAA HYSPLIT MODEL
Backward trajectories ending at 0300 UTC 12 Jun 15
NAM Meteorological Data



NOAA HYSPLIT MODEL
Backward trajectories ending at 0100 UTC 20 Jun 15
NAM Meteorological Data



Enclosure 2
Responsiveness Summary

Responsiveness Summary to Comments on ADEQ's Proposed 2015 Ozone Boundaries

Summary and Responses for Comments from Maricopa Association of Governments (MAG)

MAG Comment #1

Providing the four data-contingent options in the recommendation are appropriate in order to determine what area is necessary for recommendation.

ADEQ Response to MAG Comment #1

The statute, Clean Air Act § 107, requires a recommendation based on areas that currently do not meet, or that currently contribute to areas that do not meet, the standard. Based on the statute and EPA guidance, ADEQ's recommended area now reflects current data. The recommendation also provides suggested alternatives for the EPA to consider. EPA has assured ADEQ that it will consider all available data to develop its final designations, as it is required to do.

MAG Comment #2

The Maricopa ozone boundary should not be expanded at this time since the Queen Valley and Tonto National Monument monitors only slightly exceed the standard, and there is a downward trend at the monitors.

ADEQ Response to MAG Comment #2

Boundary recommendations are data driven. An area that is not meeting the standard is a nonattainment area according to CAA section 107(d). Although the monitors mentioned may only slightly exceed the standard, current data shows that the monitors are still violating monitors according to how design values are calculated by rule. The monitors are violating regardless of the amounts they are exceeding, or their downward trends. Therefore, these monitors must be included in the nonattainment area. ADEQ and EPA will continue to consider updated monitoring data as it becomes available. If, prior to EPA's final designations, either or both monitors attain the standard, ADEQ will work with EPA to ensure the appropriate alternative boundary scenario is taken into consideration.

MAG Comment #3

Monitoring data from the 2016 ozone season should be evaluated first to determine if the monitors have met the standard or if it is necessary to revise the boundary recommendation.

ADEQ Response to MAG Comment #3

While the typical ozone season is still in progress, 2016 data has and continues to inform ADEQ's suggested alternative boundaries for the EPA's consideration.

MAG Comment #4

Preliminary exceedances of the 2015 ozone standard at the Queen Valley and Tonto National Monument monitors in the 2016 ozone season may in some cases be the result of exceptional events caused by wildfires and stratospheric intrusions of ozone.

ADEQ Response to MAG Comment #4

Juniper Fire - May through June

MAG: The Juniper fire affected the Queen Valley and Tonto National Monument monitors from mid-May to mid-June 2016.

ADEQ: ADEQ has evaluated the mentioned timeframe and does not find reason to believe that exceedances at either monitor were affected by wildfire during the timeframe. The preliminary analysis showed the winds aloft were out of the west/southwest causing lifted smoke to travel to the northeast, away from the Phoenix area, as well as satellite imagery highlighting the lack of Juniper Fire smoke significantly impacting the Phoenix area. During periods of calm winds, there appeared to be no significant drainage of PM2.5 into the Valley, with no monitors in the Phoenix area reporting unusually high PM2.5 concentrations. Due to the lack of observed PM2.5 in the Valley, it is difficult to conclude that the Juniper Fire had a strong enough impact to cause the ozone exceedances at Queen Valley and Tonto National Monument. It appears more likely that light winds and sunny skies, which led to exceedances both before and after the fire, were the primary factors leading to ozone exceedances on the days in question. Due to the lack of evidence supporting this exceptional event, and a low likelihood of concurrence from EPA, ADEQ will not likely pursue this exceptional event demonstration.

Stratospheric Intrusion April 24, 2016

MAG: Stratospheric intrusion is possibly indicated by weather conditions.

ADEQ: ADEQ has more carefully evaluated the April 24, 2016 date and has found some weak evidence to support that a stratospheric intrusion affected ozone concentrations at the Queen Valley monitor on April 24, 2016. There is evidence to support that a possible stratospheric intrusion did occur between Las Vegas, NV and Flagstaff, AZ during the night prior to the exceedance, but there is less evidence to support that the intrusion would have reached low enough elevations to influence the monitors in the Phoenix area. The evidence to support this exceptional event is weak and further analysis would be needed to determine any influence from the stratospheric intrusion. Concurrence of this exceptional event from EPA will not have a regulatory impact on the 2016 design value for the Queen Valley monitor, as the exceedance in question is not one of the four highest exceedances, and thus ADEQ will not likely pursue this exceptional event demonstration.

MAG Comment #5

The Queen Valley monitor recorded preliminary 2016 ozone concentration exceedances while the monitor was operating with a consistent 2.5 to 3 percent high bias. Hence, the monitor was recording higher ozone concentrations than may have actually occurred. Monitor concentrations during the period that MAG mentions (approximately April to June 5, 2016) at the Queen Valley monitor should be critically evaluated given the known high bias of the recorded ozone concentrations.

ADEQ Response to MAG Comment #5

ADEQ's final recommendation is based on 2013-2015 data, which shows the Queen Valley monitor is currently violating the 2015 Ozone NAAQS. ADEQ understands that MAG is looking toward future design values with this comment regarding bias.

ADEQ has begun a pilot program for our ozone monitors to perform informal quality control checks nightly and investigation is recommended to the technical monitoring staff if the bias at a monitor hits 2 percent above or below the standard. Even so, ADEQ believes that 2.5 to 3 percent is an acceptable margin of error considering our resources, regulation, EPA policy, and our lack of confidence in the consistency of the bias.

While there was an upward bias of 2.5 to 3 percent through mid-June 2016 at the Queen Valley monitor, this bias falls within the acceptable +/- 7 percent bias allowed by EPA regulation.[1] Further, per policy,[2] EPA does not recommend post-processing data to account for a bias, and ADEQ agrees with this recommendation. The statistical inconsistencies and number of assumptions needed to data-fill makes the practice unreliable, as well as resource intensive and overly burdensome. This sort of data-filling would also need to be performed for all monitors across the state for consistency's sake, and the same level of detailed bias data is not available at all Arizona ozone monitors, nor for past years.

MAG Comment #6

MAG suggests that because the Queen Valley and Tonto National Monument monitors are located in or near the Tonto National Forest and in the intermountain west, these areas are likely subjected to high levels of background from natural and international sources. Therefore, there is no clear benefit to include the area in the nonattainment area.

ADEQ Response to MAG Comment #6

ADEQ understands that biogenic background emissions can have a large impact on monitored concentrations. At this time, however, except for limited exceptional events and international and "rural" transport, there is no regulatory mechanism to exclude or adjust data based on how monitored concentrations are affected by chronic background conditions. ADEQ must include all nonattaining monitors in its recommendation.

Pinal County Air Quality Control District (Pinal County) Comments

Pinal County Comment #1

Queen Valley is a small desert community of approximately 800 people and contributes little to ozone formation.

ADEQ Response to Pinal County Comment #1

ADEQ does not assert that the Queen Valley contributes more than a de minimis amount to the Queen Valley monitor. The monitor is violating the 2015 ozone standard, and for this reason the area is recommended for nonattainment.

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[1] 40 CFR 58, Appendix A, section 2.3.1.2.

[2] EPA's Quality Assurance Handbook Vol. II, section 12, May 2013.

Pinal County Comment # 2

Local area economic impacts will follow a nonattainment designation in Pinal County. Such a designation will slow economic development, affecting planned region-wide economic development projects.

ADEQ Response to Pinal County Comment #2

The Clean Air Act does not provide a mechanism to consider economic development in designating areas consistent with the NAAQS. ADEQ has found that the recommended area in Pinal County is either not attaining the NAAQS or is already contributing to the nonattainment of other monitors in the Phoenix area. If the EPA ultimately designates these areas as nonattainment, economic development will need to take place within the context of a nonattainment area.

Pinal County Comment #3

Emission data referenced in the draft boundary recommendation do not quantify precursor emissions generated within the Pinal County portion of the recommended nonattainment boundary, and when local emissions estimates are available they should be used over the National Emissions Inventory (NEI). The Maricopa Association of Governments (MAG) has done mobile emissions modeling in the region at a finer spatial scale than the National Emission Inventory (NEI), and therefore, this modeling should be incorporated into the five factor analysis.

ADEQ Response to Pinal County Comment #3

ADEQ did review and use the individual permitted point source contribution data supplied by Pinal County, as well as the NEI, to make its recommendation. ADEQ understands that point sources are not a large contributor to the nonattainment of the area, but point source emissions are just one of the four overarching emissions categories. Considering other likely emissions activities in the area (mobile source emissions and area source emissions) given the level of development in the area, ADEQ determined that the area should be included in the nonattainment area as a contributor to the Queen Valley monitor, as well as to multiple other monitors within Maricopa County.

Unfortunately, as with various areas within the state, a more detailed emissions inventory for this area is not available. ADEQ did contact MAG regarding using their mobile emissions modeling results as part of the five factor analysis, but MAG's modeling is not complete and the gridded emissions inventories that support the ozone modeling are not available for distribution at this time.

Pinal County Comment #4

ADEQ did not adequately consider the current level of control of emissions sources in Pinal County. The level of controls should have been more thoroughly explored as part of ADEQ's 5 factor analysis.

ADEQ Response to Pinal County Comment #4

ADEQ addressed the level of control in the Area A part of Pinal County.[3] Further, ADEQ notes that area may still be contributing to another area's nonattainment regardless of the level of controls already in place.

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[3] See Section 3.1.2 of the 2015 Ozone NAAQS Boundary Recommendation (Section 3.4.2.1 of the proposed 2015 Ozone NAAQS Boundary Recommendation Draft).

The 2008 Phoenix-Mesa Nonattainment Area also has reformulated gas, a vehicle inspection and maintenance program, and low permitting thresholds, but in spite of the level of control, monitors in that area are still not meeting the standard and the area is contributing to monitored exceedances. The San Tan Valley portion of Pinal County is an urbanized area extending from the current Phoenix-Mesa nonattainment area. Considering the recent population growth and traffic in San Tan Valley, a high level of urban driven emissions is likely produced by the area. ADEQ's evaluation of meteorology indicates that these urban driven emissions from the San Tan Valley portion of Pinal County are likely contributing to nonattainment at several monitors, including Queen Valley, and should therefore be included in the nonattainment area.

Pinal County Comment #5

Pinal County believes that a portion of the proposed nonattainment area may be meeting the 2015 Ozone NAAQS given historical Combs School (San Tan Valley) monitoring data collected from 2004 through 2010.

ADEQ Response to Pinal County Comment #5

Given the lack of a current monitor in the immediate area, the San Tan Valley area may be meeting the NAAQS. However, given the proximity of the populated area to the 2008 Phoenix-Mesa Ozone Nonattainment Area, ADEQ's analysis concentrated on the whether the San Tan Valley portion of Pinal County is likely contributing emissions to the ambient air at other monitors that do not meet the NAAQS. ADEQ believes that this urbanized area, as a part of the Phoenix-Scottsdale-Mesa metropolitan area, is contributing to nonattainment at Queen Valley and other monitors in the Phoenix area.

Pinal County Comment #6

From a health perspective, a nonattainment designation for the San Tan Valley area would offer no additional protection to the residents of the area.

ADEQ Response to Pinal County Comment #6

If the San Tan Valley area is designated nonattainment with the Phoenix area, it will hopefully come into attainment within three years of designation. In the meantime, local residents would be protected from potential increased emissions from new major sources. If the area's classification is later increased to moderate, there are additional measures that may be put in place to ensure that the area, along with the rest of the Phoenix area, will decrease its ozone levels to meet the 2015 NAAQS.

Pinal County Comment #7

The meteorological analysis of the Queen Valley monitor in the draft boundary recommendation, utilizing a wind and HYSPLIT analysis of the monitor on the 10 highest ozone concentration days (2013-2015), does not support the conclusion that the San Tan Valley/Queen Creek area contributes to nonattainment at the Queen Valley ozone monitor. In addition, the draft recommendation relies on HYSPLIT back trajectories to demonstrate air parcel movement, which must be used in conjunction with precursor emissions data to establish that an area contributes to measured concentrations at a monitor.

ADEQ Response to Pinal County Comment #7

While emissions from the San Tan Valley/Queen Creek area don't always directly impact the Queen Valley monitor, they do likely contribute to the monitor on some exceedance days (See Figure 1).

Additionally, as a largely developed extension of the Phoenix-Scottsdale-Mesa metropolitan area, emissions from the San Tan Valley/Queen Creek area likely affect multiple monitors in Phoenix, other than just the Queen Valley monitor. There were numerous other monitors with HYSPLIT analyses that showed influence from the San Tan Valley area that were not included in the recommendation for simplicity's sake, but that can be seen in Appendix A of the Recommendation. Figure 2 below highlights some of these, which, coupled with the emissions analysis of the area, leads to the conclusion that the San Tan Valley area is an extension of the urban area and contributes to ozone production at monitors throughout the valley.

ADEQ analyzed emission indicators according to the EPA's five factors appropriately as a weight of evidence. By evaluating traffic and population in the area of San Tan Valley/Queen Creek, and likely commuting habits of the area to and from Phoenix, ADEQ concluded that emissions, combined with modeled meteorological conditions, contribute to multiple Phoenix area monitors.

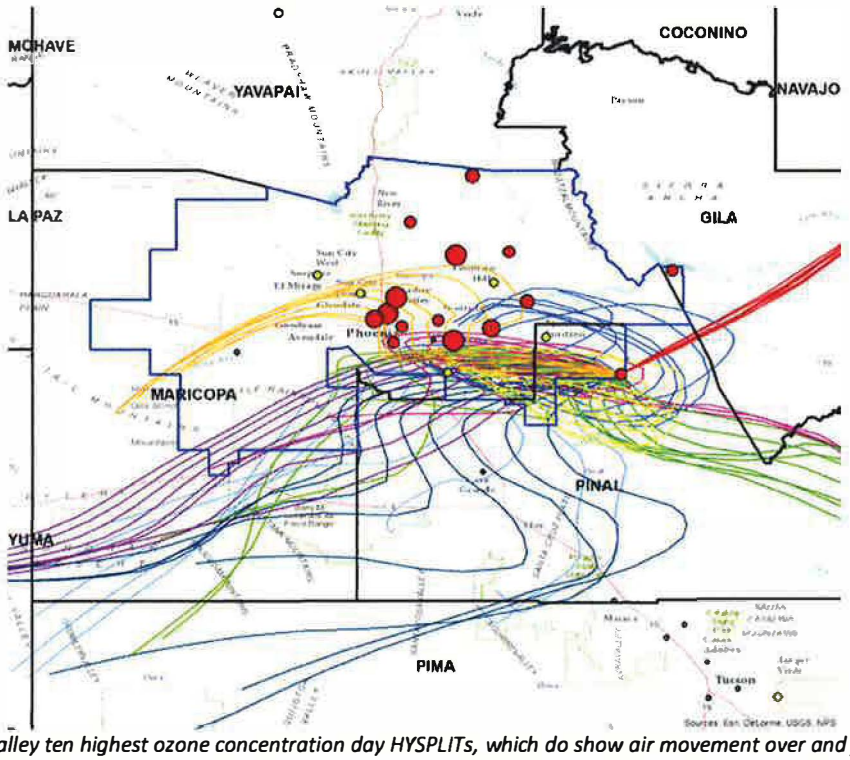

Figure 1 Queen Valley ten highest ozone concentration day HYSPLITs, which do show air movement over and from the San Tan Valley/Queen Creek area an some of the exceedance days. Each exceedance day is shown in a different color.

