

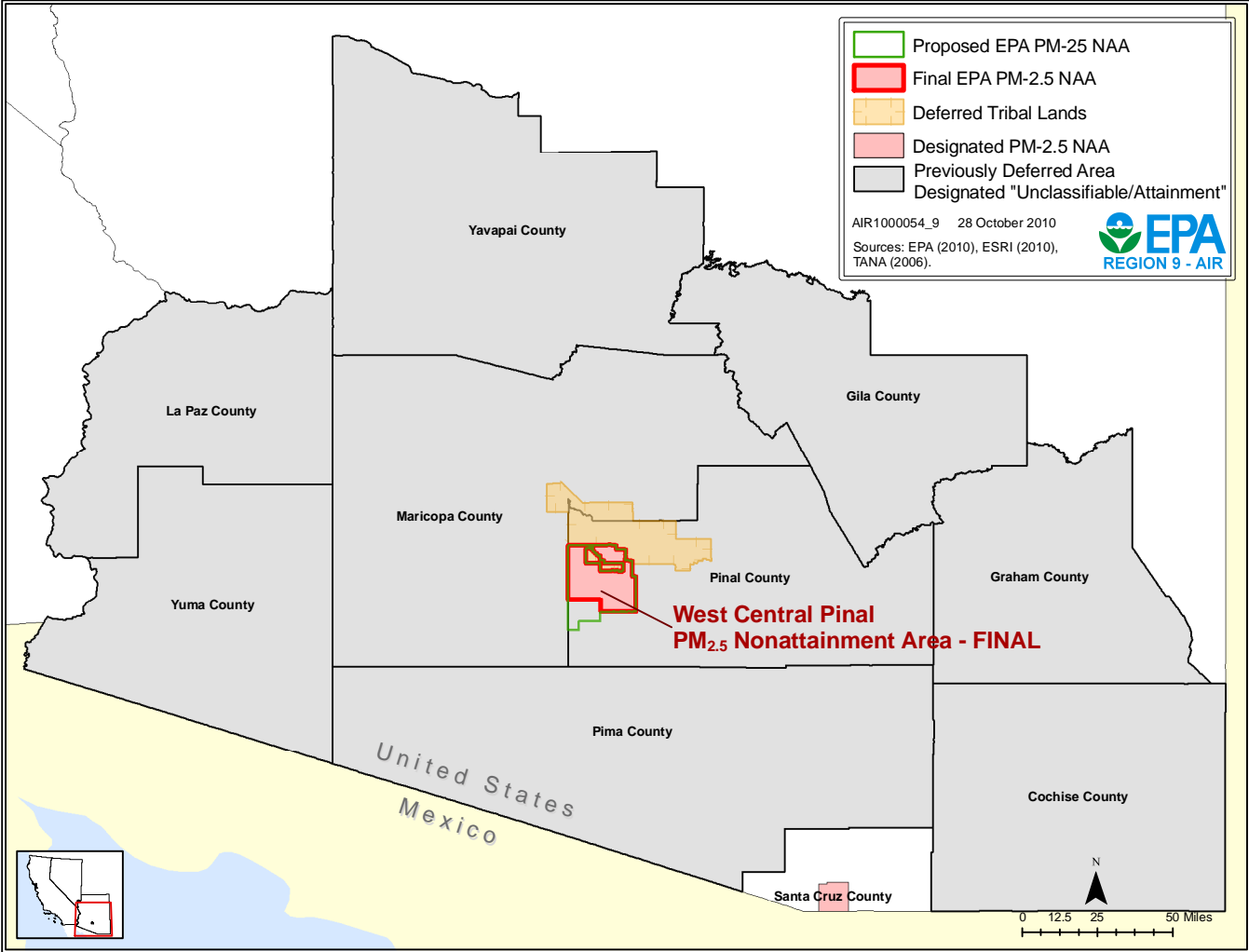
**December 2010 Addendum to EPA’s May 5, 2010 Technical Support Document  
Pinal County, Arizona Area Designation for the  
2006 24-hour Fine Particle National Ambient Air Quality Standards**

The table below identifies the portion of Pinal County in Arizona that EPA has designated as not attaining the 2006 24-hour fine particle (PM<sub>2.5</sub>) national ambient air quality standard (NAAQS). A county (or part thereof) is designated as nonattainment if it has an air quality monitor that is violating the standard or if the county or portion of the county is determined to be contributing to the violation of the standard in a nearby area.

