ARIZONA DEPARTMENT
OF
ENVIRONMENTAL QUALITY

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Janice K. Brewer
Governor

Henry R. Darwin
Director

May 2, 2011

The Honorable Janice K. Brewer, Governor
State of Arizona
1700 West Washington
Phoenix, AZ 85007

Re: Sulfur Dioxide Non-attainment Area Boundary Recommendations

Dear Governor Brewer:

In 2010, EPA established the 1-hour National Ambient Air Quality Standards (NAAQS) for sulfur dioxide and revoked the previous 24-hour and annual NAAQS for sulfur dioxide established in 1971. Under Clean Air Act Section 107(d), states must make recommendations for areas that meet, cannot be classified, or do not meet new or revised NAAQS within one year following the promulgation of such standards.

Under A.R.S. § 49-405(C)(4), the Arizona Department of Environmental Quality must finalize its proposed recommendations and supporting documents and submit them to you not later than one month before your recommendations are due to EPA. The EPA deadline for the submission of proposed boundary recommendations is June 2, 2011.

Attached to this letter are ADEQ's analysis of, and proposed boundary recommendations for, the 2010 1-hour NAAQS for sulfur dioxide, as well as the responses to public comments that have been received. Based on monitored violations of the new standard, two separate areas are proposed for designation as non-attainment: the Hayden sulfur dioxide planning area in Gila and Pinal Counties and the Miami sulfur dioxide planning area in Gila County. Both areas are centered on operating copper smelters, the primary emissions sources in their respective areas, and cover the same areas of land as the sulfur dioxide non-attainment areas for the previous 1971 sulfur dioxide NAAQS. All other areas of the State are proposed as unclassifiable.

If you have any questions, please contact me at (602) 771-2204, or Eric Massey, the Director of the Air Quality Division, at (602) 771-2288.

Sincerely,

Henry R. Darwin
Director

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Arizona Air Quality Designations

Final Proposed Boundary Recommendations
for the
2010 Primary National Ambient Air Quality Standard for Sulfur Dioxide

Introduction

This document contains the current analysis of, and proposed boundary recommendations for, the 2010 1-hour sulfur dioxide primary National Ambient Air Quality Standard (NAAQS). These recommendations follow an extensive public review process to solicit comment on the boundary recommendation.

The proposed recommendations are based on currently available ambient monitoring data. At this time the Arizona Department of Environmental Quality proposes that the Governor recommend to the U.S. Environmental Protection Agency (EPA) that most counties within the State be designated as unclassifiable. Due to monitored violations, two areas of the State are proposed as not meeting the new standard. The proposed nonattainment areas are the Hayden sulfur dioxide planning area in Gila and Pinal Counties (except that portion that is in Indian Country) and the Miami sulfur dioxide planning area in Gila County.

Arizona does not make recommendations for any tribal lands as tribal lands are not within the State's jurisdiction. ADEQ respects tribal sovereignty and has worked to develop cooperative relationships with tribal air quality programs throughout the State. Nothing in this document should be interpreted to affect the designation of Indian Country.

Background

The U.S. Environmental Protection Agency is charged with developing air quality standards for the protection of human health and the environment. As required by the Clean Air Act (CAA), EPA set primary and secondary National Ambient Air Quality Standards for six common air pollutants.[1] Maximum pollution levels or limits that are based on human health are called primary standards. Limits intended to prevent environmental and property damage are called secondary standards. EPA is also required to periodically evaluate those standards and revise them if scientific analyses indicate new standards would be more protective of public health and welfare.

Among the pollutants for which EPA has set air quality standards is sulfur dioxide (SO_2). Sulfur dioxide is part of a group of highly reactive gasses known as "oxides of sulfur" or SOx. The air quality standards for SO_2 are designed to protect against exposure to the entire group of sulfur oxides. SO_2 is linked to a number of adverse effects on the respiratory system, particularly for at-risk populations, including children, the elderly, and asthmatics. Examples of sources of SO_2 emissions include fossil fuel combustion and the extraction of metal from ore.