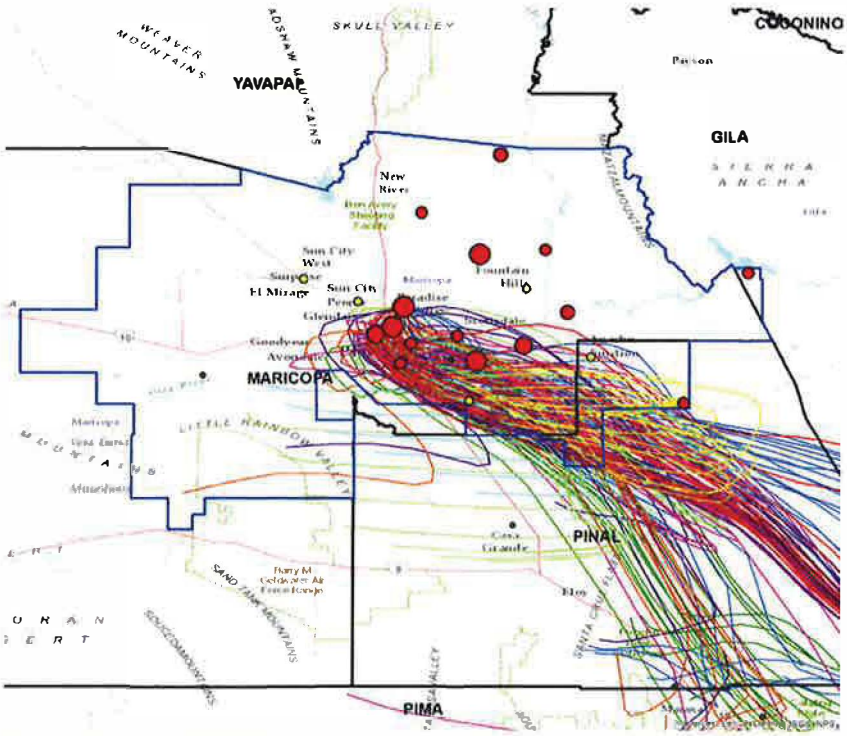

Figure 2 HYSPLITs from multiple monitors in the central Phoenix metropolitan area that show air movement over and from the San Tan Valley/Queen Creek area on high ozone concentration days.

Pinal County Comment #8

Additional documentation is needed to support the weight of evidence analysis. The recommendation does not clearly describe how evaluation of the various factors led to the conclusion that the Pinal County portion of the proposed nonattainment boundary contributes to ozone nonattainment.

ADEQ Response to Pinal County Comment #8

ADEQ respectfully disagrees with Pinal County. ADEQ collected and evaluated a large quantity of data in preparation for the recommendations. ADEQ additionally requested input and data from several hundred stakeholders and considered each comment received, formal and informal. In considering all the data for the Phoenix area, ADEQ mainly relied on EPA boundary designation guidance, which lays out a five factor weight of evidence analysis to follow. The guidance does not quantify the weight that should be attributed to each factor, but ADEQ's interpretation demonstrated that virtually all of the factors support the inclusion of San Tan Valley.

ADEQ analyzed the five factors of air quality data, emissions and emissions related data, meteorology, topography, and jurisdiction with respect to San Tan Valley and the Queen Valley monitor. With respect to air quality data, the Queen Valley monitor, as well as other monitors throughout the Phoenix area, are not attaining the standard. Regarding emissions and emissions related data, urban traffic is clearly apparent in San Tan Valley and population increased substantially between 2000 and 2010. There are also few point sources in San Tan Valley. However, considering the high density of average daily traffic, high commuting levels between Pinal and Maricopa Counties, and the population in San Tan Valley compared to the rest of Pinal County, one can assume that a high proportion of the population and mobile source related emissions from Pinal County can be attributed to San Tan Valley. Meteorological

analyses show likely air parcel movement passing through San Tan Valley to Queen Valley monitor and other nonattaining monitors during exceedance events, within the context of topographic conditions. Likewise, meteorological analyses show that air parcels from the existing nonattainment area are also likely impacting the area between the existing nonattainment area and the Queen Valley monitor. As far as jurisdiction is concerned, ADEQ placed the least weight on this factor as a part of its boundary designation because this factor does not reflect the nonattainment status of an area. However, MAG already has transportation planning in San Tan Valley and would likely have air quality planning, as well. Pinal County Air Quality Control District would likely have permitting and enforcement authority over the area. Maricopa County, MAG, Pinal County, Sun Corridor Metropolitan Planning Organization have all worked and continue to cooperatively work together in several planning capacities, including to improve air quality.

Given the above main reasons, ADEQ interprets the data as demonstrating that San Tan Valley, as an urbanized, developed, and highly populated area, is likely contributing to the ambient air in other areas that are not meeting the NAAQS. The full data available is presented in the recommendation and TSD.

Sun Corridor Metropolitan Planning Organization (Sun Corridor) & Central Yavapai Metropolitan Planning Organization (CYMPO) Comments

(ADEQ combined the comments from Sun Corridor and CYMPO due to their similarities.)

Sun Corridor and CYMPO Comment #1

The Phoenix nonattainment area should not be expanded to include the Tonto National Monument monitor because the data excludes an exceptional event, affecting the monitor's attainment status.

ADEQ Response to Sun Corridor and CYMPO Comment #1

Until the EPA concurs with exceptional events, the Tonto monitor is still legally not attaining.

Sun Corridor and CYMPO Comment #2

The Phoenix nonattainment area should not be expanded to include the Queen Valley monitor because the monitor is only slightly exceeding the standard.

ADEQ Response to Sun Corridor and CYMPO Comment #2

The monitor is currently violating the standard and is therefore included in the recommended nonattainment area. Please refer to ADEQ's response to MAG Comment #2, above.

Sun Corridor and CYMPO Comment #3

The Phoenix nonattainment area should not be expanded to include the Queen Valley monitor because it is showing a downward trend in its concentrations.

Response to Sun Corridor and CYMPO Comment #3

A downward trend does not mean that an area is attaining a standard. Please refer to ADEQ's response to MAG Comment #2, above.

Sun Corridor and CYMPO Comment #4

To include the Pinal County area would have a negative impact on economic development in the area.

ADEQ Response to Sun Corridor and CYMPO Comment #4

There is currently no mechanism under the Act to consider economic development in designating areas consistent with the NAAQS. This is also discussed in Response to Pinal County Comment #2, above.

Chamber of Commerce Comments

The Chamber of Commerce ("the Chamber") appreciated the fact that ADEQ held multiple stakeholder meetings, including in Yuma County. The Chamber also stated that while it may not be apparent to those who did not participate in the stakeholder meetings, the draft reflects ADEQ's consideration of discussions at those meetings. The Chamber supports the draft boundaries as reinforced by data, reasonable, and as compact as possible to meet regulatory requirements. However, the Chamber encourages ADEQ to re-evaluate its recommendations to ensure the designations appropriately reflect the most succinct boundaries.

ADEQ Response to the Chamber's Comments

ADEQ appreciates the Chamber's support and has thoroughly re-evaluated the data. After limited modifications, ADEQ concludes that the recommended boundary is as compact as possible to in good faith meet regulatory requirements based on current and valid data.

Salt River Project (SRP) Comments

SRP Comment #1

SRP understands why ADEQ considered the San Tan Valley area as a contributor to the ozone exceedances at the Queen Valley monitor, but asserts that there would be limited benefit in including the area in the nonattainment area. The San Tan Valley area contains no permitted industrial sources that emit more than 1 ton per year and the primary source of ozone precursor emissions is local vehicle traffic, for which there are already a number of programs in place to minimize ozone precursors from mobile sources.

ADEQ Response to SRP Comment #1

An area may still be contributing to another area's nonattainment regardless of the level of controls already in place. This is discussed in further detail in ADEQ's response to Pinal County's Comment #4.

SRP Comment #2

ADEQ's proposed boundary expansion into the San Tan Valley extends too far. ADEQ's proposed expansion of the nonattainment area boundary in Pinal County extends beyond the [current] San Tan Valley Census Designated Place (CDP) boundaries by approximately 4 miles to the west and 2 miles to the east.

The proposed expansion extends too far for the following reasons:

1. These areas east and west of the San Tan Valley CDP are undeveloped or agricultural land (Figure 1 of SRP's comment letter).

2. The areas east and west of the San Tan Valley CDP contain no permitted industrial sources.
3. Limited additional emissions from traffic and population would be gained in those areas as well (Figure 2 and 3 of SRP's comment letter).
4. Population growth has stagnated in the area since the 2010 Census (Figure 4 of SRP's comment letter), and future growth is expected to occur within CDP boundaries, since these areas outside the San Tan Valley CDP are largely State Trust Land or owned by the Bureau of Land management or the Bureau of Reclamation which cannot be developed for private use under its current classification (Figure 5 of SRP's comment letter).

ADEQ Response to SRP Comment #2

When analyzing the extent of the proposed nonattainment area, SRP raises valid points. ADEQ has reevaluated the data and concluded that the nonattainment area should more closely align with the 2010 San Tan Valley CDP boundary. Figure 3 below highlights the changes to the final recommended nonattainment boundary from the draft nonattainment boundary, with the final boundary more closely aligning with the 2010 San Tan Valley CDP boundary. The new adjusted boundary also more closely aligns with the population and traffic in the area, as seen in Figure 4, and excludes some previously uninhabited areas along the edges.

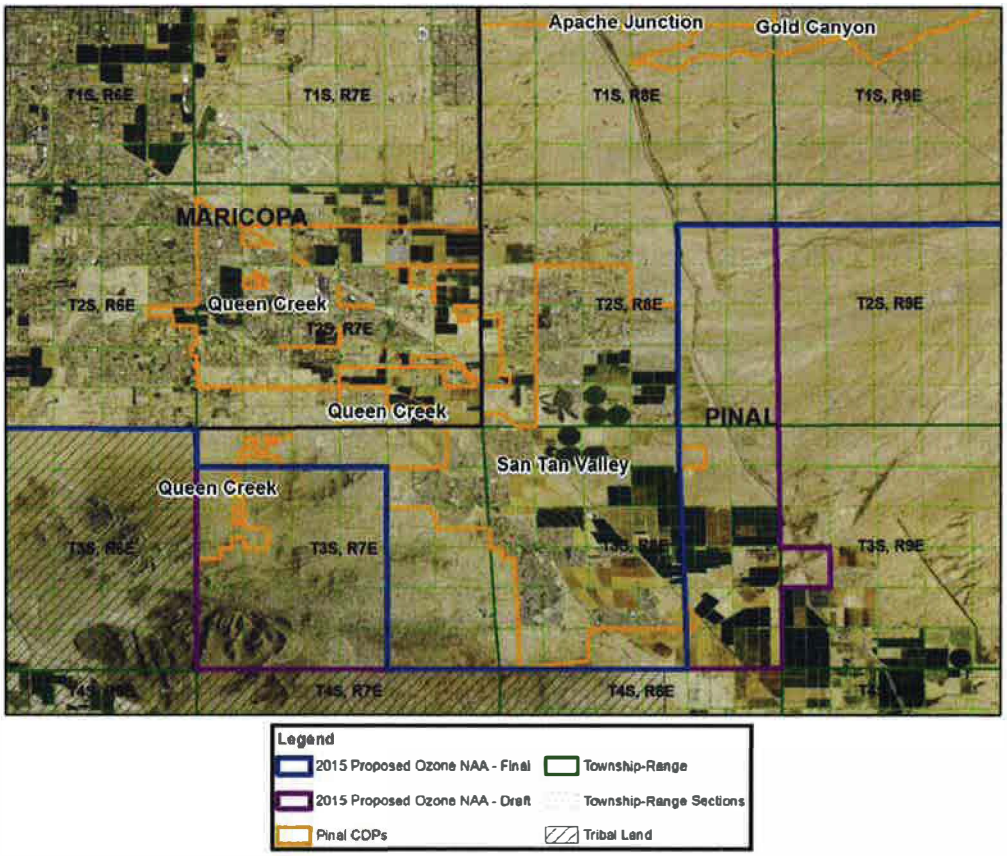

Figure 3 Changes to the recommended boundary more closely align with the San Tan Valley CDP.

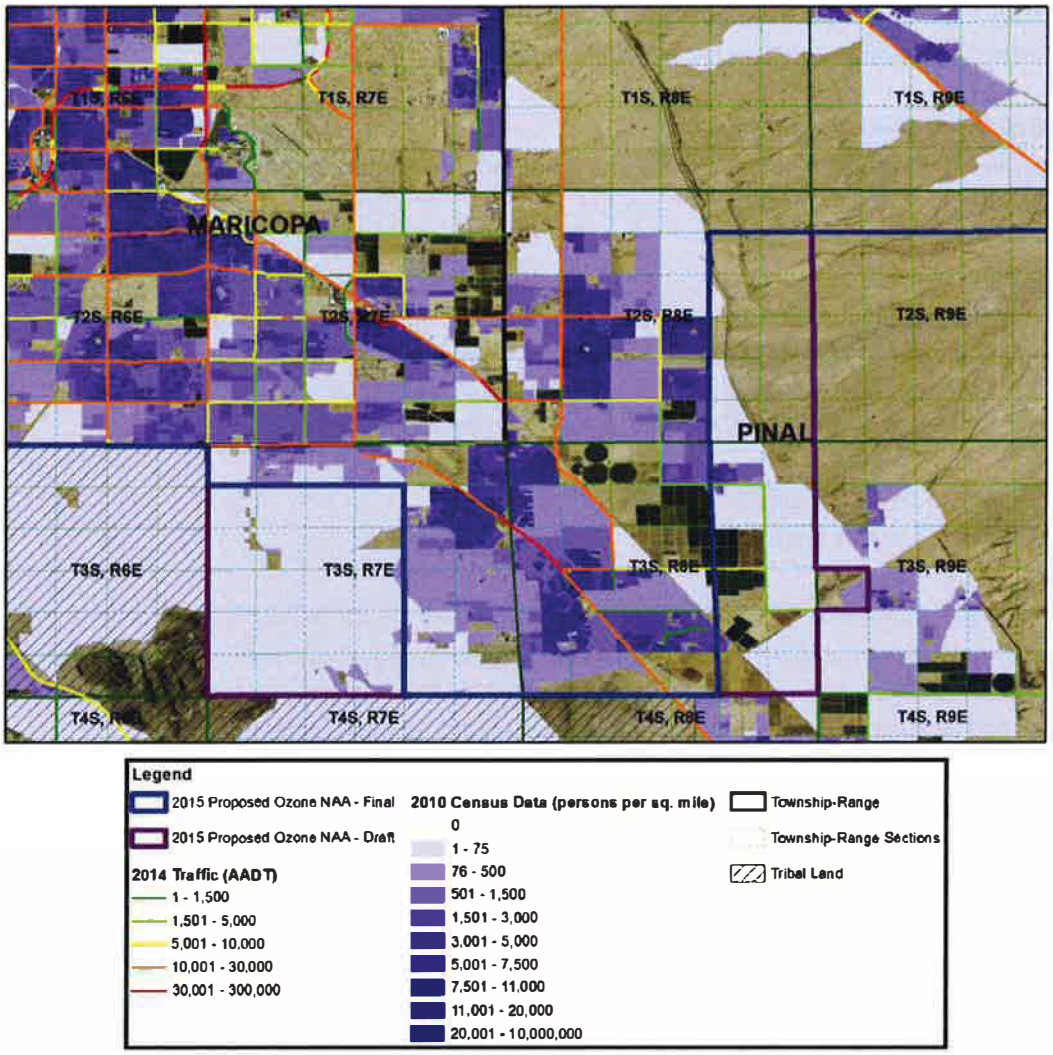

Figure 4 Changes to the recommended boundary more closely align with the population and traffic in the area.

SRP Comment #3

ADEQ appropriately excludes other neighboring towns in Pinal County beyond San Tan Valley from the recommended nonattainment area boundary. SRP supports ADEQ's conclusion, which is based on population, traffic, and meteorological analysis, that the closest adjacent towns of Coolidge and Florence do not contribute to ozone exceedances at the Queen Valley monitor.

ADEQ Response to SRP Comment #3

ADEQ appreciates SRP's feedback.

Arizona Mining Association (AMA) Comments

AMA Comment #1

AMA encourages ADEQ to remove the data contingent recommendations. AMA notes that recent air data from the Pinal County Queen Valley ozone monitor reveals it will likely be in violation of the 2015

Ozone NAAQS given the 2016 design value. For this reason, the contingent recommendations that exclude the Queen Valley monitor are no longer viable.

ADEQ Response to AMA Comment #1

ADEQ agrees that at this time, it will make one boundary recommendation and suggest viable alternatives for the EPA's consideration.

AMA Comment #2

AMA recognizes ADEQ's responsibility to comply with the Clean Air Act requirements even while the state challenges the 70 ppb standard. AMA also commended ADEQ for its inclusive stakeholder process. The Arizona Mining Association generally supported the draft recommendations for both the Phoenix and Yuma areas, and quotes the draft itself as evidence for its support.

ADEQ Response to AMA Comment #2

ADEQ appreciates AMA's feedback.

Peter Hyde ASU Adjunct Research Professor Comments

ADEQ has enclosed Mr. Hyde's comment letter along with the other seven received comments, although the letter was submitted a month after the comment period concluded. ADEQ appreciates Mr. Hyde's feedback and has taken these comments under advisement as stakeholder input.