<b>Area</b>	<b>Arizona Recommended Nonattainment Area within Pinal County</b>	<b>EPA’s Final Designated Nonattainment Area within Pinal County</b>
Pinal	T4S, R3E – R4E T5S, R3E – R4E (excluding sections 12, 13, 24, and 25)	T4S, R2E – R4E, except Indian Country; T5S, R2E – R4E, except Indian Country; T6S, R2E – R4E; T7S, R2E, except sections 13 - 36; T7S, R3E, except- <ul style="list-style-type: none"> <li>• NW ¼ , NW ¼ of section 15, SW ¼ , NW ¼ of section 15, NW ¼ , SW ¼ of section 15, SW ¼ , SW ¼ of section 15;</li> <li>• sections 16 – 21;</li> <li>• NW ¼ , NW ¼ of section 22, SW ¼ , NW ¼ of section 22, NW ¼ , SW ¼ of section 22, SW ¼ , SW ¼ of section 22;</li> <li>• NW ¼ , NW ¼ of section 27, SW ¼ , NW ¼ of section 27, NW ¼ , SW ¼ of section 27, SW ¼ , SW ¼ of section 27;</li> <li>• sections 28-33; and</li> <li>• NW ¼ , NW ¼ of section 34, SW ¼ , NW ¼ of section 34, NW ¼ , SW ¼ of section 34, SW ¼ , SW ¼ of section 34;</li> </ul> T7S, R4E

EPA has designated the remainder of state lands within Pinal County, Cochise, Gila, Graham, La Paz, Maricopa, Pima, Yavapai, and Yuma counties, and, except as noted below, Indian country located within those counties, as “unclassifiable/attainment.” EPA is deferring designation of the Gila River Indian Community reservation which is located in Pinal and Maricopa counties, and Ak-Chin Indian Community reservation, which is located in this portion of Pinal County. See Figure 1-A.

Figure 1-A: Areas Newly Designated for the 2006 24-Hour PM<sub>2.5</sub> NAAQS



## **Background**

In October of 2009, EPA notified the Governor of Arizona and Tribal leaders of tribes with lands located in Pinal and Maricopa counties that a monitor in Pinal County (i.e., the “Cowtown” monitor) was violating the 2006 24-hour PM<sub>2.5</sub> standard based on the most recent (2006-2008) air quality monitoring data. Due to this newly monitored violation, and due to the need for additional time to collect data and evaluate the area to determine an appropriate nonattainment area boundary for the area, EPA decided to defer the area designation of Pinal County, Maricopa County (i.e., the other county comprising the Phoenix-Mesa-Scottsdale CBSA), and the seven nearby counties (i.e., Cochise, Gila, Graham, La Paz, Pima, Yavapai, and Yuma counties) surrounding the Phoenix-Mesa-Scottsdale CBSA,<sup>1</sup> for the 2006 24-hour PM<sub>2.5</sub> standard and potentially contributing to the violations of the NAAQS in Pinal County.<sup>2</sup> See Figure 1 of EPA’s May 5, 2010 Technical Support Document (TSD).

On May 10, 2010, EPA notified the Governor of Arizona of its intent to designate a portion of Pinal County nonattainment for the 2006 24-hour PM<sub>2.5</sub> NAAQS thereby modifying the recommendation for an attainment designation for Pinal previously made by Arizona. In its TSD, EPA explained that emission inventory data, combined with speciation and source apportionment data, point to agricultural activities and cattle feedlots, as well as other nearby sources of PM<sub>2.5</sub>, as primary sources contributing to PM<sub>2.5</sub> levels at the Cowtown monitor on days with exceedances of the 24-hour PM<sub>2.5</sub> NAAQS. In addition, EPA assessed air quality and meteorological data, including data on monthly exceedances of the 24-hour PM<sub>2.5</sub> standards; wind direction and speed for hourly and daily PM<sub>2.5</sub> levels; correlation of PM<sub>2.5</sub> with PM<sub>10</sub> at the Cowtown monitoring site; and the diurnal pattern of PM<sub>10</sub>, wind speed, and temperature for PM<sub>2.5</sub> exceedance days. Results of these assessments led EPA to conclude that agricultural lands and cattle feedlots, and activities associated with these operations, particularly those to the south and southwest of the monitor, contributed to PM<sub>2.5</sub> levels at the monitoring site. By contrast, EPA concluded that the emissions sources in surrounding counties and eastern Pinal County are not contributing to the violations of the 2006 24-hour PM<sub>2.5</sub> standard measured at the Cowtown monitor. Therefore, EPA proposed to designate the central-western portion of Pinal County, Arizona, as “nonattainment” for the 24-hour PM<sub>2.5</sub> NAAQS as shown in Figure 2 of EPA’s (TSD).