In 2010 EPA completed a review of the primary SO_2 standards and replaced the existing annual and 24-hour standards with a 1-hour standard to better protect public health by reducing exposure to elevated short-term concentrations of SO_2 (see 75 FR 35520; June 22, 2010).[2] Table 1 compares the level of the

[1] See http://www.epa.gov/air/criteria.html for a complete list of National Ambient Air Quality Standards.
[2] A review of the secondary SO_2 standard is expected to be completed in 2012.

1971 primary sulfur dioxide standards to the new 2010 standard. EPA also revised the ambient air monitoring requirements for SO_2. Additional information about EPA's action is available at http://www.epa.gov/ttn/naaqs/standards/so2/s_so2_index.html.

Table 1: Comparison of Sulfur Dioxide Primary National Ambient Air Quality Standards

Standard	Level	Averaging Time	Form (attainment test)
1971 Primary Standards	0.030 parts per million (ppm) (80 $\mu g/m^3$)	annual	Not to be exceeded in a calendar year
	0.14 parts per million (365 $\mu g/m^3$)	24 hours	Not to be exceeded more than once in a calendar year
2010 Primary Standard	75 parts per billion (ppb) (0.075 parts per million)	1 hour	Three-year average of the 99th percentile of the annual distribution of daily maximum 1-hour average concentrations, calculated for each monitor

Area Designation Approach

Under Clean Air Act Section 107(d), states must make recommendations for areas that meet, cannot be classified, or do not meet new or revised National Ambient Air Quality Standards within one year following the promulgation of such standards. State recommendations for the 2010 1-hour sulfur dioxide standard are due to EPA by June 2, 2011. EPA anticipates promulgating final area designations by June 2, 2012.[3]

Specifically, states must submit to EPA, attainment (meets or does not contribute to ambient air quality in areas that do not meet the air quality standard), unclassifiable (cannot be classified as meeting or not meeting the standard based on available information), and nonattainment recommendations for all areas of the state. Section 107(d)(1)(A)(i) of the Clean Air Act defines a nonattainment area as "... *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 for the pollutant...*"

EPA anticipates a hybrid monitoring and modeling approach for implementing the new standard and as a process for assessing and designating areas relative to the new standard. In the final rule EPA states that "for a short term 1-hour SO_2 standard, it is more technically appropriate, efficient, and effective to use modeling as the principal means of assessing compliance for medium to large sources, and to rely more on monitoring for groups of smaller sources and sources not as conducive to modeling." EPA also expects "... to issue further guidance regarding implementation, particularly concerning issues that may arise regarding the application of refined dispersion modeling under this revised approach ..." On the subject of initial designations EPA explains -

> "For initial designations that will be finalized in June 2012, States should use monitoring data from the existing SO_2 network for the years 2008–2010, as well as any refined SO_2

[3] See *Primary National Ambient Air Quality Standard for Sulfur Dioxide*, 75 FR 35520; June 22, 2010.

dispersion modeling (see Appendix W to 40 CFR Part 51) for sources that may have the potential to cause or contribute to a NAAQS violation, provided that it is recent and available. EPA will then issue designations based on the record of information for that area. Under our anticipated approach, an area that has monitoring data or refined modeling results showing a violation of the NAAQS would be designated as ''nonattainment.'' An area that has both monitoring data and appropriate modeling results showing no violations would be designated as ''attainment.'' All other areas, including those with SO_2 monitors showing no violations but without modeling showing no violations, would be designated as ''unclassifiable.'' Areas with no SO_2 monitors at all i.e., ''rest of State,'' would be designated as ''unclassifiable'' as well."

"Any area initially designated "nonattainment" or "unclassifiable" could request redesignation to "attainment" after an assessment based on air quality modeling, conducted in accordance with the new guidance, and available monitoring data indicates that the standard has been met, as well as meeting all other requirements of the CAA for redesignation to attainment."