Enclosure 3
Comments Received

359370

MARICOPA ASSOCIATION of GOVERNMENTS

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June 24, 2016

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ADEQ
AIR QUALITY DIVISION
16 JUN 24 AM 9:40

Ms. Heidi Haggerty
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, Arizona 85007

Dear Ms. Haggerty:

The Maricopa Association of Governments (MAG) is pleased to submit comments on the May 31, 2016 Arizona Department of Environmental Quality (ADEQ) 2015 Ozone NAAQS Boundary Recommendation Draft Report. We appreciate that the Draft Report includes as the first recommendation that the current Maricopa ozone boundary will not need to be expanded if the Queen Valley or Tonto National Monument monitors do not violate the 2015 ozone standard based upon future ozone design values. This recommendation aligns with MAG's comment that monitor data from the 2016 ozone season should be evaluated first to determine if the monitors have met the standard or if it is necessary to revise the boundary recommendation, since the Queen Valley and Tonto National Monument monitors only slightly exceed the standard and there is a downward trend at the monitors.

Additional comments in support of not expanding the current Maricopa ozone boundary at this time are attached to this letter. We look forward to working cooperatively with the Arizona Department of Environmental Quality in our efforts to improve air quality. If you have any questions on our comments, please do not hesitate to contact Lindy Bauer at (602) 254-6300.

Sincerely,

Dennis Smith
Executive Director

June 24, 2016

MAG Comments on the May 31, 2016
Arizona Department of Environmental Quality (ADEQ)
2015 Ozone NAAQS Boundary Recommendation Draft Report

1. On page 31, the ADEQ "recommends four data-contingent 2015 Ozone NAAQS nonattainment area boundaries for the Phoenix area." The first boundary listed by ADEQ recommends that the nonattainment area boundary for the 2015 ozone standard remain the same as the current nonattainment area boundary for the 2008 ozone standard, if neither the Queen Valley monitor in Pinal County or the Tonto National Monument monitor in Gila County violate the 2015 ozone standard based upon future ozone design values. This first recommendation is consistent with MAG Regional Council action taken on April 27, 2016, approving that a letter be sent to ADEQ requesting that the Maricopa ozone boundary not be expanded at this time, since the Queen Valley and Tonto National Monument monitors only slightly exceed the standard and there is a downward trend at the monitors. The May 3, 2016 letter to ADEQ also stated that monitor data from the 2016 ozone season should be evaluated first to determine if the monitors have met the standard or if it is necessary to revise the boundary recommendation. A copy of the May 3, 2016 letter to ADEQ is attached to these comments.

2. On page 36, ADEQ discusses the long-term and short-term downward trends in ozone concentrations at the Queen Valley and Tonto National Monument monitors in support of retaining the existing Maricopa ozone nonattainment area as the recommended boundary for the 2015 ozone standard. In addition to the information presented by ADEQ on this page, the following information provides additional evidence as to why the Maricopa ozone nonattainment area boundary should not be expanded at this time:

   A. Preliminary exceedances of the 2015 ozone standard at the Queen Valley and Tonto National Monument monitors in the 2016 ozone season may in some cases be the result of exceptional events caused by wildfires and stratospheric intrusions of ozone.

   Located north and east of the Queen Valley and Tonto National Monument monitors, the Juniper fire burned in the Tonto National Forest from mid-May to mid-June 2016. Satellite photos show smoke from the Juniper fire blowing towards the Queen Valley and Tonto National Monument monitors on multiple dates. Exceedances of the 2015 ozone standard occurred at the Queen Valley and Tonto National Monument monitors in late May and early June when the Juniper fire was most active, making it possible that the Juniper fire contributed to these recorded ozone exceedances. Additionally, the exceedance on April 24, 2016 at the Queen Valley monitor may have been influenced by stratospheric intrusion of ozone, as indicated by weather conditions during the exceedance. Exclusion of exceedances during this period as exceptional events will lower the ozone design values at these monitors and may result in the Queen Valley and Tonto National Monument monitors meeting the 2015 ozone standard with data from the 2016 ozone season, making expansion of the Maricopa ozone nonattainment area boundary unnecessary.

B. Preliminary 2016 ozone concentrations at the Queen Valley monitor were recorded while the monitor was operating with a consistent bias towards recording higher ozone concentrations than may have actually occurred.

ADEQ staff has indicated that ozone calibration trend data at the Queen Valley monitor was consistently biased upward by 2.5 to 3 percent through early June of the 2016 ozone season. This could result in the Queen Valley monitor recording ozone concentrations that are approximately 0.002 parts per million (ppm) higher than they actually were. This is not an insignificant value, given that some of the preliminary 2016 exceedances recorded at the Queen Valley monitor are only 0.001 to 0.002 ppm higher than the 2015 ozone standard. Additionally, a 0.002 ppm difference in 2016 ozone concentrations may determine whether the monitor meets or violates the standard with 2014-2016 ozone concentration data. Monitor concentrations during this period (approximately April - June 5, 2016) at the Queen Valley monitor should be critically evaluated given the known high bias of the recorded ozone concentrations and may be an over-representation of actual ozone concentrations at the monitor.

C. The Queen Valley and Tonto National Monument monitors are located in or very near the Tonto National Forest, making these monitors subject to high levels of background ozone.

EPA's white paper[1] on background ozone acknowledges that background ozone concentrations are known to be highest in the rural areas of the intermountain west, including locations such as the Tonto National Monument monitor situated in the middle of the Tonto National Forest, and the Queen Valley monitor located on the edge of the Tonto National Forest. These areas are particularly subject to increases in ozone from natural sources such as vegetation, wildfires, and stratospheric intrusions, along with ozone from interstate and international transport. EPA's white paper estimates that in 2017, 67% of the ozone concentration at the Queen Valley monitor and 64% of the ozone concentration at the Tonto National Monument monitor will be due to background ozone. This in contrast to the current Maricopa nonattainment area, where the estimated contribution of background ozone in 2017 is 52%. Since background ozone concentrations are uncontrollable, expanding the Maricopa nonattainment area to include the rural Tonto National Monument and Queen Valley monitors will provide no clear benefit in reducing background ozone concentrations or in meeting the 2015 ozone standard at these monitors.

[1] *Implementation of the 2015 Primary Ozone NAAQS: Issues Associated with Background Ozone. White Paper for Discussion.* U.S. Environmental Protection Agency. December 30, 2015.

MARICOPA ASSOCIATION of GOVERNMENTS

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May 3, 2016

Mr. Misael Cabrera, Director
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, Arizona 85007

Dear Mr. Cabrera:

The Maricopa Association of Governments (MAG) has appreciated the opportunity to participate in the Arizona Department of Environmental Quality (ADEQ) stakeholder meetings on the 2015 Ozone Standard Boundary Designations. On April 27, 2016, the MAG Regional Council took action to approve sending a letter to ADEQ requesting that the Maricopa ozone boundary not be expanded at this time, since the Queen Valley and Tonto National Monument monitors only slightly exceed the standard and there is a downward trend at the monitors. Monitor data from the 2016 ozone season should be evaluated first to determine if the monitors have met the standard or if it is necessary to revise the boundary recommendation.

On April 14, 2016, ADEQ conducted a stakeholder meeting and proposed an expansion of the Maricopa eight-hour ozone nonattainment area to include portions of Pinal County and Gila County. Based upon 2013-2015 monitor data, the Queen Valley monitor in Pinal County and the Tonto National Monument monitor in Gila County are at 0.071 parts per million compared to the 2015 ozone standard of 0.070 parts per million. The data for the Tonto monitor excludes an exceedance caused by a wildfire exceptional event in 2015. On February 29, 2016, MAG staff provided information to ADEQ showing a downward trend in the concentrations at both monitors from 2001-2015 (see attachment).

In accordance with the Clean Air Act, states are required to submit their area designation recommendations by October 1, 2016 to the Environmental Protection Agency (EPA) based upon 2013-2015 data. By October 1, 2017, EPA will finalize the designations based upon 2014-2016 data. For this reason, EPA encourages states to review and consider preliminary 2016 air quality data in their designation recommendations. This is stated on page 4 of the EPA memorandum, Area Designations for the 2015 Ozone National Ambient Air Quality Standards dated February 25, 2016.

If the Maricopa eight-hour ozone nonattainment area is expanded as ADEQ is proposing, there will be tighter controls on business and industry in the new area and transportation conformity requirements will apply. These requirements could have a negative impact on economic development in Pinal County.

Again, MAG is requesting that the Maricopa ozone boundary not be expanded at this time, since the Queen Valley and Tonto National Monument monitors only slightly exceed the standard and there is a downward trend at the monitors. Monitor data from the 2016 ozone season should be evaluated first to determine if the monitors have met the standard or if it is necessary to revise the boundary recommendation.

We look forward to working cooperatively with the Arizona Department of Environmental Quality in our continuing efforts to improve air quality. If you have any questions, please do not hesitate to contact Lindy Bauer or me at (602) 254-6300.

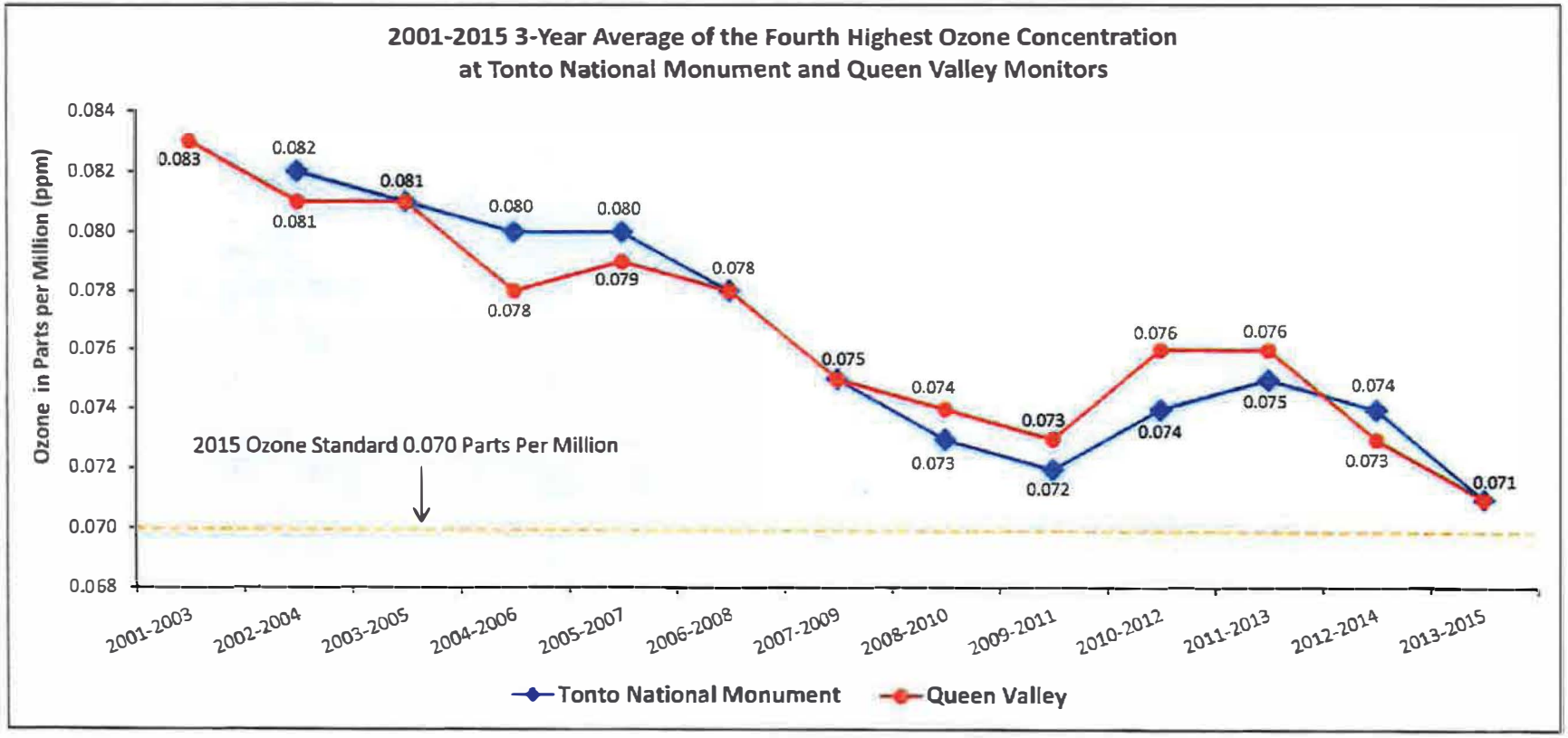
Sincerely,

Dennis Smith
Executive Director

cc: MAG Regional Council
Greg Stanley, Pinal County
Irene Higgs, Sun Corridor Metropolitan Planning Organization
Ken Hall, Central Arizona Governments
Timothy Franquist, Arizona Department of Environmental Quality

Monitor	2001-2015 FOURTH HIGHEST OZONE CONCENTRATIONS (parts per million)														
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Tonto National Monument		0.087	0.084	0.077	0.084	0.081	0.076	0.078	0.072	0.070	0.076	0.078	0.072	0.072	0.070
Queen Valley	0.079	0.083	0.087	0.073	0.084	0.079	0.076	0.080	0.070	0.072	0.078	0.078	0.073	0.068	0.074

Monitor	2001-2015 3-YEAR AVERAGE OF THE FOURTH HIGHEST OZONE CONCENTRATIONS (parts per million)												
	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009	2008-2010	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015
Tonto National Monument		0.082	0.081	0.080	0.080	0.078	0.075	0.073	0.072	0.074	0.075	0.074	0.071
Queen Valley	0.083	0.081	0.081	0.078	0.079	0.078	0.075	0.074	0.073	0.076	0.076	0.073	0.071



Data Source: U.S. EPA Air Data (http://www3.epa.gov/airdata) accessed on April 26, 2016.

Note: The June 20, 2015 exceedance of 0.079 ppm at the Tonto monitor is excluded from the data as an exceptional event caused by the Lake Fire in San Bernardino County, California

359650

Michael Sundblom
Air Quality Director

Greg Stanley
County Manager

PINAL • COUNTY
wide open opportunity

June 30, 2016

Timothy Franquist Jr., Director
Air Division
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, Arizona 85007

Via e-mail and First Class Mail

Re: Proposed 2015 Ozone Boundary Recommendation

Dear Mr. Franquist,

We appreciate the opportunity to comment on the 2015 Ozone National Ambient Air Quality Standard (NAAQS) Boundary Recommendation draft proposed by ADEQ on May 31, 2016.

This constitutes comment on behalf of Pinal County concerning ADEQ's recommendation to include a portion of Pinal County in the Phoenix area nonattainment boundary with respect to a designation under the 2015 8-hour ozone NAAQS. The recommendation proposes to include within the nonattainment boundary the communities of Apache Junction, Gold Canyon, San Tan Valley, Queen Creek, and Queen Valley. Queen Valley, where the ozone monitor of concern is located, is a small desert community of approximately 800 people and contributes little to ozone formation as the local emissions are limited to automobile use by local residents. Pinal County offers the following with regard to the portion of the recommended boundary within Pinal County.

Local Area Impacts

An ozone nonattainment designation for the area will slow economic development and could potentially increase vehicle travel into the metropolitan area. Pinal County is focused on region-wide economic development projects which will provide local work locations for residents. Slowing this development process with a nonattainment designation will in the long term result in less local jobs for residents and enhance the need for residents to travel further for employment opportunities, thereby increasing vehicle emissions.

Emissions Inventory

Emission data referenced in the draft boundary recommendation do not quantify precursor emissions generated within the Pinal County portion of the recommended nonattainment boundary. Rather, county–wide emissions appear to have been used in the analysis. In early 2016 Pinal County provided ADEQ with a 2014 emission inventory for NOx and VOC which accounted for permitted sources (actual annual emission >1 ton/yr) within the Pinal portion of the proposed boundary. Within the area NOx emissions amount to approximately 12 tons/yr and VOC emissions amount to approximately 186 tons/yr. These emissions constitute a small fraction of the overall estimated emissions in the Phoenix Metropolitan area. Emissions estimates from the 2011 NEI, used in the analysis, are a useful tool to use as part of the five factor analysis. However, if more local

emissions estimates are available, especially as it pertains to large contributing sources (i.e. mobile), then the local emissions estimates should be used. The Maricopa Association of Governments has done extensive ozone modeling for the region and part of that modeling effort includes quantifying local mobile emissions, including down to a finer spatial resolution than the NEI. Therefore the MAG mobile emissions modeling should be incorporated into the five factor analysis rather than the more coarse NEI emissions in order to clearly demonstrate contribution from the proposed nonattainment area in Pinal County.