In a letter dated July 19, 2010, the Governor of Arizona responded to EPA’s May 10, 2010 notification of its intention to modify the state’s initial designation recommendation. The Governor argued that a nonattainment designation was unwarranted, given the evidence that exceedances of the PM<sub>2.5</sub> NAAQS are an artifact of the high concentrations of PM<sub>10</sub>, and given the progress Arizona is making in reducing PM<sub>10</sub> concentrations. EPA notes that these arguments did not address the fact that there are monitored violations of the 2006 24-hour PM<sub>2.5</sub> NAAQS in the area, nor negate EPA’s obligation under section 107(d) to designate as

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<sup>1</sup> As described in EPA’s final rule promulgating initial PM<sub>2.5</sub> designations for the 2006 24-hour standard, in evaluating areas potentially contributing to a monitored violation, EPA examined those counties located in the surrounding metropolitan statistical area (in this case, Pinal and Maricopa counties), and those nearby counties one or two adjacent rings beyond. See “Air Quality Designations for the 2006 24-hour Fine Particle (PM<sub>2.5</sub>) National Ambient Air Quality Standards,” 74 FR 58688, November 13, 2009, page 58694.

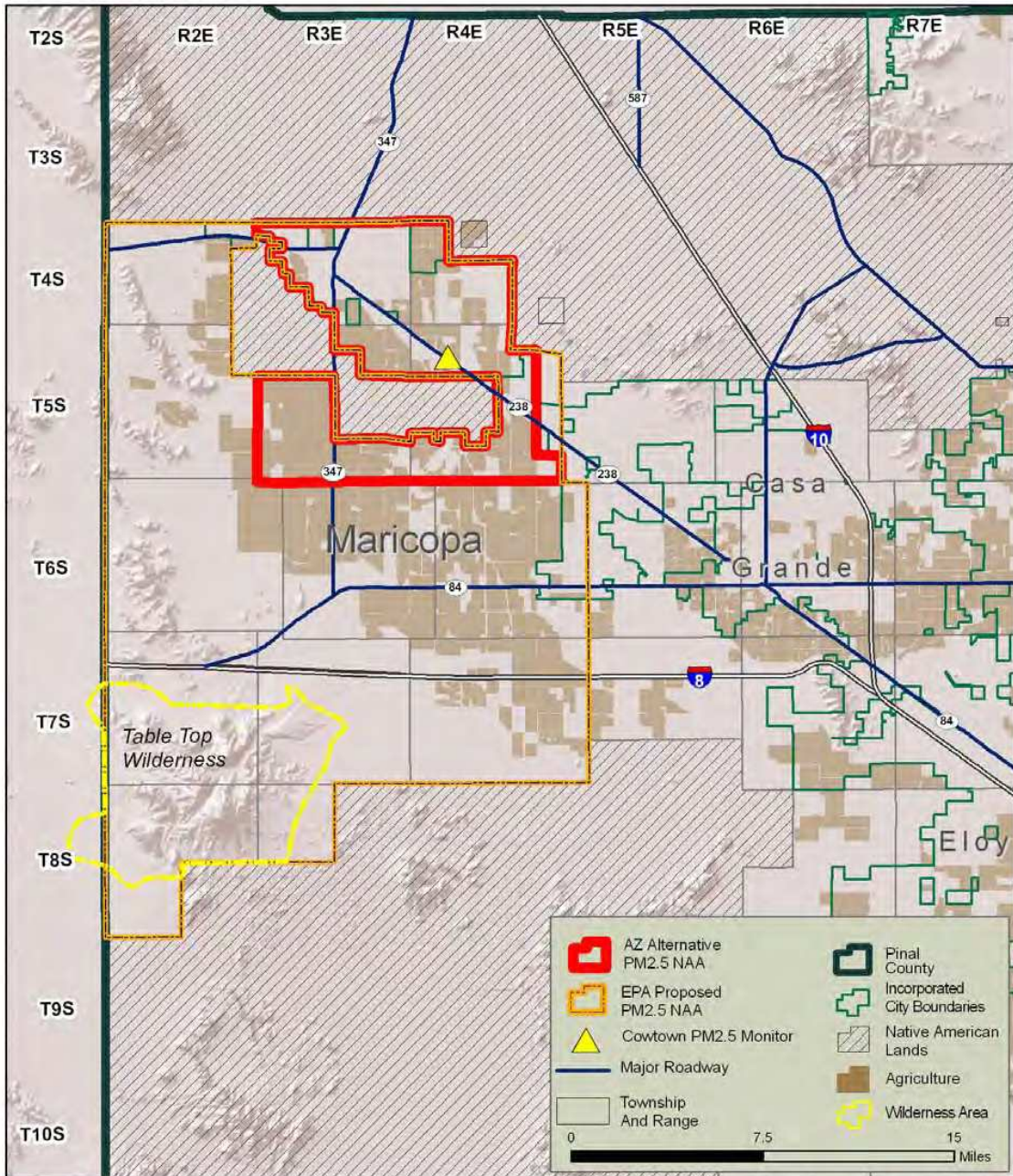
<sup>2</sup> Unless otherwise specified, references to “counties” or to “Arizona” include all lands within the geographic boundary and do not differentiate between lands under state or tribal jurisdiction.

nonattainment those areas that are violating the NAAQS, or contributing to nearby areas that are violating the NAAQS.