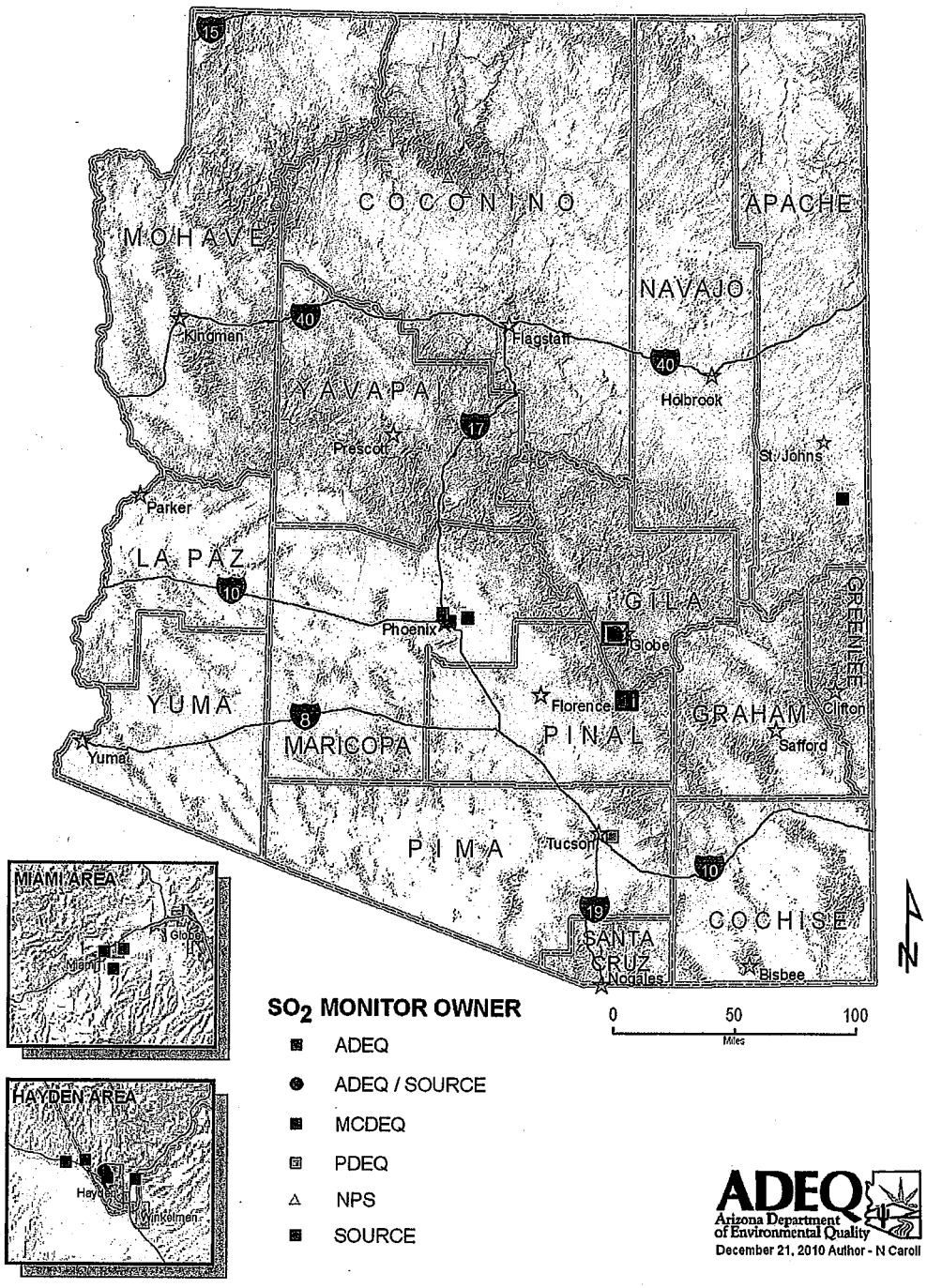
Because EPA has only recently finalized the designation guidance necessary to conduct dispersion modeling analyses, and because there is no other modeling analyses of which ADEQ is aware, Arizona can only make initial designation recommendations based on available monitoring information. The proposed designations include nonattainment recommendations for two separate areas of the state with monitored violations. Modeling analyses to refine the recommended nonattainment area boundaries, if necessary, and to evaluate unclassifiable areas will be completed following the release of EPA's expected implementation guidance.[4]

Ambient Monitoring Network

Currently fourteen sulfur dioxide ambient monitoring sites are operated in six counties across Arizona. Six of these sites are operated by the Arizona Department of Environmental Quality (ADEQ), Maricopa County Air Quality Department (MCAQD), and the Pima County Department of Environmental Quality (PDEQ). The remaining sites are operated by the National Park Service (NPS) and industrial sources. These ambient data provide information on population exposure, source impacts, and pollutant transport. Monitor locations are illustrated in Figure 1.