The draft recommendation does not adequately consider the current "level of control of emissions sources", a component of emissions and emissions related data in the 5 factor analysis. Vehicle emissions in the proposed nonattainment boundary are currently controlled to the same level as those in the nearby Phoenix ozone nonattainment area. The Area A designation imposes vehicle emission testing, reformulated fuels, mandatory travel reduction for major employers, and summertime open burning restrictions. The San Tan Valley/Queen Creek area, generally south of the Germann Road alignment, is predominately residential in nature which results in tailpipe emissions. Considering the emission inventory referenced in the draft recommendation illustrates that mobile sources are the predominant source of NOx precursor emissions, including the San Tan Valley/Queen Creek area in in the nonattainment boundary would not yield any emission reductions from these sources; and, as explained above, could actually prevent or slow reductions in emissions from these sources. Pinal County believes the draft recommendation does not adequately address these regulatory programs in the weight-of-evidence evaluation.

Ambient data and Meteorological analysis

We believe a portion of the proposed nonattainment area can meet the 2015 ozone NAAQS. Ozone data collected from 2004 through 2010 at Combs School (San Tan Valley) show the area met the 2015 standard during all years of operation with a margin of 7ppb in 2010. Considering that the general ozone trend at the Combs site was decreasing over time, just as many others in the Maricopa and Pinal monitoring networks, one can project that the area would continue to meet the 2015 NAAQS today. From a heath perspective, a nonattainment designation for this area would offer no additional protection to the residents of the area. This information should be considered in the analysis and documentation.

The draft recommendation compared Queen Valley ozone concentrations on the 10 highest days (2013-2015) to local wind direction during the period from 10:00 A.M. to 5:00 P.M., essentially creating a pollution rose. The result of the analysis shows that maximum concentrations occur when the winds are from the west-northwest indicating that ozone transport on these days does not originate from San Tan Valley located south-west of Queen Valley. Rather, the transport of ozone generally moves along the U.S. 60 alignment from the greater Phoenix area. This information appears to conflict with the conclusion that the San Tan Valley/Queen Creek area contributes to nonattainment at the Queen Valley ozone monitor.

The draft recommendation relies on HYSPLIT back trajectories to demonstrate air parcel movement from areas of Pinal County toward the Queen Valley monitoring site. HYSPLIT trajectories do not quantify the magnitude of emissions contribution, only the movement of air parcels. In cases where parcels travel through the Pinal portion of the proposed nonattainment area, the preceding hours also traveled through the Phoenix Metropolitan area. Back trajectories analysis must be used in conjunction with precursor emissions data to establish that an area contributes to measured concentrations at a monitor.

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Analytical Approach

The 5 factor analysis is described in EPA guidance as a weight-of-evidence approach. The draft recommendation does not clearly describe how evaluation of the various factors led to a conclusion that the Pinal County portion of the proposed nonattainment boundary contributes to ozone nonattainment. Pinal County believes additional documentation of the weight-of-evidence approach is needed.

Pinal County concludes, based upon emissions data provided and the relatively small population, that the San Tan Valley/Queen Creek area alone does not generate emissions capable of causing an ozone NAAQS exceedance at Queen Valley. The evaluation should identify all contributors to the Queen Valley exceedances and proportion the result to the San Tan Valley/Queen Creek area in order to provide stakeholders with a clear indication of the area's contribution.

Should you wish to discuss these comments in greater detail, please call me at (520)866-6929.

Sincerely,

Mike Sundblom
Director
Pinal County Air Quality Control

359776

SunCorridor
Metropolitan Planning Organization

June 29, 2016

RECEIVED
JUL 1 2016

Mr. Misael Cabrera, Director
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, Arizona 85007

Dear Mr. Cabrera:

The Sun Corridor Metropolitan Planning Organization (MPO) is writing this letter in support of the letter sent to Arizona Department of Environmental Quality (ADEQ) on May 3, 2016 from the Maricopa Association of Governments (MAG), requesting that the Maricopa ozone boundary not be expanded at this time, since the Queen Valley and Tonto National Monument monitors only slightly exceed the standard and there is a downward trend at the monitors. Monitor data from the 2016 ozone season should be evaluated first to determine if the monitors have met the standard or if it is necessary to revise the boundary recommendation.

The Sun Corridor Metropolitan Planning Organization (MPO) has appreciated the opportunity to participate in the ADEQ 2015 Ozone Standard Boundary Designations stakeholder meetings. At the stakeholder meeting held on April 14, 2016, ADEQ proposed an expansion of the Maricopa eight-hour ozone nonattainment area to include portions of Pinal County and Gila County. Based upon 2013-2015 monitor data, the Queen Valley monitor in Pinal County and the Tonto National Monument monitor in Gila County are at 0.071 parts per million compared to the 2015 ozone standard of 0.070 parts per million. The data for the Tonto monitor excludes an exceedance caused by a wildfire exceptional event in 2015.

In accordance with the Clean Air Act, states are required to submit their area designation recommendations by October 1, 2016 to the Environmental Protection Agency (EPA) based upon 2013- 2015 data. By October 1, 2017, EPA will finalize the designations based upon 2014-2016 data. For this reason, EPA encourages states to review and consider preliminary 2016 air quality data in their designation recommendations. This is stated on page 4 of the EPA memorandum, Area Designations for the 2015 Ozone National Ambient Air Quality Standards dated February 25, 2016.

If the Maricopa eight-hour ozone nonattainment area is expanded as ADEQ is proposing, there will be tighter controls on business and industry in the new area and transportation conformity requirements will apply. These requirements could have a negative impact on economic development in Pinal County.

Again, the Sun Corridor MPO is requesting that the Maricopa ozone boundary not be expanded at this time, since the Queen Valley and Tonto National Monument monitors only slightly exceed the standard and there is a downward trend at the monitors. Monitor data from the 2016 ozone season should be evaluated first to determine if the monitors have met the standard or if it is necessary to revise the boundary recommendation.

We look forward to partnering and working cooperatively with the ADEQ in our continuing efforts to improve air quality. If you have any questions, please do not hesitate to contact me at (520) 705-5143.

Sincerely,

Irene Higgs

Irene Higgs
Executive Director

Cc: Dennis Smith, Maricopa Association of Governments
Greg Stanley, Pinal County
Ken Hall, Central Arizona governments

359516

CYMPO
Central Yavapai Metropolitan Planning Organization

Central Yavapai Metropolitan Planning Organization

1971 Commerce Center Circle, Ste. E
Prescott, AZ 86301
Phone: 928-442-5730
Fax: 928-442-5736
www.cympo.org

June 20, 2016

Mr. Misael Cabrera, Director
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, Arizona 85007

Dear Mr. Cabrera:

The Central Yavapai Metropolitan Planning Organization (CYMPO) has appreciated the opportunity to participate in the Arizona Department of Environmental Quality (ADEQ) stakeholder meetings on the 2015 Ozone Standard Boundary Designations. On June 15, 2016, the CYMPO Executive Board took action to approve sending a letter to ADEQ, and in support of the Maricopa Association of Government's (MAG) request, that the ozone boundaries across the state not be expanded at this time.

In accordance with the Clean Air Act, states are required to submit their area designation recommendations by October 1, 2016 to the Environmental Protection Agency (EPA) based upon 2013- 2015 data. By October 1, 2017, EPA will finalize the designations based upon 2014-2016 data. For this reason, EPA encourages states to review and consider preliminary 2016 air quality data in their designation recommendations. This is stated on page 4 of the EPA memorandum, Area Designations for the 2015 Ozone National Ambient Air Quality Standards dated February 25, 2016.

The specific data previously provided to you by MAG in their letter dated May 3, 2016 shows that the Queen Valley and Tonto National Monument monitors only slightly exceed the standard and there is a downward trend at those monitors. Although the CYMPO region is currently shown to be just beneath the EPA threshold of 0.070 at a level of 0.069, the CYMPO Executive Board believes that the monitor data from the 2016 ozone season should be evaluated across the state first to determine if the monitors have met the standard or if it is necessary to revise the boundary recommendation.

The CYMPO Executive Board agrees with the MAG Regional Council that if the ozone nonattainment area is expanded as ADEQ is proposing, there will be tighter controls on business and industry in those newly designated non-attainment areas. As a result, transportation conformity requirements will also apply in regions of the state where it may not actually be necessary if the most current data is utilized. These requirements could have a negative impact on economic development in the State of Arizona.

In summary, the CYMPO Executive Board is requesting that monitor data from the 2016 ozone season should be evaluated first to determine if the monitors have met the standard or if it is necessary to revise the boundary recommendation.

Sincerely,

Craig L. Brown
CYMPO Board Chairman
Yavapai County Supervisor – District 4

Attachment

AUTHENTICATED
U.S. GOVERNMENT
INFORMATION
GPO

I

114TH CONGRESS
2D SESSION

H. R. 4775

To facilitate efficient State implementation of ground-level ozone standards, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

MARCH 17, 2016

Mr. OLSON (for himself, Mr. FLORES, Mr. SCALISE, Mr. LATTA, Mr. MCCARTHY, and Mr. CUELLAR) introduced the following bill; which was referred to the Committee on Energy and Commerce

---

A BILL

To facilitate efficient State implementation of ground-level ozone standards, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Ozone Standards Implementation Act of 2016".

SEC. 2. FACILITATING STATE IMPLEMENTATION OF EXISTING OZONE STANDARDS.

(a) DESIGNATIONS.—

(1) DESIGNATION SUBMISSION.—Not later than October 26, 2024, notwithstanding the deadline

1 specified in paragraph (1)(A) of section 107(d) of
2 the Clean Air Act (42 U.S.C. 7407(d)), the Gov-
3 ernor of each State shall designate in accordance
4 with such section 107(d) all areas (or portions there-
5 of) of the Governor's State as attainment, nonattain-
6 ment, or unclassifiable with respect to the 2015
7 ozone standards.

8 (2) DESIGNATION PROMULGATION.—Not later
9 than October 26, 2025, notwithstanding the deadline
10 specified in paragraph (1)(B) of section 107(d) of
11 the Clean Air Act (42 U.S.C. 7407(d)), the Adminis-
12 trator shall promulgate final designations under
13 such section 107(d) for all areas in all States with
14 respect to the 2015 ozone standards, including any
15 modifications to the designations submitted under
16 paragraph (1).

17 (3) STATE IMPLEMENTATION PLANS.—Not
18 later than October 26, 2026, notwithstanding the
19 deadline specified in section 110(a)(1) of the Clean
20 Air Act (42 U.S.C. 7410(a)(1)), each State shall
21 submit the plan required by such section 110(a)(1)
22 for the 2015 ozone standards.

23 (b) CERTAIN PRECONSTRUCTION PERMITS.—

1 (1) IN GENERAL.—The 2015 ozone standards
2 shall not apply to the review and disposition of a
3 preconstruction permit application if—
4 (A) the Administrator or the State, local,
5 or tribal permitting authority, as applicable, de-
6 termines the application to be complete on or
7 before the date of promulgation of the final des-
8 ignation of the area involved under subsection
9 (a)(2); or
10 (B) the Administrator or the State, local,
11 or tribal permitting authority, as applicable,
12 publishes a public notice of a preliminary deter-
13 mination or draft permit for the application be-
14 fore the date that is 60 days after the date of
15 promulgation of the final designation of the
16 area involved under subsection (a)(2).
17 (2) RULES OF CONSTRUCTION.—Nothing in
18 this section shall be construed to—
19 (A) eliminate the obligation of a
20 preconstruction permit applicant to install best
21 available control technology and lowest achiev-
22 able emission rate technology, as applicable; or
23 (B) limit the authority of a State, local, or
24 tribal permitting authority to impose more
25 stringent emissions requirements pursuant to

1 State, local, or tribal law than national ambient
2 air quality standards.

3 **SEC. 3. FACILITATING STATE IMPLEMENTATION OF NA-**
4 **TIONAL AMBIENT AIR QUALITY STANDARDS.**

5 (a) TIMELINE FOR REVIEW OF NATIONAL AMBIENT
6 AIR QUALITY STANDARDS.—

7 (1) 10-YEAR CYCLE FOR ALL CRITERIA AIR
8 POLLUTANTS.—Paragraphs (1) and (2)(B) of sec-
9 tion 109(d) of the Clean Air Act (42 U.S.C.
10 7409(d)) are amended by striking "five-year inter-
11 vals" each place it appears and inserting "10-year
12 intervals".

13 (2) CYCLE FOR NEXT REVIEW OF OZONE CRI-
14 TERIA AND STANDARDS.—Notwithstanding section
15 109(d) of the Clean Air Act (42 U.S.C. 7409(d)),
16 the Administrator shall not—

17 (A) complete, before October 26, 2025, any
18 review of the criteria for ozone published under
19 section 108 of such Act (42 U.S.C. 7408) or
20 the national ambient air quality standard for
21 ozone promulgated under section 109 of such
22 Act (42 U.S.C. 7409); or

23 (B) propose, before such date, any revi-
24 sions to such criteria or standard.

1 (b) CONSIDERATION OF TECHNOLOGICAL FEASI-
2 BILITY.—Section 109(b)(1) of the Clean Air Act (42
3 U.S.C. 7409(b)(1)) is amended by inserting after the first
4 sentence the following: "If the Administrator, in consulta-
5 tion with the independent scientific review committee ap-
6 pointed under subsection (d), finds that a range of levels
7 of air quality for an air pollutant are requisite to protect
8 public health with an adequate margin of safety, as de-
9 scribed in the preceding sentence, the Administrator may
10 consider, as a secondary consideration, likely technological
11 feasibility in establishing and revising the national pri-
12 mary ambient air quality standard for such pollutant.".
13 (c) CONSIDERATION OF ADVERSE PUBLIC HEALTH,
14 WELFARE, SOCIAL, ECONOMIC, OR ENERGY EFFECTS.—
15 Section 109(d)(2) of the Clean Air Act (42 U.S.C.
16 7409(d)(2)) is amended by adding at the end the fol-
17 lowing:
18 "(D) Prior to establishing or revising a national am-
19 bient air quality standard, the Administrator shall re-
20 quest, and such committee shall provide, advice under sub-
21 paragraph (C)(iv) regarding any adverse public health,
22 welfare, social, economic, or energy effects which may re-
23 sult from various strategies for attainment and mainte-
24 nance of such national ambient air quality standard.".

1 (d) TIMELY ISSUANCE OF IMPLEMENTING REGULA-
2 TIONS AND GUIDANCE.—Section 109 of the Clean Air Act
3 (42 U.S.C. 7409) is amended by adding at the end the
4 following:
5 "(e) TIMELY ISSUANCE OF IMPLEMENTING REGULA-
6 TIONS AND GUIDANCE.—
7 "(1) IN GENERAL.—In publishing any final rule
8 establishing or revising a national ambient air qual-
9 ity standard, the Administrator shall, as the Admin-
10 istrator determines necessary to assist States, per-
11 mitting authorities, and permit applicants, concur-
12 rently publish regulations and guidance for imple-
13 menting the standard, including information relating
14 to submission and consideration of a preconstruction
15 permit application under the new or revised stand-
16 ard.
17 "(2) APPLICABILITY OF STANDARD TO
18 PRECONSTRUCTION PERMITTING.—If the Adminis-
19 trator fails to publish final regulations and guidance
20 that include information relating to submission and
21 consideration of a preconstruction permit application
22 under a new or revised national ambient air quality
23 standard concurrently with such standard, then such
24 standard shall not apply to the review and disposi-
25 tion of a preconstruction permit application until the

1 Administrator has published such final regulations
2 and guidance.
3 "(3) RULES OF CONSTRUCTION.—
4 "(A) Nothing in this subsection shall be
5 construed to preclude the Administrator from
6 issuing regulations and guidance to assist
7 States, permitting authorities, and permit appli-
8 cants in implementing a national ambient air
9 quality standard subsequent to publishing regu-
10 lations and guidance for such standard under
11 paragraph (1).
12 "(B) Nothing in this subsection shall be
13 construed to eliminate the obligation of a
14 preconstruction permit applicant to install best
15 available control technology and lowest achiev-
16 able emission rate technology, as applicable.
17 "(C) Nothing in this subsection shall be
18 construed to limit the authority of a State,
19 local, or tribal permitting authority to impose
20 more stringent emissions requirements pursu-
21 ant to State, local, or tribal law than national
22 ambient air quality standards.
23 "(4) DEFINITIONS.—In this subsection:

1 "(A) The term 'best available control tech-
2 nology' has the meaning given to that term in
3 section 169(3).
4 "(B) The term 'lowest achievable emission
5 rate' has the meaning given to that term in sec-
6 tion 171(3).
7 "(C) The term 'preconstruction permit'—
8 "(i) means a permit that is required
9 under part C or D for the construction or
10 modification of a major emitting facility or
11 major stationary source; and
12 "(ii) includes any such permit issued
13 by the Environmental Protection Agency
14 or a State, local, or tribal permitting au-
15 thority.".
16 (e) CONTINGENCY MEASURES FOR EXTREME OZONE
17 NONATTAINMENT AREAS.—Section 172(c)(9) of the Clean
18 Air Act (42 U.S.C. 7502(c)(9)) is amended by adding at
19 the end the following: "Notwithstanding the preceding
20 sentences and any other provision of this Act, such meas-
21 ures shall not be required for any nonattainment area for
22 ozone classified as an Extreme Area.".
23 (f) PLAN SUBMISSIONS AND REQUIREMENTS FOR
24 OZONE NONATTAINMENT AREAS.—Section 182 of the
25 Clean Air Act (42 U.S.C. 7511a) is amended—

1 (1) in subsection (b)(1)(A)(ii)(III), by inserting
2 "and economic feasibility" after "technological
3 achievability";
4 (2) in subsection (c)(2)(B)(ii), by inserting
5 "and economic feasibility" after "technological
6 achievability"; and
7 (3) in paragraph (5) of subsection (e), by strik-
8 ing ", if the State demonstrates to the satisfaction
9 of the Administrator that—" and all that follows
10 through the end of the paragraph and inserting a
11 period.
12 (g) PLAN REVISIONS FOR MILESTONES FOR PARTIC-
13 ULATE MATTER NONATTAINMENT AREAS.—Section
14 189(c)(1) of the Clean Air Act (42 U.S.C. 7513a(c)(1))
15 is amended by inserting ", which take into account techno-
16 logical achievability and economic feasibility," before "and
17 which demonstrate reasonable further progress".
18 (h) EXCEPTIONAL EVENTS.—Section 319(b)(1)(B)
19 of the Clean Air Act (42 U.S.C. 7619(b)(1)(B)) is amend-
20 ed—
21 (1) in clause (i)—
22 (A) by striking "(i) stagnation of air
23 masses or" and inserting "(i)(I) ordinarily oc-
24 curring stagnation of air masses or (II)"; and
25 (B) by inserting "or" after the semicolon;

1 (2) by striking clause (ii); and

2 (3) by redesignating clause (iii) as clause (ii).