Anticipating that EPA would move forward with the nonattainment designation for the Pinal area, the Governor also offered a “counter-proposal” to EPA’s recommended nonattainment area boundary, which is significantly smaller than the boundary EPA originally proposed in its TSD. See Figure 2-A. In support of the Governor’s recommended alternative boundary, the Arizona Department of Environmental Quality (ADEQ) submitted a technical report entitled “Arizona Air Quality Designations, Technical Support Document, Boundary Recommendation for the Pinal County 24-hour Standard PM<sub>2.5</sub> Nonattainment Area (July 13, 2010),” herein referred to as ADEQ’s “technical report.”

Figure 2-A. Arizona's Recommended PM<sub>2.5</sub> Nonattainment Area Boundary

Pinal County  
 PM<sub>2.5</sub> Nonattainment Area Proposals:  
 Arizona Preferred Alternative



9 July 2010

Data and Cartography: Juan Delet & Phil Denee, Nancy Caroli, AOD-ADEQ

EPA has reviewed the Governor's July 19, 2010 letter and ADEQ's technical report, and as a result has made a revision to the southwestern portion of the originally proposed nonattainment boundary. We have determined that the Table Top Wilderness Area, which occupies most of the southwestern corner of our proposed nonattainment area, along with state lands to the south of the wilderness area, are not likely to be contributing to the exceedances measured at the Cowtown monitor due to the absence of sources of emissions of PM<sub>2.5</sub> or PM<sub>2.5</sub> precursors in the wilderness area. As illustrated by Figure 3-A (page 12 below) very few sources of PM<sub>2.5</sub> emissions are present in this area and future development will be limited by virtue of the restrictions that apply to wilderness areas. Given these considerations, we are revising our proposed boundary for the nonattainment area to exclude the Table Top Wilderness Area and state lands to the south of the final nonattainment area. See Figure 4-A on page 13 of this Addendum.

A summary of the main points in ADEQ's technical report and EPA's analysis of these issues follows.

### **Emissions Data**

ADEQ's July 13, 2010 technical report considered the Pinal County source apportionment study conducted by the Pinal County Air Quality Control District (PACAQCD) in 2003 and provided two back trajectories to analyze emissions transport to the Cowtown monitor. ADEQ's technical report states that the modeled days show winds from the south-southwest, likely carrying particulate matter from feedlots, agricultural fields, and unpaved roads.<sup>3</sup> Based on their analysis of PM<sub>2.5</sub> versus PM<sub>10</sub> concentrations as presented in the July 13, 2010 document, ADEQ concludes that the concentrations seen at Cowtown are attributable to nearby feedlots and agricultural activities.<sup>4</sup> In support of a smaller designated nonattainment area, ADEQ states that the other PM<sub>2.5</sub> monitors in Arizona (Casa Grande, Apache Junction, Douglas, and others shown in Figure 4 of EPA's TSD) record considerably lower concentrations and do not show exceedances that correlate with Cowtown. ADEQ concludes that this demonstrates that the emissions do not travel far and are from very localized sources.<sup>5</sup>

EPA agrees with ADEQ's conclusion that the PM<sub>2.5</sub> concentrations monitored at Cowtown are strongly influenced by local sources. However, with regard to the extent of the nonattainment area, EPA notes that CAA section 107(d)(1)(A) defines a nonattainment area as one that does not meet, or that "contributes to" ambient air quality in a nearby area that does not meet the NAAQS. The mere absence of violating monitors in other locations does not establish that sources in those locations are not contributing to nearby violations. The pollution rose in our TSD (Figure 11) indicates that most PM<sub>2.5</sub> exceedances in this area occur when resultant wind is from the southwest to southeast. Figure 3 in our TSD and Figure 5-A below show that emission sources of concern (e.g., feedlots and geologic soil sources such as agriculture and unpaved roads) are located in areas to the southwest and southeast of ADEQ's recommended nonattainment area. Thus, the emissions inventory data and related maps do not support

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<sup>3</sup> July 13, 2010 ADEQ TSD, p 13.

<sup>4</sup> Ibid, p 17

<sup>5</sup> Ibid p 14.

Arizona's recommended boundaries, but rather argue for a larger nonattainment area including the portion of the south-southwestern half of the county that contains emissions sources (e.g., feedlots and agriculture) similar to those included within ADEQ's proposed boundary.

EPA's final boundary includes areas for which emissions data show a relatively high prevalence of the types of sources (e.g., feedlots and agriculture and unpaved roads (geological soil)) contributing the most to the PM<sub>2.5</sub> emissions at Cowtown. See Figure 5-A.