[4] On March 24, 2011, EPA released guidance entitled *Area Designations for the 2010 Revised Primary Sulfur Dioxide National Ambient Air Quality Standards*. The guidance contains information on factors EPA intends to evaluate in determining boundaries for areas designated nonattainment as well as modeling guidance for states to use to support designation recommendations. EPA plans to issue additional guidance for developing plans for implementing the standard following the initial designation process.

Figure 1: Arizona Sulfur Dioxide Ambient Monitoring Networks



Ambient data from ADEQ, MCAQD, and PDEQ monitors are collected and reported to EPA's Air Quality System (AQS) database by each responsible agency. Design values are the statistics that are compared to the level of the air quality standards to determine compliance with the NAAQS. The design value for the new primary SO_2 NAAQS is the 3-year average of annual 99th percentile daily maximum 1-hour values for a monitoring site. The 2007-2009 design values for agency monitors are shown in Table 2. Design values for 2008-2010 will be provided upon completion of required quality assurance procedures. Data for the 1-hour SO_2 standard from source operated sites are not currently available. NPS monitors in Coconino County are related to the Regional Haze IMPROVE program and are not federal reference or equivalent method monitors.

Table 2: 2007-2009 Design Values for the One-Hour Sulfur Dioxide NAAQS (in ppb) (One Hour NAAQS – 75 ppb)

Site Name	99th Percentile			Three-Year Average
	2007	2008	2009	
Gila County				
Hayden Old Jail, ADEQ	322	257	274	284
Miami Ridgeline, ADEQ	156	128	113	132
Number of Sites in Violation of the NAAQS				≥ 2
Maricopa County				
Central Phoenix	12	8	10	10
JLG Supersite	8	8	7	8
South Scottsdale	8	5	8	7
Number of Sites in Violation of the NAAQS				0
Pima County				
22nd St. & Craycroft	13	12	5	10
Number of Sites in Violation of the NAAQS				0

Monitoring sites in the metropolitan areas of Phoenix (Maricopa County) and Tucson (Pima County) recorded design values of less than 14 percent of the 1-hour NAAQS. Two source impact monitors in Gila County, located near the Hayden and Miami copper smelters, show violations of the new NAAQS. The number of days when the maximum hourly SO_2 concentrations at the Miami Ridgeline monitor exceeded 75 ppb totaled more than 20 for each year in the 2007-2009 analysis period. The number of days when the maximum hourly SO_2 concentration at the Hayden Old Jail monitor exceeded 75 ppb totaled more than 100 for each year in the same 3-year period. A monitor that records less than four exceedances per year ensures attainment of the standard.[5]

The Ridgeline monitor is located within the eight townships that comprise the Miami sulfur dioxide planning area. The planning area, centered on the Miami primary copper smelter, the dominant source of SO_2 emissions in the area, was designated by operation of law as nonattainment for the 1971 primary standards following the Clean Air Act amendments of 1990. Due to implementation of permanent and enforceable control measures, the area achieved attainment in 1984. A plan demonstrating maintenance of the standards was submitted to EPA in 2002. EPA subsequently redesignated the area to attainment in 2007 (see 72 FR 3061; January 24, 2007).

Similar to Miami, the Hayden Old Jail monitor is located within the Hayden sulfur dioxide planning area near the Hayden primary copper smelter. Due to implementation of permanent and enforceable control

[5] Assumes 100% data collection.

measures, the area achieved attainment in 1989. A plan demonstrating maintenance of the 1971 primary standards in the area's nine townships was submitted to EPA in 2002. EPA action on the plan is still pending.

The new SO_2 standard also requires changes to the ambient air monitoring network. In the final rule EPA is relying on "monitoring for groups of smaller sources and sources not as conducive to modeling" as a means of assessing compliance with the standard.