3 (i) REPORT ON EMISSIONS EMANATING FROM OUT-
4 SIDE THE UNITED STATES.—Not later than 24 months
5 after the date of enactment of this Act, the Administrator,
6 in consultation with States, shall submit to the Congress
7 a report on—

8 (1) the extent to which foreign sources of air
9 pollution, including emissions from sources located
10 outside North America, impact—

11 (A) designations of areas (or portions
12 thereof) as nonattainment, attainment, or
13 unclassifiable under section 107(d) of the Clean
14 Air Act (42 U.S.C. 7407(d)); and

15 (B) attainment and maintenance of na-
16 tional ambient air quality standards;

17 (2) the Environmental Protection Agency's pro-
18 cedures and timelines for disposing of petitions sub-
19 mitted pursuant to section 179B(b) of the Clean Air
20 Act (42 U.S.C. 7509a(b));

21 (3) the total number of petitions received by the
22 Agency pursuant to such section 179B(b), and for
23 each such petition the date initially submitted and
24 the date of final disposition by the Agency; and

1 (4) whether the Administrator recommends any
2 statutory changes to facilitate the more efficient re-
3 view and disposition of petitions submitted pursuant
4 to such section 179B(b).

5 **SEC. 4. DEFINITIONS.**

6 In this Act:

7 (1) ADMINISTRATOR.—The term "Adminis-
8 trator" means the Administrator of the Environ-
9 mental Protection Agency.

10 (2) BEST AVAILABLE CONTROL TECH-
11 NOLOGY.—The term "best available control tech-
12 nology" has the meaning given to that term in sec-
13 tion 169(3) of the Clean Air Act (42 U.S.C.
14 7479(3)).

15 (3) LOWEST ACHIEVABLE EMISSION RATE.—
16 The term "lowest achievable emission rate" has the
17 meaning given to that term in section 171(3) of the
18 Clean Air Act (42 U.S.C. 7501(3)).

19 (4) NATIONAL AMBIENT AIR QUALITY STAND-
20 ARD.—The term "national ambient air quality
21 standard" means a national ambient air quality
22 standard promulgated under section 109 of the
23 Clean Air Act (42 U.S.C. 7409).

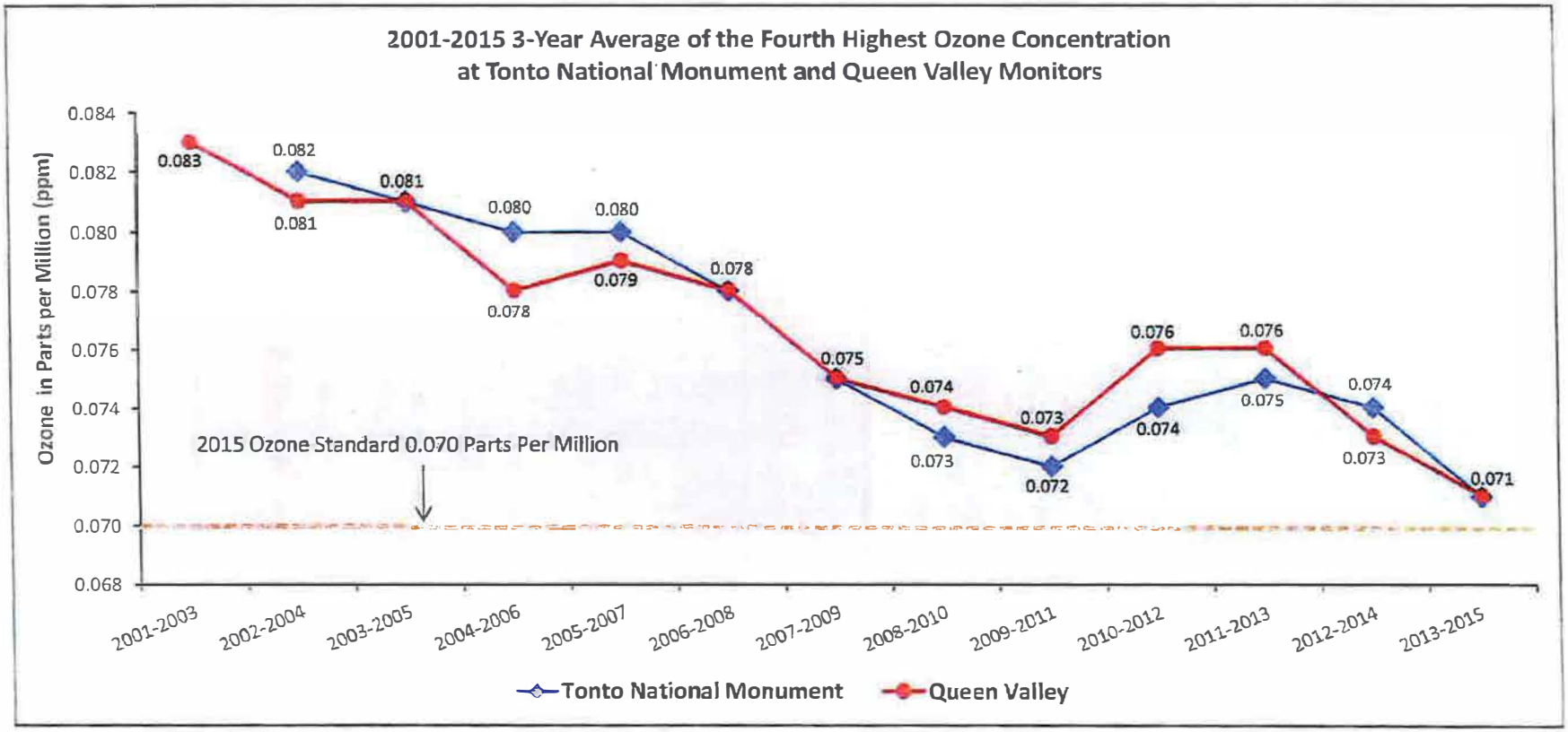
24 (5) PRECONSTRUCTION PERMIT.—The term
25 "preconstruction permit"—

1 (A) means a permit that is required under
2 part C or D of title I of the Clean Air Act (42
3 U.S.C. 7470 et seq.) for the construction or
4 modification of a major emitting facility or
5 major stationary source; and
6 (B) includes any such permit issued by the
7 Environmental Protection Agency or a State,
8 local, or tribal permitting authority.
9 (6) 2015 OZONE STANDARDS.—The term "2015
10 ozone standards" means the national ambient air
11 quality standards for ozone published in the Federal
12 Register on October 26, 2015 (80 Fed. Reg. 65292).

O

Monitor	2001-2015 FOURTH HIGHEST OZONE CONCENTRATIONS (parts per million)														
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Tonto National Monument		0.087	0.084	0.077	0.084	0.081	0.076	0.078	0.072	0.070	0.076	0.078	0.072	0.072	0.070
Queen Valley	0.079	0.083	0.087	0.073	0.084	0.079	0.076	0.080	0.070	0.072	0.078	0.078	0.073	0.068	0.074

Monitor	2001-2015 3-YEAR AVERAGE OF THE FOURTH HIGHEST OZONE CONCENTRATIONS (parts per million)												
	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009	2008-2010	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015
Tonto National Monument		0.082	0.081	0.080	0.080	0.078	0.075	0.073	0.072	0.074	0.075	0.074	0.071
Queen Valley	0.083	0.081	0.081	0.078	0.079	0.078	0.075	0.074	0.073	0.076	0.076	0.073	0.071



Data Source: U.S. EPA Air Data (http://www3.epa.gov/airdata) accessed on April 26, 2016.

Note: The June 20, 2015 exceedance of 0.079 ppm at the Tonto monitor is excluded from the data as an exceptional event caused by the Lake Fire in San Bernardino County, California

359690

ARIZONA CHAMBER
OF COMMERCE & INDUSTRY

July 1, 2016

VIA Haggerty.Heidi@azdeq.gov

Ms. Heidi Haggerty
Air Quality Division, State Implementation Plan Section
Arizona Department of Environmental Quality
1110 W. Washington St.
Phoenix, AZ 85007

Re: 2015 Ozone NAAQS Boundary Recommendation Draft Report

The Arizona Chamber of Commerce and Industry ("Arizona Chamber") appreciates the opportunity to comment on the Arizona Department of Environmental Quality ("ADEQ") 2015 Ozone NAAQS Boundary Recommendation Draft Report ("2015 Ozone Boundary Draft Report").

Like ADEQ, the Arizona Chamber continues to oppose the EPA's Final Rule revising to 70 parts per billion ("70 ppb") the National Ambient Air Quality Standard ("NAAQS") for ozone. We are grateful to Arizona Attorney General Mark Brnovich for immediately filing a lawsuit in October 2015 challenging the validity of the standard. We recognize that while this lawsuit is currently moving forward, ADEQ must still proceed in accordance with the implementation timeframes set forth under the Clean Air Act ("CAA") in order to prevent arbitrary implementation of nonattainment designations and boundaries by the EPA. Therefore, while maintaining our objections to the 70 ppb standard, we are supportive of nonattainment boundaries that are established reasonably and as compactly as possible to achieve the regulatory requirements, as supported by available data. Upon review and apt consideration of the submitted public comments, we encourage the State to re-evaluate its recommendations to ensure the nonattainment designations appropriately reflect the most succinct boundaries.

Furthermore, we appreciate that ADEQ hosted multiple stakeholder meetings for the general public. We are especially grateful that ADEQ held an additional meeting in Yuma, thereby allowing our Yuma members the ability to participate in the development of these designation recommendations. ADEQ continues to be accessible and responsive to all Arizonans, and while it may not be apparent to those who did not participate in the public stakeholder meetings, the 2015 Ozone Boundary Draft Report truly reflects ADEQ's consideration of the discussions that occurred at those meetings.

For the aforementioned reasons, even though the Arizona Chamber continues to oppose the EPA's 70 ppb standard, we support reasonable boundary designations for Arizona.

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Glenn Hamer
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Arizona Chamber of Commerce and Industry

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KELLY J. BARR, ESQ
Senior Director
Environmental Management
and Chief Sustainability and
Compliance Executive

Submitted via hand delivery

July 1, 2016

Misael Cabrera, Director
Arizona Department of Environmental Quality
1110 W. Washington St.
Phoenix, AZ 85007

RE: SRP Comments on ADEQ's 2015 Ozone NAAQS Boundary Recommendation Draft Report

Dear Mr. Cabrera:

Salt River Project Agricultural Improvement and Power District ("SRP") appreciates the opportunity to comment on the Arizona Department of Environmental Quality's ("ADEQ") 2015 Ozone National Ambient Air Quality Standards ("NAAQS") Boundary Recommendation Draft Report ("Draft Report").

SRP is a political subdivision of the State of Arizona that provides retail electric services to more than 1 million residential, commercial, industrial, agricultural, and mining customers in Arizona. As a vertically integrated utility, SRP provides generation, transmission and distribution services, as well as metering and billing services. With the majority of SRP's customers and business operations located in, or nearby, areas impacted by the boundary recommendations, particularly the recommendations for the proposed Maricopa-Pinal Nonattainment Area boundary, SRP has a clear and significant interest in this pending action. As a result, SRP provides the following comments on the Draft Report.

I. Background

On February 25, 2016, the U.S. Environmental Protection Agency ("EPA") issued guidance on the area designation process for the 2015 ozone NAAQS ("EPA Guidance")[1]. The EPA Guidance details the factors EPA intends to evaluate in making final nonattainment area boundary decisions for the 2015 ozone NAAQS and recommends that states consider these same factors

[1] *Area Designations for the 2015 Ozone National Ambient Air Quality Standards*, Memorandum from Janet G. McCabe, Acting Assistant Administrator, to Regional Administrators, Regions 1-10 (February 25, 2016).

in making their recommendations to the EPA. The five factors listed in the EPA Guidance include:

1. air quality data,
2. emissions and emissions-related data,
3. meteorological data,
4. geography/topography, and
5. jurisdictional boundaries.

In the Draft Report, ADEQ applies the EPA's five factors in developing their weight of evidence analysis and their resulting recommended nonattainment areas. Recognizing that EPA will use 2014-2016 data to support final designations for the 2015 standard, ADEQ identifies four separate nonattainment boundary options for the Phoenix area, and recommends selection of the final boundaries be delayed until 2016 data is available for area monitors. More specifically, ADEQ recommends that final boundaries be contingent on the future design values for two monitors that are in close proximity to, but are currently located outside of, the area encompassed by the 2008 Phoenix-Mesa Ozone Nonattainment Area Boundary. These monitors are the Tonto National Monument ozone monitor located in Gila County and the Queen Valley ozone monitor located in Pinal County.

Available 2013-2015 design values indicate these two monitors exceed the 2015 ozone NAAQS. For the Tonto National Monument monitor, ADEQ concludes that the existing Maricopa County sources are the primary contributor to the ozone exceedances at the monitor. As a result, if future design values indicate this monitor exceeds the 2015 ozone NAAQS, ADEQ recommends extending the existing 2008 Phoenix-Mesa Ozone Nonattainment Area boundary to include a small portion of Gila County to capture the Tonto National Monument monitor. For the Queen Valley monitor, if future design values indicate this monitor exceeds the 2015 ozone NAAQS, ADEQ concludes that the existing 2008 Phoenix-Mesa Ozone Nonattainment Area boundary be expanded to include both the Queen Valley monitor and San Tan Valley.

SRP's comments below focus on ADEQ's analysis and recommendations related to the draft boundary designations that are contingent on the future design values at the Queen Valley Monitor.

II. ADEQ's Proposed Boundary Expansion into the San Tan Valley Extends Too Far

SRP has reviewed ADEQ's five-factor analysis and understands why consideration was given to San Tan Valley as a contributor to the ozone exceedances at the Queen Valley monitor given its location between the existing Phoenix-Mesa Nonattainment Area boundary and the Queen Valley monitor. However, there would be limited additional environmental benefit to including San Tan Valley in an ozone nonattainment area. San Tan Valley is a residential area where the

primary source of ozone precursors is local vehicle traffic. There are no industrial sources that emit more than 1 ton per year of nitrogen oxides ("NOx") or volatile organic compounds ("VOC"). As a result, there would be very few emission sources, if any, that local regulatory agencies would be able to further control. The Phoenix metropolitan area, which includes San Tan Valley, already has a number of programs in place to minimize ozone forming pollution from mobile sources. These programs include a vehicle inspection and maintenance program and a cleaner burning gasoline program that establishes requirements for summertime and wintertime gasoline blends and requires gasoline fuel to meet the specifications for California Air Resources Board Phase 2 reformulated fuel. Other standards for mobile sources, including emissions and fuel economy standards, are all regulated at the federal level and are independent from nonattainment designations. Further, a significant proportion of the ozone measured in the area can be attributed to background ozone.[2]

Given the limited benefits that would be realized by including the San Tan Valley in the nonattainment area, SRP encourages ADEQ to take a more detailed look at the boundary recommendations involving this area. SRP review of data included in ADEQ's Draft Report and the five factor analysis suggested in the EPA Guidance, supports establishment of the nonattainment boundary that more closely aligns with the boundaries of the San Tan Valley census designated place ("CDP").