### **Air Quality Data**

Both Arizona's recommended nonattainment area and EPA's proposed nonattainment area encompass the location of the violating monitor. However, section 107(d)(1)(A) of the CAA requires that areas that are contributing to violations in a nearby area must also be included within a nonattainment area. While feedlot soil makes up a large portion of the PM<sub>2.5</sub> mass measured at the Cowtown monitor, geologic soil also contributes to high concentrations of PM<sub>2.5</sub>. EPA believes that Arizona's recommended boundary excludes similar feedlot and geologic soil sources that are contributing to violations at the Cowtown monitor. To ensure that contributing sources are included in the nonattainment area, EPA has finalized a nonattainment area boundary that extends farther to the south and west of Arizona's recommended boundary. See Figure 5-A. By inclusion of these sources within the boundaries of the nonattainment area, Arizona will be evaluating these sources for potential controls in its attainment plan in order to provide for expeditious attainment of the NAAQS in this area.

### **Population Density and Degree of Urbanization**

EPA evaluates population data because it can give an indication of whether it is likely that population-based emissions in an area are contributing to PM<sub>2.5</sub> levels at the violating monitor. In addressing this factor, ADEQ's technical report notes that 95 percent of the Pinal County population lives along the Interstate-8 and Interstate-10 corridors (page 19). These corridors lie to the south and east of Arizona's recommended nonattainment area. The executive summary of ADEQ's technical report asserts that the Governor's recommended boundary "includes the population most affected by high PM<sub>2.5</sub> concentrations," but lacks supporting information. See Table ES-1. In any event, the boundary of the nonattainment area must include areas that are experiencing violations of the air quality standard, as well as those nearby areas that contribute to those violations. In this case, the violations appear to be largely driven by emissions from cattle feedlots and agricultural activities that are inversely related to population density. As a result EPA concludes that population density is not significant factor in determining the geographic extent of the nonattainment area given the facts and circumstances of this particular area.

### **Traffic and Commuting Patterns**

EPA and ADEQ agree that traffic and commuting patterns are not significant factors in determining the geographic extent of the nonattainment area given the facts and circumstances of this particular area.



## **Growth Rates and Patterns**

Because cattle feedlots, agriculture, and unpaved roads dominate the sources included in the emissions inventory that are contributing to violations in this area, EPA does not believe that growth rates and patterns are a significant factor with respect to determining the boundary of this nonattainment area. ADEQ, by pointing to the proximity of Indian country and publicly-owned lands as a buffer from contiguous development, reaches the same conclusion.

## **Meteorology**

In developing its boundary decision, EPA also considered additional meteorological evidence submitted by ADEQ. Analyses performed by ADEQ are discussed in ADEQ technical report section 3.4 on Air Quality Data (pages 11 - 17) and in Appendix B. These included source apportionment, HYSPLIT trajectories, consideration of how a plume from a distant source would affect Cowtown and other monitors, comparison of concentrations between different 24-hour PM<sub>2.5</sub> monitoring sites, and comparison of PM<sub>10</sub> and PM<sub>2.5</sub> temporal variation. Some of these analyses are similar to, and support, the conclusions reached by EPA discussed above, i.e. that Cowtown exceedances appear to be driven by a different mix of sources than those affecting the other monitoring sites in the area, with the dominant component caused by local sources. However, EPA does not believe these analyses provide sufficient basis for reducing the size of the nonattainment area proposed by EPA. EPA has already limited the boundary to a portion of Pinal County that contains the sources that appear to be contributing to the violations at the Cowtown monitor. Further reduction in the size of the boundaries would result in the exclusion of sources of the types that available evidence indicates contribute to the violations.

The source apportionment data, based on the 2003 PCAQCD study using the Chemical Mass Balance model, provides evidence that feedlots are the most important emission source for Cowtown exceedances, and are responsible for 49% of the monitored value. Samples from other monitoring sites have a far lower proportion of feedlot emissions. ADEQ uses this as evidence of Cowtown's uniqueness, and also to support their position that emissions from feedlots are not widely transported. However, the same source apportionment analysis shows a soil contribution of 24% at Cowtown. This soil contribution may have come from locations beyond the immediate vicinity of the Cowtown monitor. In setting area boundaries, the CAA directs EPA to include locations that likely contribute to exceedances at the violating monitor(s). EPA does not believe that the 2003 PCAQCD source apportionment study supports a smaller area than that proposed by EPA.

ADEQ also performed a back trajectory analysis using the HYSPLIT model for seven different PM<sub>2.5</sub> exceedance days (ADEQ TSD Appendix B, pp.17-25). Air parcels arriving at the Cowtown monitor were traced back in time 6, 12, 18, and 24 hours to find their origin and to check for emission sources the parcels may have passed over. ADEQ concludes that in all cases there are no obvious PM<sub>2.5</sub> sources along the transport path. It is not clear what criteria ADEQ applied to check for sources, but even if there are no apparent point sources, many of the trajectories do pass over agricultural land and over other areas of open land. Both agricultural and open land could be contributing PM<sub>10</sub>, PM<sub>2.5</sub>, and PM<sub>2.5</sub> precursors to the air parcels arriving at Cowtown. For over half the trajectories, parcel arrival times (indicated by short line segments



on the graphs of hourly PM<sub>10</sub> over time, which accompany each HYSPLIT map) correspond to elevated PM<sub>10</sub> concentrations.<sup>6</sup> EPA does not believe that the HYSPLIT evidence definitively proves or disproves the hypothesis of a local-only contribution to exceedances. Nor does EPA believe that the HYSPLIT analyses undermine the area boundary proposed by EPA.