As such, the final monitoring regulations require monitors to be placed in Core Based Statistical Areas (CBSAs) based on a population weighted emissions index (PWEI) as follows:

- 3 monitors in CBSAs with index values of 1,000,000 or more,
- 2 monitors in CBSAs with index values less than 1,000,000 but greater than 100,000, and
- 1 monitor in CBSAs with index values greater than 5,000.

The PWEI is calculated by multiplying the population of the CBSA by its tons per year sulfur dioxide emissions and dividing the product by 1,000,000. Table 3 shows Arizona CBSAs and the calculated PWEI for each. Currently, minimum monitoring requirements are met.

Table 3: Evaluation of Ambient Monitoring Requirements for Arizona						
Core Based Statistical Area (County)	**2005 Emissions (Tons)**	**2005 Population**	**Population Weighted Index**	**Monitors Required**	**Current Monitors***	**Additional Monitors Needed**
None (Apache)	20,747	71,118	1,475	0	0	0
Sierra Vista-Douglas (Cochise)	3,826	127,757	489	0	0	0
Flagstaff (Coconino)	4,772	124,953	596	0	0	0
Payson (Gila)	20,342	52,209	1,062	0	2	0
Safford (Graham & Greenlee)	139	41,398	6	0	0	0
None (La Paz)	148	20,256	3	0	0	0
Phoenix-Mesa-Scottsdale (Maricopa & Pinal)	5,276	4,039,182	24,370	1	3	0
Lake Havasu City-Kingman (Mohave)	901	193,035	174	0	0	0
Show Low (Navajo)	24,062	111,399	2,680	0	0	0
Tucson (Pima)	6,157	946,362	5,826	1	1	0
Nogales (Santa Cruz)	115	43,080	5	0	0	0
Prescott (Yavapai)	1,912	208,014	398	0	0	0
Yuma (Yuma)	555	187,555	104	0	0	0

* Includes only those monitors operated by ADEQ, MCAQD, and PDEQ.

Emissions

Section 107 of the Clean Air Act requires that, in addition to violating areas, areas that contribute to violations of ambient air quality standards in a nearby area be included as part of a nonattainment area. Table 4 is presented to characterize county level emissions and sources.

Counties with the highest emissions rates are associated with electric generating facilities and the smelting of sulfide copper ore. For example, more than 98 percent of total emissions in Apache County and more than 91 percent in Navajo County are attributable to the "Fuel Combustion Electric Utility" source category of the 2005 National Emissions Inventory. In Gila County, the location of the Hayden and Miami copper smelters, greater than 98 percent of total emissions are in the "Metals Processing" category.

By contrast, the largest source category in the most populated county, Maricopa County, is "Off-Highway," contributing 58 percent of the total County emissions inventory.

Because there is no currently available modeling information for the 1-hour standard, sources that may be contributing to nonattainment in areas where there is no ambient monitoring data will be analyzed in future using EPA guidance.

Table 4: Arizona State and County Emissions Data - Sulfur Dioxide (tons)

County/State	Size Ranking	Area (square miles)	Emissions
Apache	3	11,204.9	**20,747**
Cochise	8	6,169.4	3,826
Coconino	1	18,617.4	4,773
Gila	11	4,767.7	**20,342**
Graham	12	4,629.3	61
Greenlee	14	1,847.0	78
La Paz	13	4,499.9	148
Maricopa	5	9,203.1	5,276
Mohave	2	13,311.6	901
Navajo	4	9,953.2	**24,062**
Pima	6	9,186.3	6,157
Pinal	10	5,369.6	757
Santa Cruz	15	1,237.6	115
Yavapai	7	8,123.3	1,912
Yuma	9	5,514.1	555
Arizona Total		113,634.6	89,709

Source: U.S. Environmental Protection Agency, National Emission Inventory (NEI) database for 2005 (Version 2, created in January 2009).

Summary of Monitoring and Emissions Information and Next Steps

Based on available ambient monitoring data and absence of current modeling analyses, the proposed designation for the majority of the State is "unclassifiable" for the 2010 1-hour primary sulfur dioxide

NAAQS. ADEQ is proposing to recommend that two separate and distinct areas, the existing Hayden and Miami SO_2 planning areas be designated nonattainment.