ADEQ's proposed expansion of the nonattainment area boundary in Pinal County extends beyond the San Tan Valley CDP boundaries by approximately 4 miles to the west and 2 miles to the east. For the purpose of these comments, the section of the recommended nonattainment area expansion encompassed by the 4-mile-wide area to the west of the San Tan Valley CDP is referred to as "Area A" and the section of the recommended nonattainment area expansion encompassed by the 2-mile-wide area to the east of the San Tan Valley CDP is referred to as "Area B" (See Figure 1).[3] The additional VOC or NOx emissions that would be captured by extending the nonattainment boundary beyond the San Tan Valley CDP is insignificant.

As identified in the Draft Report, there is not a single industrial source located in either Area A or Area B that emit more than 1 ton per year of NO_x or VOC emissions. While 1 ton per year is the bottom threshold ADEQ used for including Pinal County point sources in the evaluation[4], there are very few industrial sources in these areas that emit any quantity of NOx or VOC

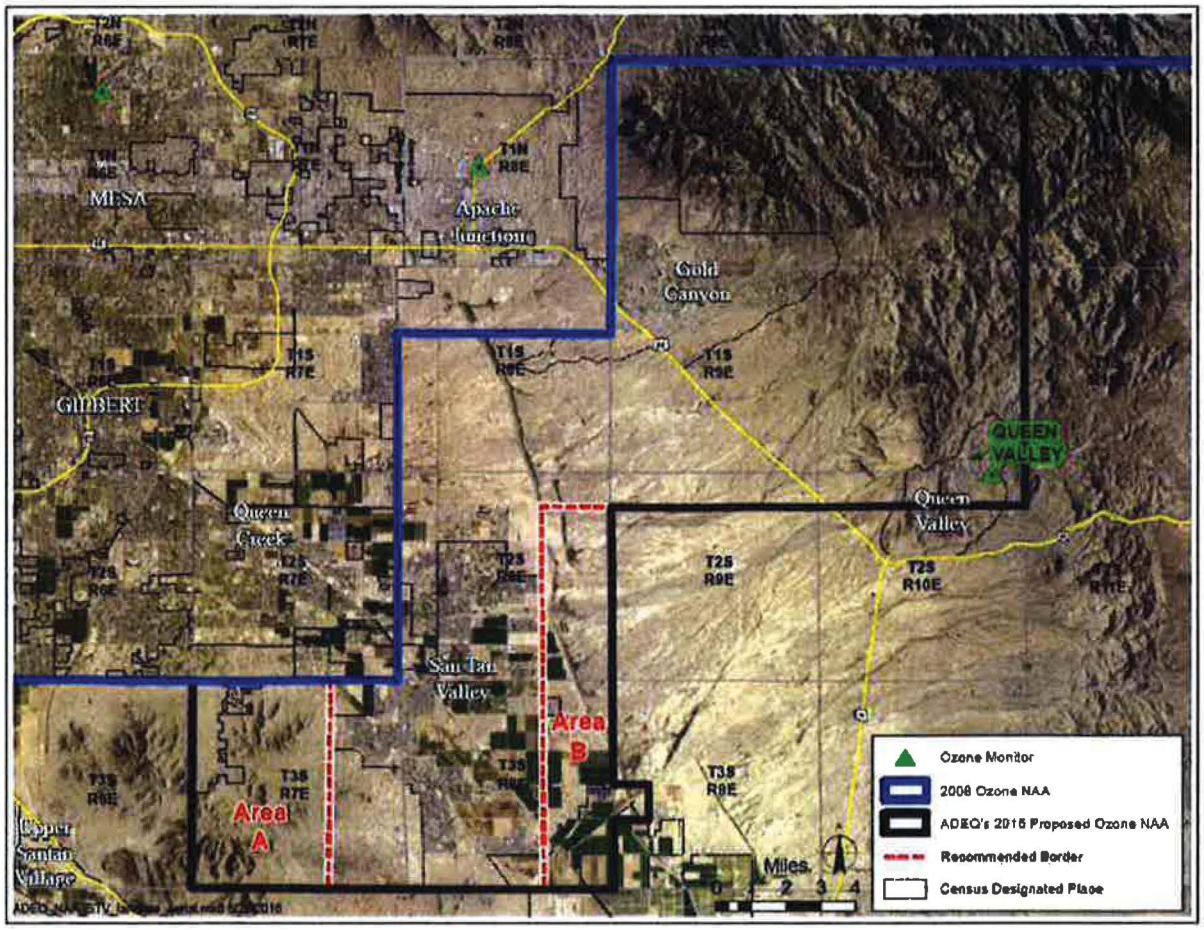
[2] The largest contributor to the ozone exceedances is background ozone. Per EPA's December 30, 2015, whitepaper on background ozone, only 25% of the ozone concentrations in Pinal County are attributed to in-state manmade sources, based on 2017 project design values. https://www.epa.gov/sites/production/files/2016-03/documents/whitepaper-bgo3-final.pdf

[3] References to Area A and Area B are for purposes of these comments only and are unrelated to Area A and Area B as defined under Arizona Revised Statute 49-541.

[4] ADEQ's analysis of point sources in Pinal County is based on permitted sources and Pinal County permitting threshold is 1 ton per year.

emissions. As seen in the satellite imagery in Figure 1, the majority of the land in both Area A and Area B is either undeveloped or is being used for agricultural purposes.

Figure 1. Proposed 2015 Pinal County Ozone Nonattainment Boundary Satellite Image

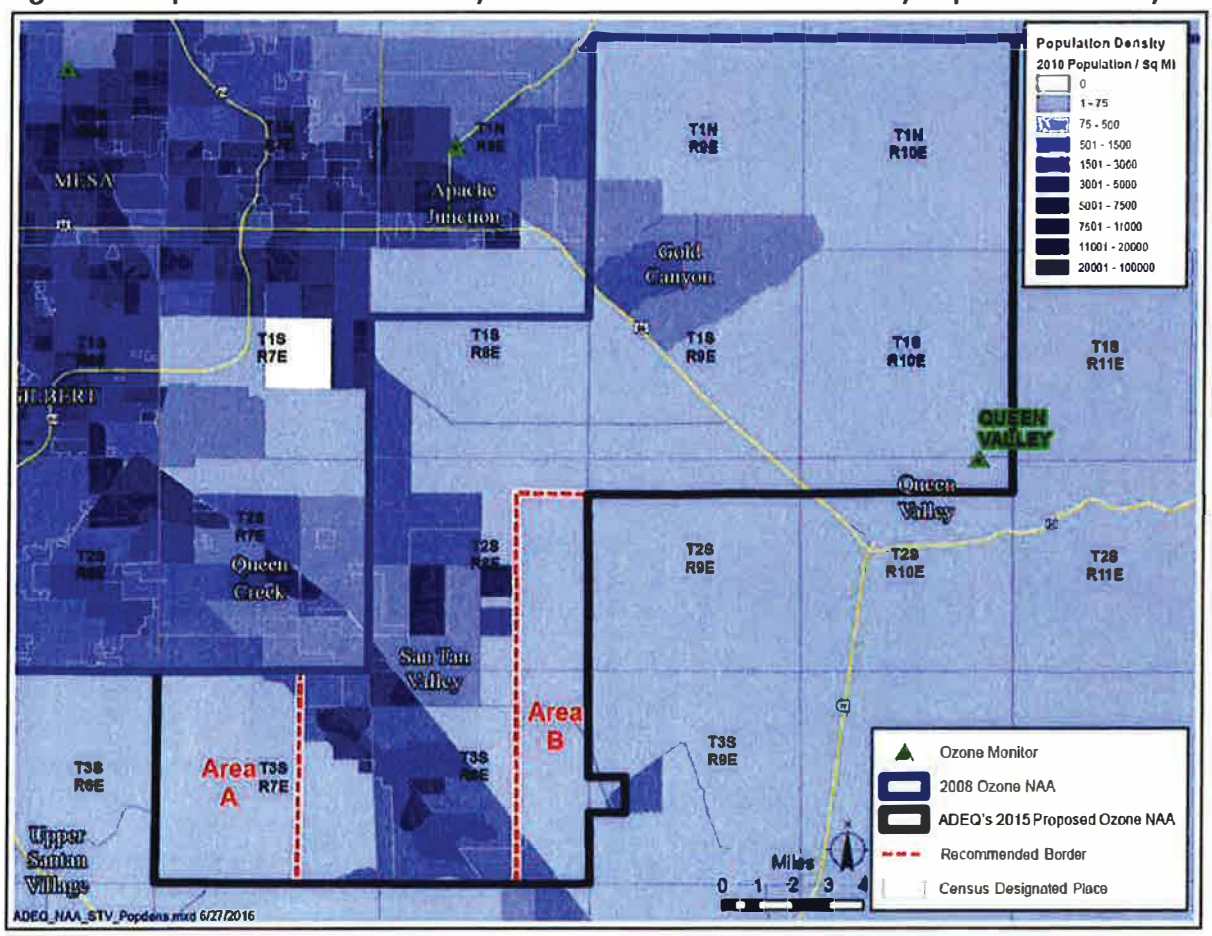


Similarly, the emissions-related data for Area A and Area B, primarily population and vehicle traffic, demonstrates an absence of any significant NOx and VOC emissions sources that would be contributing to ozone exceedances at the Queen Valley monitor. As previously stated, the land in both Area A and Area B is largely either undeveloped or is being used for agricultural purposes. This is consistent with the 2010 census-based population density for the areas (see Figure 2). Based on 2010 census data, the total population for Area A and Area B is approximately 2,300 and 730, respectively[5]. This population is trivial compared to the 2010 San Tan Valley CDP population of 81,321 or the 2010 population of the Phoenix-Scottsdale-Mesa

[5] Population values based on 2010 census tract data. Census tracts due not align exactly with the boundaries of Area A and Area B. Therefore, values are estimated by summing the census tracts where 30% or more of the census tract area falls within the Area A and Area B boundaries.

Core Based Statistical Area (CBSA) of 4,192,887. Excluding the population in both Area A and Area B from ADEQ's recommended nonattainment boundary would have no impact on the percentage of the population captured – either option would contain approximately 94% of the Phoenix-Scottsdale-Mesa CBSA population.

Figure 2: Proposed 2015 Pinal County Ozone Nonattainment Boundary Population Density

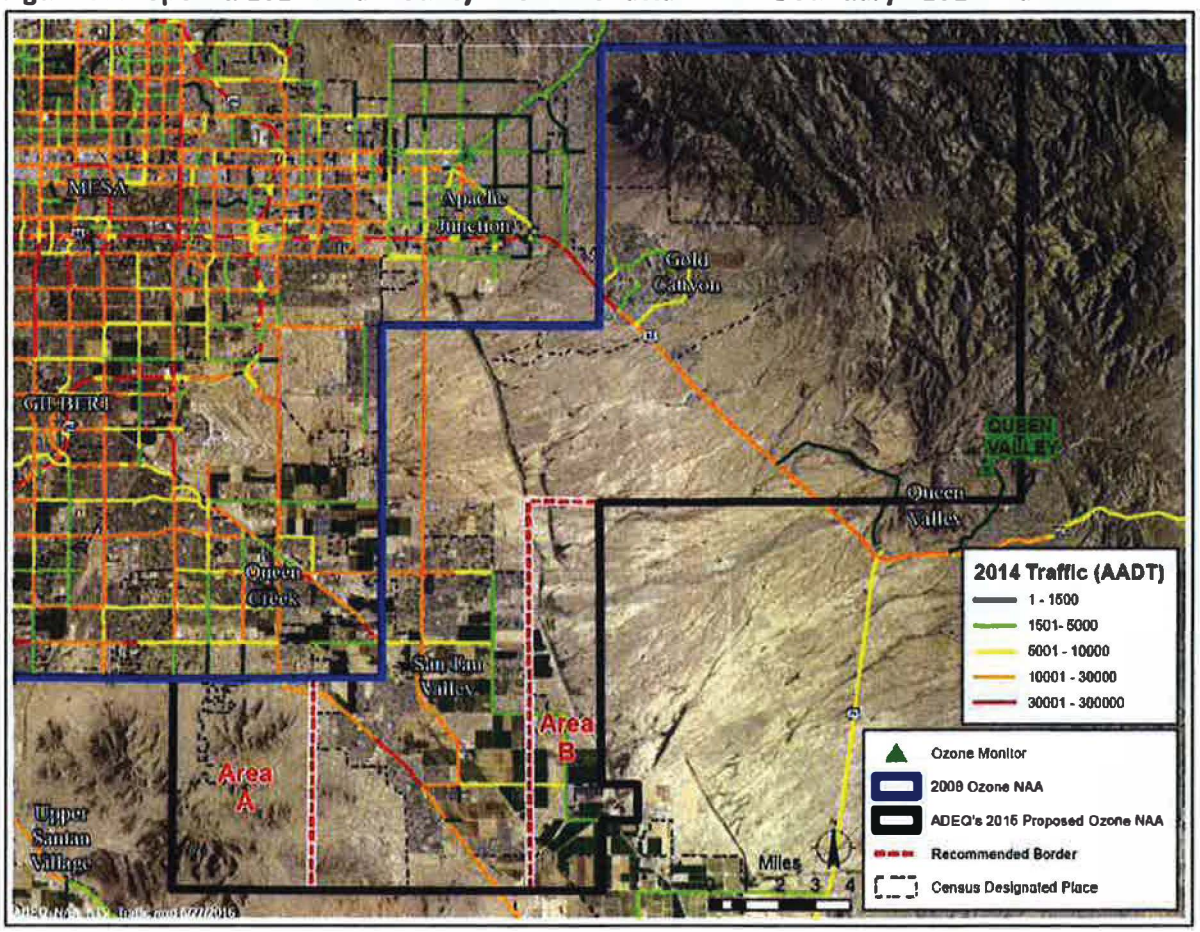


The additional vehicle traffic that would be included in the nonattainment area by capturing Area A and Area B is likewise insignificant (see Figure 3). Based on the graphical representation of vehicle traffic contained in the Draft Report, and using the upper ends of the ranges provided, it is conservatively estimated that 30,000 annual vehicle miles traveled (VMT) is captured in Area A and 35,000 annual VMT is captured in Area B[6]. Compared to the

[6] VMT value for Area A is based on 30,000 average annual daily traffic (AADT) for a 1 mile long road segment. VMT value for Area B is based on 10,000 AADT for a 1 mile long road segment and 5,000 AADT for a 5 mile long road segment.

31,334,133,501 total annual VMT captured in ADEQ's recommended 2015 ozone nonattainment boundary, the VMT included in Area A and Area B is 0.0002% of the total VMT captured. Excluding the VMT in both Area A and Area B from ADEQ's recommended nonattainment boundary results again has no impact on the percentage of VMT captured – either options would capture 89% of the annual VMT in entire Phoenix-Scottsdale-Mesa CBSA.

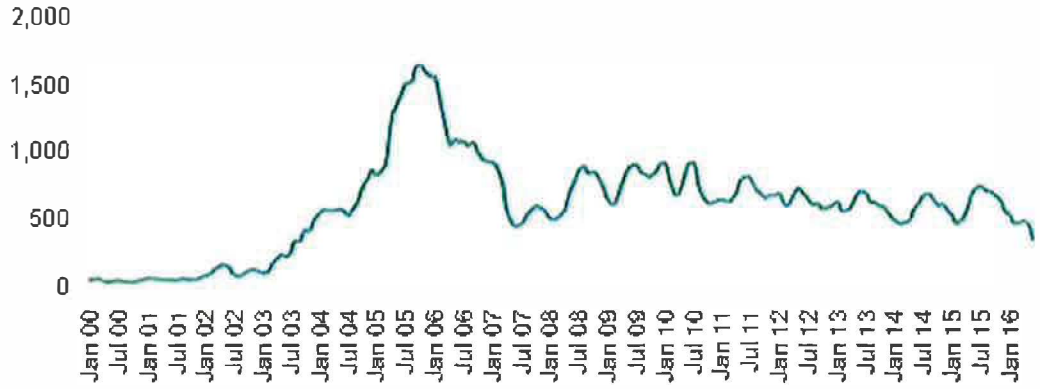
Figure 3. Proposed 2015 Pinal County Ozone Nonattainment Boundary - 2014 Traffic



The EPA Guidance recommends that states can review trends in population growth and patterns of residential and commercial development when evaluating the location of sources that may contribute to ozone concentrations in a given nonattainment area. When evaluating these trends, the data similarly demonstrates that it is not appropriate to include Area A and Area B in the recommended nonattainment area because there is little to no population growth or patterns of residential and commercial development in Area A or B.