Appendix B of ADEQ's technical report also discusses (pages 26 - 32) the width of a plume from a hypothetical source 100 kilometers away, showing that it would be so wide by the time it reached Cowtown and Casa Grande, that it would likely affect monitors at both locations. ADEQ points out that this analysis is inconsistent with the fact that only the Cowtown monitor experiences exceedances. ADEQ presents the plume analysis as evidence that medium- and long-range transport are not responsible for the Cowtown exceedances. EPA agrees that this analysis provides some indication of the lack of difference in monitor impact from a somewhat distant point source. However, the longest dimension of EPA's final boundary is approximately 40 km, which is substantially less than the 100 km examined by ADEQ. Finally, EPA is not claiming that emissions from moderately distant locations dominate Cowtown concentrations, but rather that these emissions contribute to monitored violations of the air quality standard. Thus, EPA does not agree that the ADEQ analysis justifies reducing the final area boundary.

Other analyses performed by ADEQ show that concentrations at Cowtown are statistically significantly different than those at other monitors (Appendix B, pages 28 - 31), and that there is a strong correlation between PM<sub>2.5</sub> and PM<sub>10</sub> at Cowtown (Appendix B, pages 32 - 34). EPA agrees with the findings that the same sources, likely local feedlots, constitute the major portion of both PM<sub>2.5</sub> and PM<sub>10</sub> emissions at the Cowtown monitor and supports the conclusion that Cowtown has a different mix of sources than the other 24-hour PM<sub>2.5</sub> monitoring sites in Arizona. However, as shown by the source apportionment data and EPA's analysis of the diurnal variation of PM<sub>10</sub> and wind speed for certain exceedance days where high PM<sub>10</sub> is associated with high wind speed (e.g., 02-23-2007, 04-12-2007, 10-09-2007), there appears to be a soil contribution not associated with nearby feedlots, and there remains the potential for dust transport from moderately distant land. While ADEQ has presented evidence for a localized source causing the PM<sub>2.5</sub> exceedances, EPA believes that there is some transport contribution from other locations within the final area boundary.

## **Geography and Topography**

The ADEQ technical report section 3.3 (p.11) on Geography and Topography discusses the same mountain ranges discussed in the EPA TSD. EPA believes these mountain ranges are partial barriers to the transport of air pollution. Other than the Estrella Mountains to the north, ADEQ did not characterize these ranges as barriers to transport. However, the absence of barriers does not support an area smaller than that recommended by EPA. The ADEQ technical report also presents concentrations below the NAAQS at the Apache Junction and Casa Grande monitors and interprets this as evidence that the influence of emissions near Cowtown does not extend for

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<sup>6</sup> Hourly PM<sub>2.5</sub> data are not available for the Cowtown site, but hourly PM<sub>10</sub> data are. Because the PM<sub>2.5</sub> at the Cowtown site is mainly from sources associated with primary PM<sub>10</sub> (74% feedlot material and soil per ADEQ source apportionment), there is a correlation between 24-hour PM<sub>10</sub> and PM<sub>2.5</sub> levels at the Cowtown site. As a result, PM<sub>10</sub> data can provide useful information about PM<sub>2.5</sub>. See page 26 of EPA's TSD and Appendix B, page 11, figure 6 of ADEQ's technical report.

any significant distance from Cowtown. In setting area boundaries, however, EPA includes locations that may contribute to exceedances at Cowtown, rather than those locations without violating monitors to which Cowtown sources may contribute. EPA believes that the additional evidence presented by ADEQ for this factor does not support a smaller boundary area than proposed by EPA; however, upon further analysis we have concluded that the topography of the Table Top Wilderness Area would inhibit the transport of air pollution from the state lands located immediately to its south, and have revised the nonattainment area boundary accordingly.

### **Jurisdictional Boundaries**

The State, lacking jurisdiction over tribal lands, properly excludes Indian country from its recommended nonattainment area. It also notes that, “since the violating monitor lies within the boundaries of the City of Maricopa and near Casa Grande, the incorporated boundaries of these municipalities were taken into account. The [State’s] recommended nonattainment area includes almost all of the City of Maricopa and excludes all of Casa Grande.”

The northern portion of the eastern boundary of EPA’s nonattainment area partially coincides with Arizona’s proposed boundary. However, EPA’s boundary includes all state lands within T5S, R4E, whereas Arizona’s proposed boundary excludes section 12, 13, 24, and 25 of T5S, R4E. Although ADEQ’s technical report does not explicitly make the connection, it appears that these sections were excluded out in order to avoid including portions of Casa Grande in the nonattainment area.