As in the past, EPA's expected approach is to use the county boundary as the "presumptive" nonattainment boundary. Because of ADEQ's previous planning area determinations, ADEQ is proposing to recommend that the Payson CBSA (Gila County) is not an appropriate nonattainment area boundary. EPA's March 24, 2011, guidance lists five factors to consider in evaluating alternative boundaries for nonattainment areas:

1) air quality data;
2) emissions-related data (location of sources and potential contribution to ambient SO2 concentrations);
3) meteorology (weather/transport patterns);
4) geography/topography (mountain ranges or other air basin boundaries); and
5) jurisdictional boundaries (e.g., counties, air districts, pre-existing nonattainment areas, reservations, metropolitan planning organizations).

The recommended Hayden and Miami nonattainment areas:

- include all monitors violating the 1-hour SO_2 standard for the period 2008-2010,
- include the primary emissions sources that likely contribute to monitored violations of the 1-hour SO_2 NAAQS (the Hayden and Miami primary copper smelters),
- include mountainous complex terrain that separates the emissions sources from other areas of the County, and impacts dispersion (elevations range from 2,000 to 7,000 feet above sea level).
- are identical to the existing SO_2 planning areas (except that portion of the Hayden planning area that is in Indian Country) and therefore include the area of applicability for SO_2 emissions control measures designed to bring the Hayden and Miami areas into attainment for the 1971 standards.

Additional information that warrants consideration in relation to emissions impacts in the Hayden and Miami areas include:

- the size of Gila County (Gila County at 4,796 square miles nearly equals the land area of the state of Connecticut at 4,845), and
- the location of emissions sources and violating monitors relative to the County boundaries (the distance from the violating monitor in Hayden is less than 1/2 mile from the southwest Gila County border and more than 100 miles from the northern Gila County border).

As an example of size disparity, a violating monitor in Middlesex County, Connecticut, would result in a presumptive nonattainment area boundary of 369 square miles. A violating monitor in Gila County would result in a presumptive nonattainment area boundary of 4,796 square miles. Conceivably, emissions sources of similar type and magnitude could create a presumptive nonattainment area boundary in Arizona that is thirteen times larger than one in Connecticut.

Based on available information it cannot be determined whether the recommended nonattainment areas should be larger or smaller than the existing SO_2 planning areas. Additional analysis and modeling will be performed following the completion of the designation process and release of EPA's implementation guidance and, if appropriate, the recommended boundaries of the Hayden and Miami planning areas may be revised at that time. Per EPA's final rule, future analysis and modeling will also be performed with EPA's guidance to determine the attainment status of other counties in the State recommended as unclassifiable during this "initial" designation process.

Proposed Boundary Recommendations

ADEQ proposes to recommend that all of the following counties (except for Indian Country) be designated unclassifiable for the 1-hour sulfur dioxide NAAQS:

Apache County
Cochise County
Coconino County
Graham County
Greenlee County
La Paz County
Maricopa County
Mohave County
Navajo County
Pima County
Santa Cruz County
Yavapai County
Yuma County

In addition, ADEQ is proposing to recommend that Gila County and Pinal County (except for Indian Country), except those portions described below, be designated unclassifiable for the 1-hour sulfur dioxide NAAQS. Figure 2 illustrates the draft recommended 1-hour sulfur dioxide nonattainment areas. Table 5 describes by county and township the areas of the State ADEQ is proposing to recommend for unclassifiable and nonattainment designations.