In the Draft Report, ADEQ evaluates population growth for the affected areas but only does so using trends based on 2000 and 2010 census data. However, the population growth identified by the census data is not representative of current trends. Between 2000 and 2006, San Tan Valley, experienced exponential population growth due to an overall housing boom in the Phoenix metropolitan area. The population growth for San Tan Valley identified in the Draft Report (i.e., going from a non-CDP to a CDP with a population of 81,321) likely occurred in its majority during this period. In 2007, the Phoenix area housing market crashed and population growth in San Tan Valley slowed significantly. Since 2007, home sales have stabilized with no significant new growth occurring (see Figure 4). Currently, there are still several housing developments in San Tan Valley that remain unfinished since 2007.

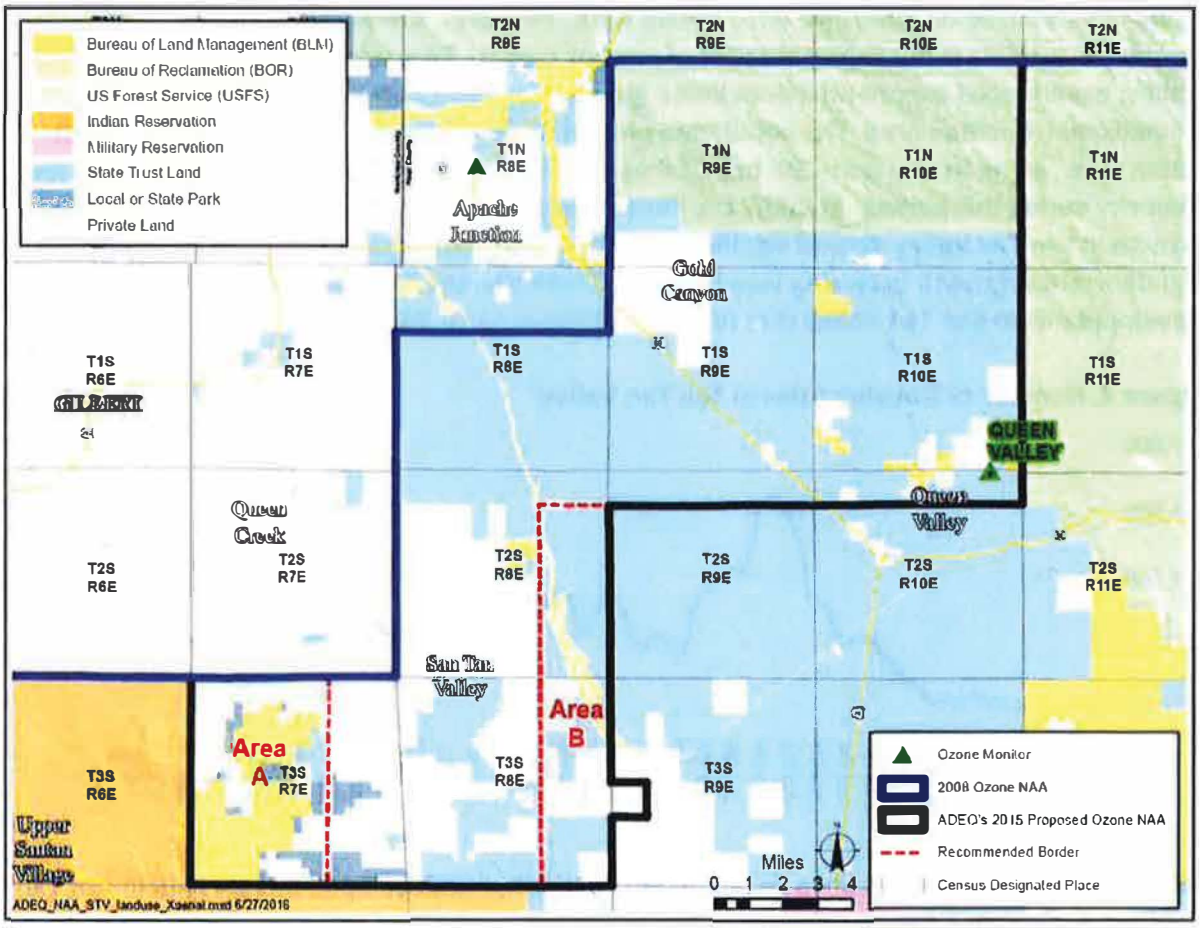
Figure 4. Number of Housing Sales in San Tan Valley[7]



Based on the unfinished housing developments and other undeveloped private land in San Tan Valley, it is expected that additional population growth in the area will likely occur within the boundaries of the San Tan Valley CDP. Outside of the boundaries of the San Tan Valley CDP, the land encompassed in Area A and Area B is largely either State Trust Land or land owned by the Bureau of Land Management or the Bureau of Reclamation which cannot be developed for private use under its current classification (See Figure 5).

[7] http://www.trulia.com/real_estate/San_Tan_Valley-Arizona/market-trends/

Figure 5. Proposed 2015 Ozone Nonattainment Boundary Land Use



III. ADEQ Appropriately Excludes Other Neighboring Towns from the Recommended Nonattainment Area Boundary

In ADEQ's proposed Maricopa-Pinal nonattainment area boundary, ADEQ excludes other neighboring Pinal County towns beyond San Tan Valley. SRP supports ADEQ's conclusion that these neighboring towns are not contributing to the ozone exceedances at the Queen Valley monitor. The closest adjacent towns, Coolidge and Florence, have very small populations. As indicated in the Draft Report, the 2010 population for Coolidge and Florence are 11,825 and 25,536, respectively. And, of the 25,536 people in Florence, 9,349 of them are prisoners[8] that do not drive and are a minimal source of local emissions. Additionally, as included in the Draft

[8] Based on 2014 Arizona Department of Corrections data for Eyman and Florence prison complexes: https://corrections.az.gov/sites/default/files/DAILY_COUNT/Dec2014/12082014_daily_count.pdf

Report, the wind patterns on days of historic exceedances at the Queen Valley monitor primarily come from the west and do not pass through Coolidge or Florence.

IV. Revisions to ADEQ's Recommended Maricopa-Pinal Nonattainment Area

Based on the comments contained herein, SRP encourages ADEQ to revise the contingent nonattainment boundary recommendations related to the Queen Valley monitor to exclude Area A and Area B and align more closely with the San Tan Valley CDP. Specifically, SRP recommends that the ADEQ make the following revisions to the Pinal County section of the proposed nonattainment area boundary:

- T3S, R7E: Exclude Sections 3-10, 15-22, and 27-34
- T2S, R8E: Exclude Sections 11-14, 23-26, and 35-36
- T3S, R8E: Exclude Sections 1-2, 11-14, 23-26, and 35-36
- T3S, R9E: Exclude Section 19

If you have questions or need additional information regarding these comments, please contact me at kelly.barr@srpnet.com or (602) 236-5262.

Sincerely,

Kelly J. Barr

cc: Tim Franquist, ADEQ (via email)
Marina Mejia, ADEQ (via email)
Heidi Haggerty, ADEQ (via email)
File: ORG 2-1-2

359665

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Kelly Norton, AMA President

July 1, 2016

VIA Haggerty.Heidi@azdeq.gov

Ms. Heidi Haggerty
Air Quality Division, State Implementation Plan Section
Arizona Department of Environmental Quality
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Re: 2015 Ozone NAAQS Boundary Recommendation Draft Report

The Arizona Mining Association ("AMA") respectfully submits the following comments to the Arizona Department of Environmental Quality ("ADEQ") in regard to its *2015 Ozone NAAQS Boundary Recommendation Draft Report* ("2015 Draft Report").

The AMA is a non-profit corporation comprised of entities engaged in mining and mineral processing in Arizona. Its members include (but are not limited to): ASARCO LLC, BHP Copper Inc., Freeport-McMoRan Inc., Capstone – Pinto Valley, KGHM – Carlota Copper Company, Hudbay – Rosemont Project, Resolution Copper Company, Florence Copper, Inc., Energy Fuels, Peabody Energy, and Golden Vertex. The AMA is the unified voice of responsible, sustainable and safe mining in Arizona. We support educational programs that demonstrate the importance and benefits of mining to the economy and the quality of life. Our members benefit from productive relationships and alliances with government, business associations and natural resource industry groups. Through our advocacy, we help Arizona continue to be a premier location for mining investment in the U.S.

The Environmental Protection Agency ("EPA") published on October 26, 2015 its Final Rule revising the ozone standard to a more stringent and unachievable NAAQS of 70 ppb ("2015 Ozone NAAQS"). As such, Section 107(d)(1)(A) of the Clean Air Act ("CAA") mandates the submittal of initial designation recommendations to the EPA by Governor Ducey by October 2016. Thus, the AMA recognizes that this 2015 Draft Report has been prepared in accordance with the CAA, as well as that of A.R.S. 49-405.

The AMA is well aware of the State's conundrum in preparing this 2015 Draft Report. After all, it continues to exploit every venue and opportunity to express to the EPA and the U.S. Congress its legitimate concerns in relation to a more stringent ozone standard. ADEQ has even assisted Senator Jeff Flake on conceptualizing and drafting numerous proactive legislative measures geared towards improving the CAA's functionality. While the AMA appreciates all these efforts, we especially praise ADEQ and the Arizona Attorney General for their swift legal action on October 29, 2015 in response to the EPA's Final Rule. We wholly support the State in its lawsuit challenging the EPA's 2015 Ozone NAAQS.

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Kelly Norton, AMA President

While the AMA shares the State's frustration, we recognize that in order to minimize federal intrusion it is imperative to move forward on this parallel track of complying with the CAA while legally challenging the new standard. Therefore, while the AMA submits the following comments to the 2015 Draft Report, we reiterate our objections to the 2015 Ozone NAAQS as verbally expressed during the stakeholder meetings and public hearings, and submitted in writing to the EPA as identified by docket numbers: EPA-HQ-OAR-2008-0699-1637; EPA-HQ-OAR-2013-0572-0090 & 0174; and EPA-HQ-OAR-2016-0097-0052.

I. Public Participation

We commend ADEQ for its transparent and inclusive process of developing the 2015 ozone boundary recommendations for Arizona. The AMA was in attendance at each of the multiple public stakeholder meetings held by ADEQ; and we appreciate that it encouraged feedback, asked for input and readily answered questions. Upon review of the 2015 Draft Report, it is apparent that the comments expressed during these meetings had been given due consideration as ADEQ prepared the boundary recommendations.

II. Attainment or Unclassifiable Areas Recommendation

The AMA supports the recommendation that most of Arizona be designated attainment/unclassifiable for the 2015 Ozone NAAQS. ADEQ's evaluation of the three most recent consecutive years (2013-2015) of certified air data thoroughly validates this recommendation.

III. Phoenix Nonattainment Area Recommendation

The AMA recognizes that the State must submit initial boundary designations based on its evaluation of the three most recent consecutive years (2013-2015) of certified air data, while the EPA will be basing its final determinations for boundary designations using air data from the 2014-2016 years. Since the Greater Phoenix Area is already in a moderate nonattainment designation for the 2008 ozone standard of 75 ppb, we support ADEQ's decision to generally rely on the 2008 ozone nonattainment area boundary as a basis for its 2015 ozone boundary recommendation.

ADEQ's original proposal for Phoenix Nonattainment Area 2015 ozone boundary expanded the 2008 boundary to include two additional monitors: Gila County's Tonto National Monument ozone monitor and Pinal County's Queen Valley ozone monitor. ADEQ explained that neither of these monitors is currently attaining the new 2015 Ozone NAAQS. However, Maricopa Association of Governments argued that it believes the 2014-2016 air data will reveal that one, the other or both of these monitors will be in attainment; thus encouraged ADEQ to present its recommendations via a "contingent-based" approach.

While the AMA generally supports ADEQ's initial designation recommendations, we propose that it remove the contingent recommendations presented in sections 1.1.1 and 1.1.2.[1] In the time since the 2015 Draft

[1] Arizona Department of Environmental Quality, 2015 Ozone NAAQS Boundary Recommendation Draft Report, pp. 4-6, (2016).

Report was released for public comment, air data at the Pinal County Queen Valley ozone monitor has revealed that it is in violation of the 2014-2016 design value for the 2015 Ozone NAAQS. Therefore, the aforementioned contingent recommendations are no longer viable options.

It deeply concerns the AMA that the Gila County Tonto National Monument ozone monitor, located in the Tonto National Forest and where there has been no growth in the immediate area, is in jeopardy of being in nonattainment. However, ADEQ's analysis of back trajectories for this monitor verify that emissions impacting it are from the Phoenix area; and attributes the exceedances being triggered as a result of the strong winds from the southwest pushing the ozone plume up over the mountains to the east. Therefore, the AMA supports ADEQ's recommendation to include the immediate surrounding area of the Gila County Tonto National Monument ozone monitor.

The AMA recognizes that the San Tan Valley area has experienced the most growth in the Greater Phoenix Area over the past decade, thereby having a significant impact on the Pinal County Queen Valley ozone monitor. Furthermore, as ADEQ points out, this particular monitor is listed as a Photochemical Assessment Monitoring Stations ("PAMS") site in its network monitoring plan as it is "considered to be downwind of the source of maximum precursor emissions in the Phoenix metropolitan area" and is thereby impacted by the emissions activity of the 2008 Ozone Nonattainment Area and San Tan Valley[2]. For these aforementioned reasons, we support ADEQ's boundary recommendations for the inclusion of the area specified around the Pinal County Queen Valley ozone monitor.

IV. Yuma Nonattainment Area Recommendation

Yuma is in an impossibly difficult position in regard to all air regulatory matters. It is a prominent gateway for domestic and international travelers migrating to and from Mexico and the vacation destination hot spots of Southern California. ADEQ notes that "approximately 95.5% of all VOCs in the county are estimated to be from biogenic emissions."[3] There are very few point sources in Yuma County; and, as ADEQ states: "There is relatively little population or industry in the area, and yet concentrations at the monitor are several parts per billion higher than the standard."[4] ADEQ points out that transport and background "clearly affects nonattainment at the Yuma monitor;"[5] and establishes that "Yuma is not an urban area that substantially contributes to its own nonattainment."[6] Therefore, ADEQ's recommendation to limit the boundary designation to the highest populated area, while also including the existing major and possibly impactful point sources, is very reasonable. Furthermore, it argues that establishing a larger nonattainment area "would not protect public health or the environment because there would be minimal benefits from future controls on what few emissions" exist outside the proposed boundary designation.[7] We recognize that the State is forced to present

[2] Id., pp. 75-76.
[3] Id., p. 79.
[4] Id., p. 87.
[5] Id.
[6] Id., p. 95.
[7] Id., p. 96.

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Kelly Norton, AMA President

its initial designation recommendation for the area, thus the AMA supports ADEQ's recommendation for the Yuma Nonattainment Area. However, the AMA believes that it is extraordinarily irresponsible for the EPA to hold accountable an area that has absolutely zero control over the emission sources principally responsible for its nonattainment status.

The AMA recognizes that the health and welfare of the people and environment in the Yuma vicinity are at the mercy of Mexico, California, and the EPA; especially since only a mere 6% of emissions impacting the monitor are attributable to anthropogenic sources originating within Arizona.[8] Additionally, ADEQ explains that "background and transport have proportionally increased effect on nonattainment concentrations, especially as background levels continue to increase in magnitude."[9] Background, international and interstate transport, and vehicular emissions predominantly impact the State's ability to achieve the 2015 Ozone NAAQS; and yet, the State is required to implement control measures on areas that have very few sources within its power to control. The AMA is keenly aware that these are the State's challenges in preparing its 2015 Draft Report; and, we appreciate its judicious consideration in its recommendations.

Sincerely,

Kelly Shaw Norton
President,
Arizona Mining Association

[8] Id., p. 96.
[9] Id., p. 25.