Because the sources that are the primary contributors to PM<sub>2.5</sub> are regulated by the State and County, rather than by municipalities, EPA does not believe the inclusion of a portion of Casa Grande within the nonattainment area (or conversely, the exclusion of a portion of the City of Maricopa as Arizona has proposed), presents jurisdictional challenges. Further, municipal boundaries are subject to change. As a result, in this case EPA does not believe that municipal boundaries are a major factor in determining the boundary of the nonattainment area. By including all state lands within T5S, R4E, additional agricultural lands, some of which lie within Casa Grande’s incorporated boundaries, are included in the nonattainment area.

### **Level of Control of Emissions Sources**

EPA noted in our TSD that we were not aware of any information regarding emissions controls that would have relevance to assessing source contribution to the monitored violations. As a result, the level of control of emissions sources was not considered to be a factor in determining the boundary of the nonattainment area. ADEQ’s technical analysis presented general information regarding air quality modeling and monitoring, and permitting and inspection programs, but did not use that information to support its proposed boundary.

### **Conclusion**

Based on our review of the Governor July 19, 2010 letter and ADEQ’s technical report, EPA has made a revision to the southwestern portion of the originally proposed nonattainment boundary. We have determined that the Table Top Wilderness Area, which occupies most of the

southwestern corner of our proposed nonattainment area, along with state lands to the south of the wilderness area, are not likely to cause or contribute to the exceedances measured at the Cowtown monitor. As a result, the final nonattainment area boundary excludes this area. Figures 4-A and 6-A illustrate the revision to the nonattainment area boundary.

Figure 3-A. Emissions Sources and Revision to EPA's Proposed PM<sub>2.5</sub> Nonattainment Area Boundary.