Figure 2: Draft Recommended Sulfur Dioxide Nonattainment Area Boundaries

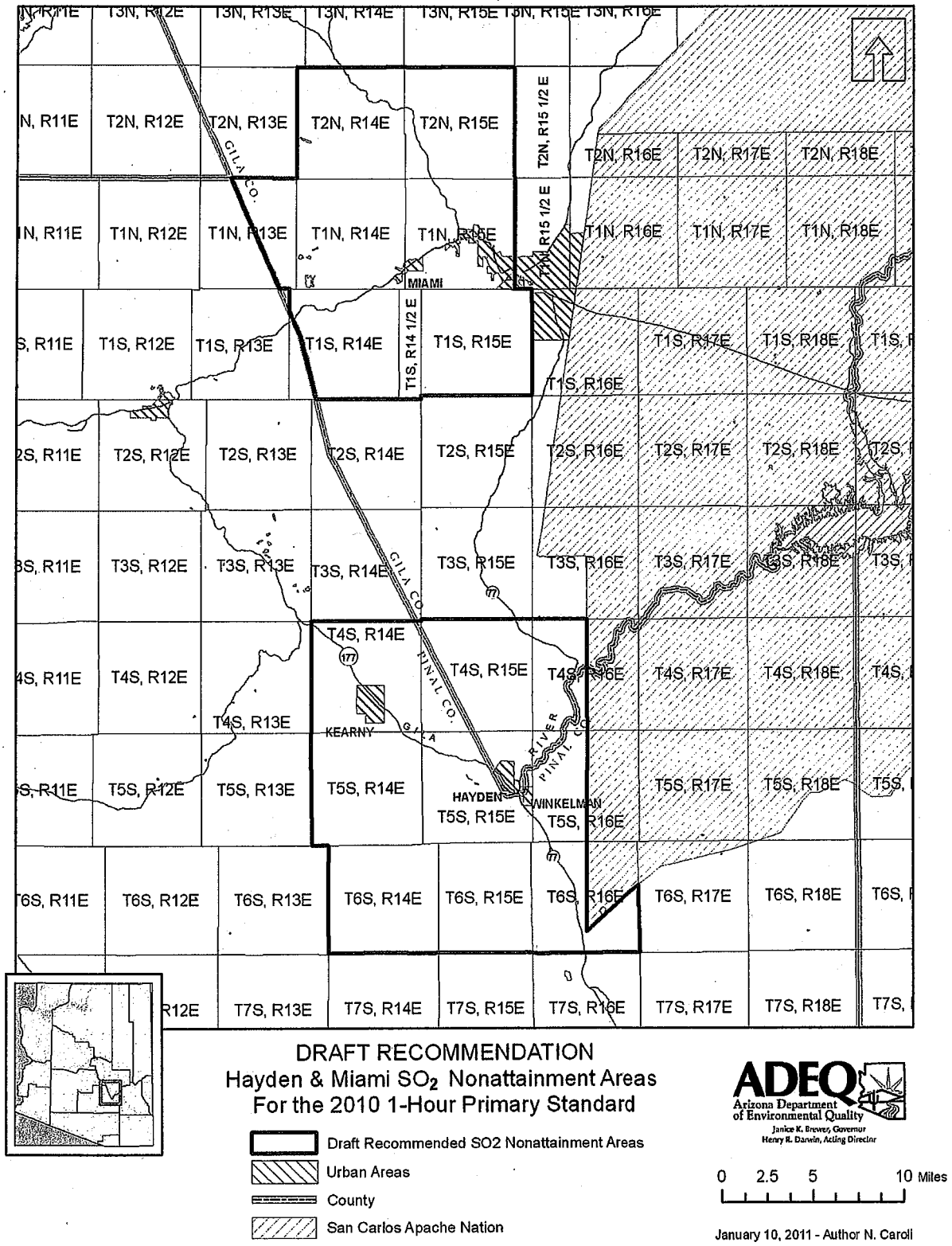


Table 5: Arizona Draft Designation Recommendations for the 2010 Primary Sulfur Dioxide National Ambient Air Quality Standard	
Designated Area	Designation Type
Hayden Area: Gila County (part) and Pinal County (part).....	Nonattainment
T4S, R14E T4S, R15E T4S, R16E (except that portion in Indian Country) T5S, R14E T5S, R15E T5S, R16E (except that portion in Indian Country) T6S, R14E T6S, R15E T6S, R16E (except that portion in Indian Country)	
Miami Area: Gila County (part).....	Nonattainment
T2N, R14E T2N, R15E T1N, R13E (only that portion in Gila County) T1N, R14E T1N, R15E T1S, R14E (only that portion in Gila County) T1S, R14 1/2E T1S, R15E	
Rest of State (except those portions in Indian Country)	Unclassifiable
Apache County Cochise County Coconino County Gila County (part) Remainder of County Graham County Greenlee County La Paz County Maricopa County Mohave County Navajo County Pima County Pinal County (part) Remainder of County Santa Cruz County Yavapai County Yuma County	