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3 August 2016

Mr. Timothy Franquist

Director, Air Quality Division

Arizona Department of Environmental Quality

1110 West Washington Street

Phoenix, Arizona 85007

Dear Mr. Franquist:

It's been a pleasure to participate in the recent round of meetings concerning proposed new boundaries for nonattainment areas for ozone. I offer the following comments on Arizona Department of Environmental Quality's *2015 Ozone NAAQS Boundary Recommendation Draft Report*, Air Quality Division, 31 May 2016 proposed draft. These comments are in a separate document that accompanies this letter called "pHyde comments on O3 boundary report". I would be happy to discuss these matters with you and your staff and can be reached at 602 451 3487 or at phyde@asu.edu.

Cordially,

Peter Hyde

Adjunct Research Professor

3 August 2016

Comments on Arizona Department of Environmental Quality's *2015 Ozone NAAQS Boundary Recommendation Draft Report*, Air Quality Division, 31 May 2016 proposed draft

The report clearly stated the rationale and the specific recommendations for the new ozone boundaries; and in this sense, the report is sound and defensible, as far as the subjects it covered. Two subjects that I had hoped would be discussed were not: namely, tribal nonattainament areas and the absence of much future outlook in setting the boundaries. In addition to some thoughts on control strategies, these topics will be discussed below, after a few specific statements which deserve comment.

Specifics

p. 21, 2nd paragraph: "According to CAA section 109, EPA must set *emission* standards for criteria pollutants, also known as National Ambient Air Quality Standards"

As stated, this appears to confuse air pollutant emissions with their resultant concentrations: a clearer statement would be as follows:

According to CAA section 109, EPA must set air quality standards for criteria pollutants, also known as National Ambient Air Quality Standards, and these standards are expressed as concentrations of the various air pollutants, concentrations above which the health or welfare of the populace is endangered.

p.30, Table 2-1

Comparing region-wide emissions totals has always been somewhat difficult, in spite of valiant efforts on EPA's part to standardize emission calculations. Below is a part of Table 2-1, with some additions.

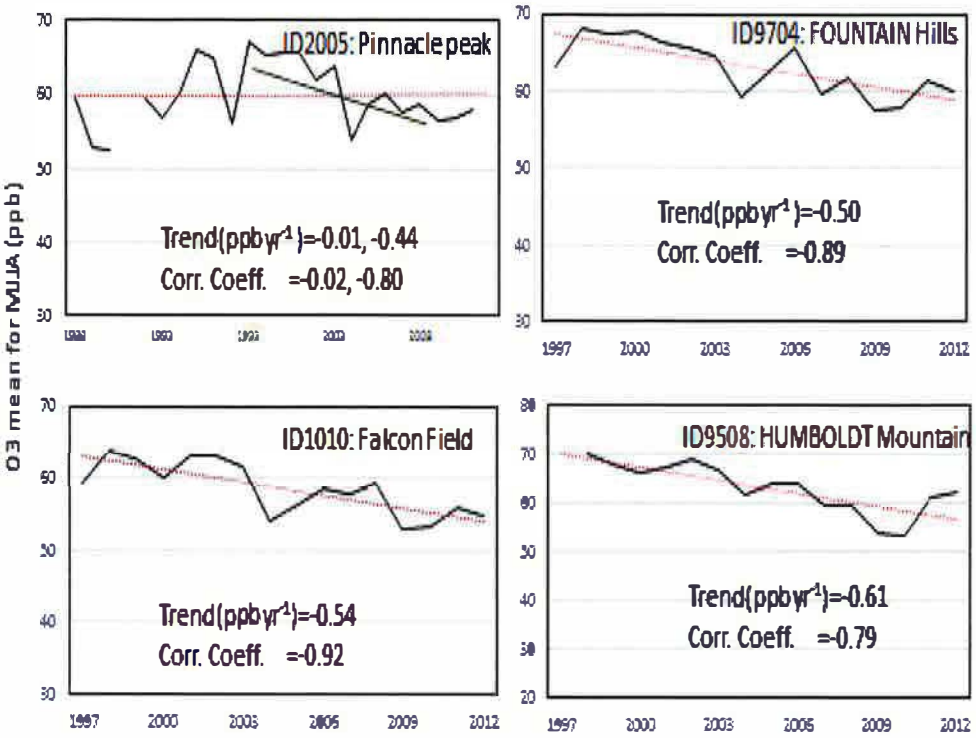
region	Nox (tpy)	VOC (tpy)	population	VOC/Nox		Nox per capita	VOC per capita
Dallas Fort Worth	178,595	307,050	6,426,214	1.72		0.028	0.048
Phoenix area	103,347	421,857	4,192,887	4.08		0.025	0.101

Noteworthy differences between the two regions are the widely divergent VOC/NOx emission ratios: 4.1 for PHX but only 1.7 for Dallas. And while the NOx emissions per capita in the two regions is the same, the VOC emissions per capita in PHX are twice that of Dallas. Differences such as these strain the credulity of scientists and general public alike.

p. 36, Figures 3-6 and 3-7: long-term ozone design value trends

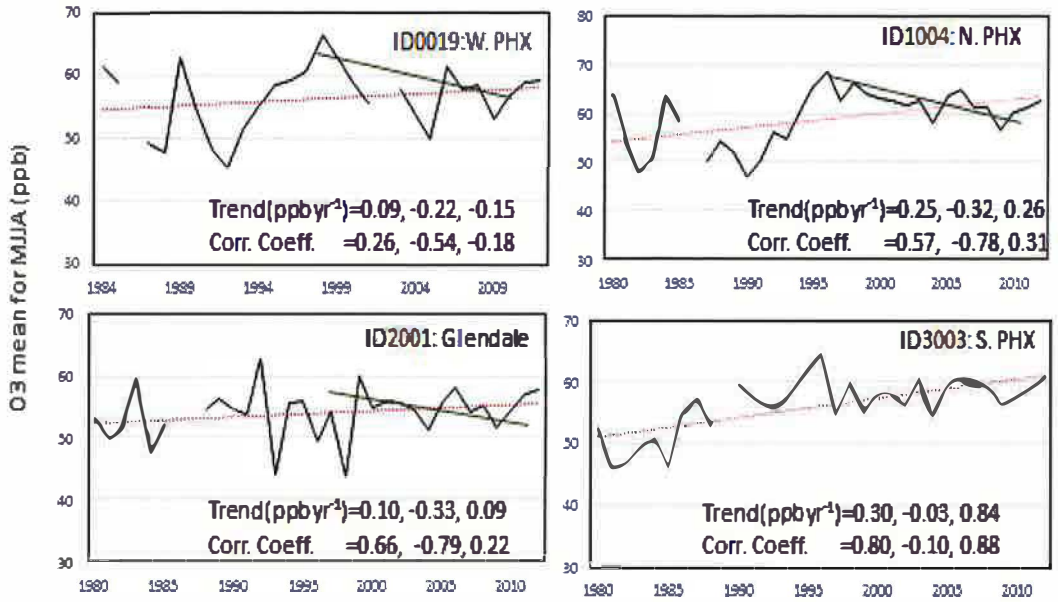
While these graphs most certainly illustrate the downward trends at the Tonto and Queen Valley ozone monitoring sites, they visually over-emphasize the trends because the y-axis does not begin at zero. This is an old trick in displaying information graphically. If these are replotted with the y-axis starting at zero, then the eye sees them as nearly flat, with only a slight downward trajectory. On the subject of trends my colleague Dr. Jialun Li put these ozone trends together recently. These trends are more robust though less regulatorily relevant than the design value trends in the May report. Each data point is the 120 day average (May, June, July, and August) of the daily maximum 8-hour ozone concentration for each calendar year. Note that while the eastern sites display downward trends, the central-city sites show the opposite. Though explanations for these discordant trends vary, the consensus invokes the greater areal extent of the Phoenix area now, in contrast to its smaller extent in the earliest years of the trend. A larger area that has had increased ozone precursor emissions in the west Valley through time translates into longer transport times as air parcels transit from far west and west through the central area and on towards the eastern fringe. Longer transport times mean that peak photochemical production hours come later in the central area, and come too late on the eastern fringe to sustain the higher concentrations measured in earlier years. This idea has not been tested and remains somewhat speculative.

Mean 8-hr maximum ozone concentration for MJJA at eastern sites



R>0.482 for 15 years R>0.349 for 30 years ($p<0.05$)

Mean 8-hr maximum ozone concentration for MJJA at central sites (cont')



Note: not all sites begin with the same year

R>0.482 for 15 years R>0.349 for 30 years (p<0.05)

p. 48, Table 3-6

Conspicuous by their absence are biogenic emissions of VOC, unless they've been incorporated into the "nonpoint" category. Perhaps some explanation would help here.

p. 65, Figure 3-37: Supersite summer ozone concentrations from HYSPLIT

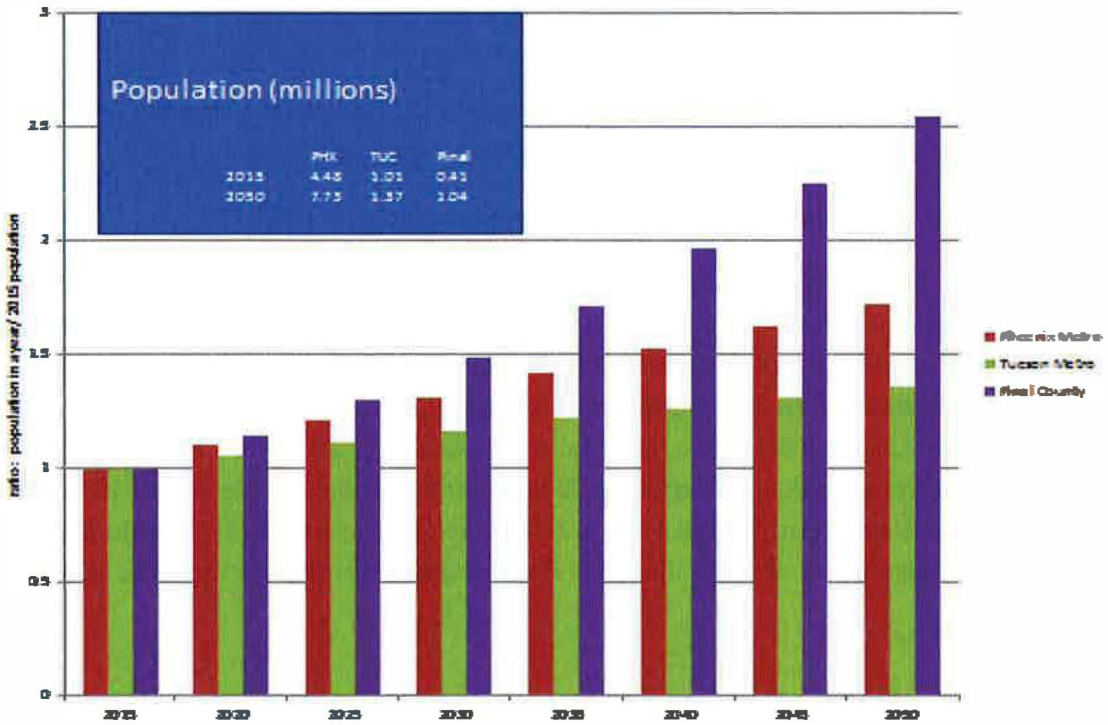
This figure alone, considering only those eight-hour ozone concentrations in excess of 70 ppb, would strongly suggest that ozone precursor emissions occurring to the south and east of central Phoenix – including virtually all of northern Pinal County -- contribute to the elevated ozone concentrations measured at the JLG Supersite. This trajectory map is especially robust, as it consists of roughly 100 days times two years for a sample size of 200 for all concentrations. Presumably those concentrations in excess of 70 ppb outnumber the sample size of 10, in the ten highest ozone days trajectories (Figure 3-36, p. 64). Maps such as Figure 3-37 ought to be done for at least one eastern fringe site (e.g. Pinnacle Peak) and two contentious monitors of Tonto and Queen Valley.

Tribal considerations

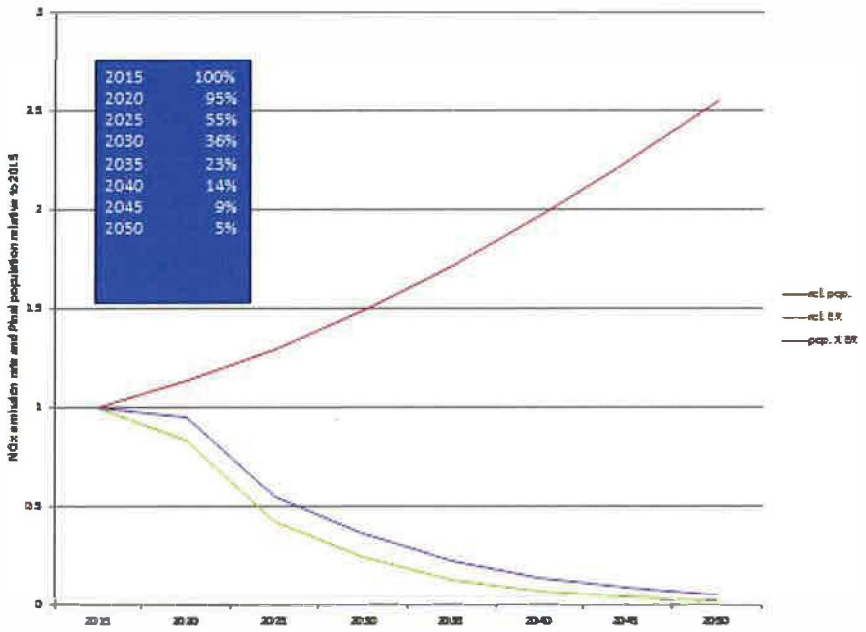
Granted that Native American Indian communities are sovereign nations and are obligated to submit to EPA their own recommendations for ozone boundaries, doesn't it make more sense, that in one urban area with three Indian communities -- Fort McDowell, Salt River Pima Maricopa, and Gila River – all of whose lands are part and parcel of the entire Phoenix area – there would be some discussion of tribal lands, emissions, and ozone concentrations? Furthermore, what attempts, if any, has ADEQ made to confer with the Indian communities about this subject, and, ideally, to present to EPA a unified recommendation that reflected all of the interested parties? Please give this matter some serious thought, as EPA should, for such coordination could at the least result in a more consistent boundary determination for the entire area; and, moreover, avoid conflicting boundary recommendations.

Future outlook on emissions is missing

If the newly promulgated ozone standard has a lifetime of years to a decade or two, and if the Phoenix area continues to struggle to meet this standard, then setting boundaries for a nonattainment area ought to consider future populations and emissions. The population maps and tables of Section 3.4.2.3 are limited to the years 2000 and 2010, despite the predictions for robust growth in Maricopa and Pinal Counties. For example, the chart below shows Pinal County's population more than doubling from 2015 to 2050 -- a 35 year span.



As a crude proxy for nitrogen oxides emissions from Pinal County, the following chart shows the population, overall vehicular NOx emission rate, and their product relative to the year 2015. Note that even with a decided decline in the NOx emission rate from 2015 to 2025, the increasing population counters this trend such that the product of the two (population x emission rate) remains nearly constant for 2015 – 2020 and still retains over half of its 2015 value ten years hence. The omission of future considerations in the air pollutant emission picture for the two counties is a serious one.



Sources: Arizona Department of Administration, "Arizona State and County Population Projections: 2015 – 2050, medium series",*https://population.az.gov/population-projections*, accessed May 2016

U. S. EPA, 2015, "Exhaust on-road final report, MOVES", EPA-420-R-15-005, October

Unconventional strategies to reduce ozone precursor emissions

With most of the low-hanging fruit already picked, officials in ozone nonattainment areas face an exceptionally difficult task in designing, promoting, and obtaining new rules, regulations, or enabling legislation for additional control strategies to reduce ozone precursor emissions. To this end Phoenix area environmental officials in the Arizona Department of Environmental Quality, in the Maricopa County Air Quality Department, in the Maricopa Association of Governments, and in its member cities and towns ought to consider strategies that reduce nitrogen oxides emissions by extensive electrification of passenger vehicles, by adopting more effective energy and conservation measures in buildings, and increasing the share of wind and solar power in the

electric sector. These strategies are explained and analyzed in D. H. Loughlin, K. R. Kaufan, C. S. Lenox, and B.J. Hubbell 's 2015 paper entitled "Analysis of alternative pathways for reducing nitrogen oxide emissions", *Journal of Air and Waste Management Association*, **65** (09): 1083 – 1093. The authors are all U.S. EPA staff, in either the Office of Research and Development or in the Office of Air Quality Planning and Standards.