RESPONSIVENESS SUMMARY
to
Testimony Taken at Oral Proceeding and Written Comments Received on
Arizona Air Quality Designations, Draft Boundary Recommendations for the 2010 Primary National Ambient Air Quality Standard for Sulfur Dioxide, February 1, 2011

A public notice appeared on the Arizona Department of Environmental Quality's (ADEQ) Website announcing the opening of a public comment period on February 3, 2011, and in *The Arizona Republic* on March 10 and 11, 2011. Notice was provided to counties, municipalities, and other interested parties that would be included in a nonattainment area under the draft proposed recommendations via the U.S. Postal Service on February 2, 2011. Subsequent notice was provided to counties and other stakeholders statewide via e-mail.

A stakeholder meeting was held on Thursday, March 17, 2011, and an oral proceeding on the draft recommendations was held on Tuesday, April 12, 2011, at the Arizona Department of Environmental Quality, Conference Room 145, 1110 West Washington Street, Phoenix, Arizona. The public comment period closed on Tuesday, April 12, 2011, at 5:00 p.m. Oral and written comments received and the Arizona Department of Environmental Quality's responses are described below.

1) **Comment:** A representative of ASARCO LLC, operator of the Hayden copper smelter, commented at the public hearing that ASARCO has "reviewed ADEQ's proposed nonattainment boundary designation and pending the outcome of litigation we do not have any objections to the proposed boundaries."

   Response: ADEQ appreciates the positive comments regarding the proposed recommended boundaries.

2) **Comment:** Written comment was received from Freeport-McMoRan Miami Inc. (FMMI), operator of the Miami copper smelter, in support of two separate nonattainment areas for the Hayden and Miami areas. FMMI noted that the Hayden and Miami Copper smelters are the primary sources of sulfur dioxide (SO_2) emissions in their respective proposed nonattainment areas and experience with attaining the previous primary SO_2 standards demonstrates that the smelters have no effect on the other's SO_2 area. FMMI further stated that attainment of the previous primary SO_2 standards was achieved by permanent and enforceable control measures at the Miami smelter and maintaining the existing planning area boundaries provides consistency with proven boundaries.

   Response: ADEQ appreciates the positive comments regarding the proposed recommended boundaries.

3) **Comment:** Written comment was received from the Gila County Division of Health and Emergency Services in support of two separate nonattainment areas for Hayden and Miami. The commenter noted that separate areas would allow issues particular to an area to be better addressed.

   Response: ADEQ appreciates the positive comments regarding the proposed recommended boundaries.

4) **Comment:** A written comment from Pinal County included a request that ADEQ advise the Governor to recommend to the U.S. Environmental Protection Agency (EPA) that Pinal County

receive an "unclassifiable" designation because there are no monitored or modeled violations of the 2010 primary standard in Pinal County.

Response: ADEQ is proposing nonattainment boundaries for the 2010 primary SO_2 standard that are identical to the existing Hayden SO_2 nonattainment area. The existing nonattainment area was established (and approved by EPA) for the 1971 primary SO_2 standards as the area impacted by emissions from the Hayden copper smelter, the principal source of SO_2 emissions in the area.

The existing and proposed boundaries are comprised of nine townships in Gila and Pinal Counties centered on the Hayden smelter. The smelter is located in southern Gila County approximately one mile from the Pinal County border. A violation nearly four times the level of the 2010 standard has been recorded at an ADEQ operated monitor more than 1/2 mile from the smelter.

Because of past boundary determinations, the proximity of the smelter to the Gila/Pinal County line, and the lack of data supporting a smaller boundary recommendation, ADEQ has determined that it is reasonable to include the portion of the existing Hayden nonattainment area that is within Pinal County in the recommended nonattainment area boundary for the 2010 standard.