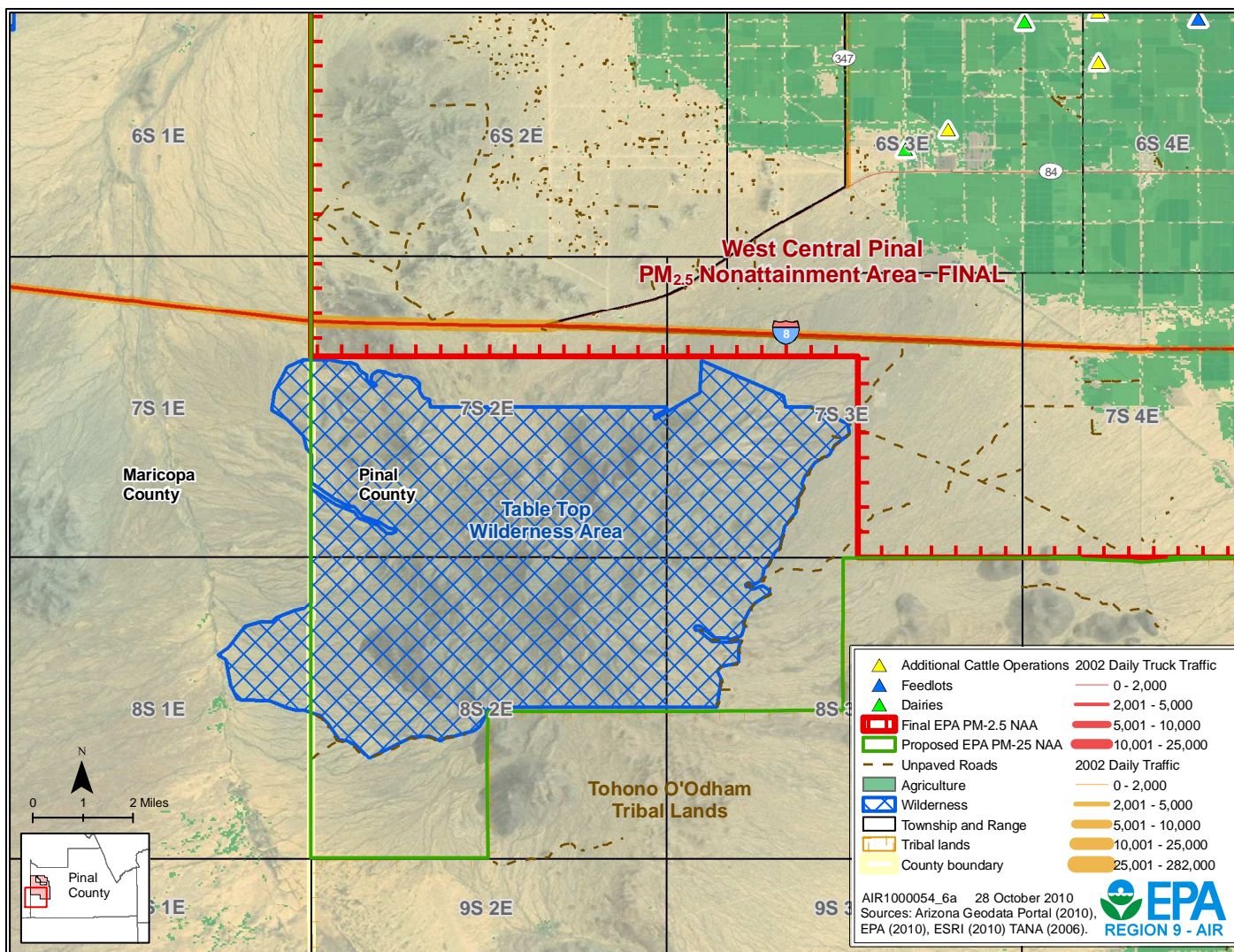




Figure 4-A. Detail of Revision to EPA’s Proposed PM2.5 Nonattainment Area Boundary.

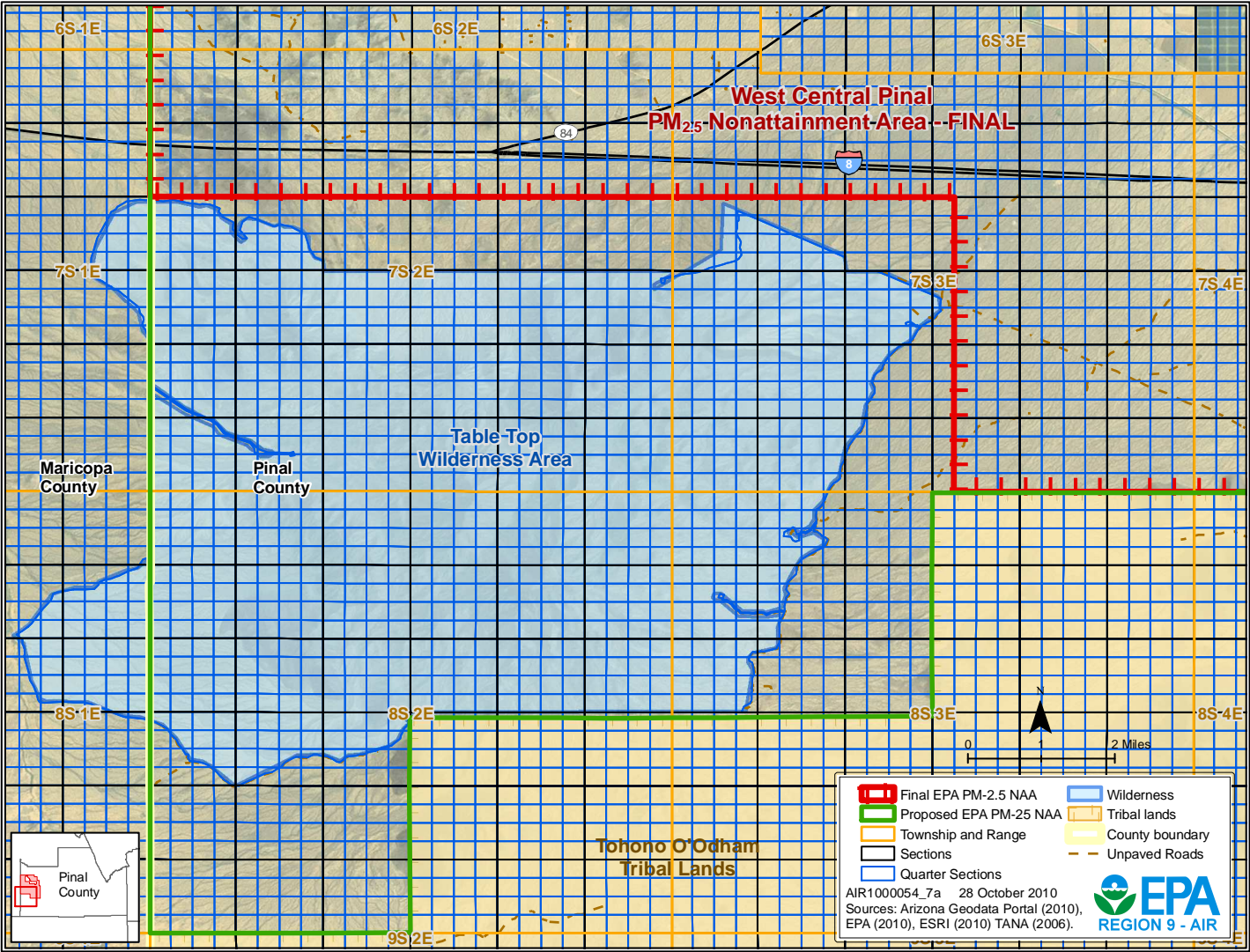


Figure 5-A. Final West-Central Pinal PM<sub>2.5</sub> Nonattainment Area and Sources of Emissions.

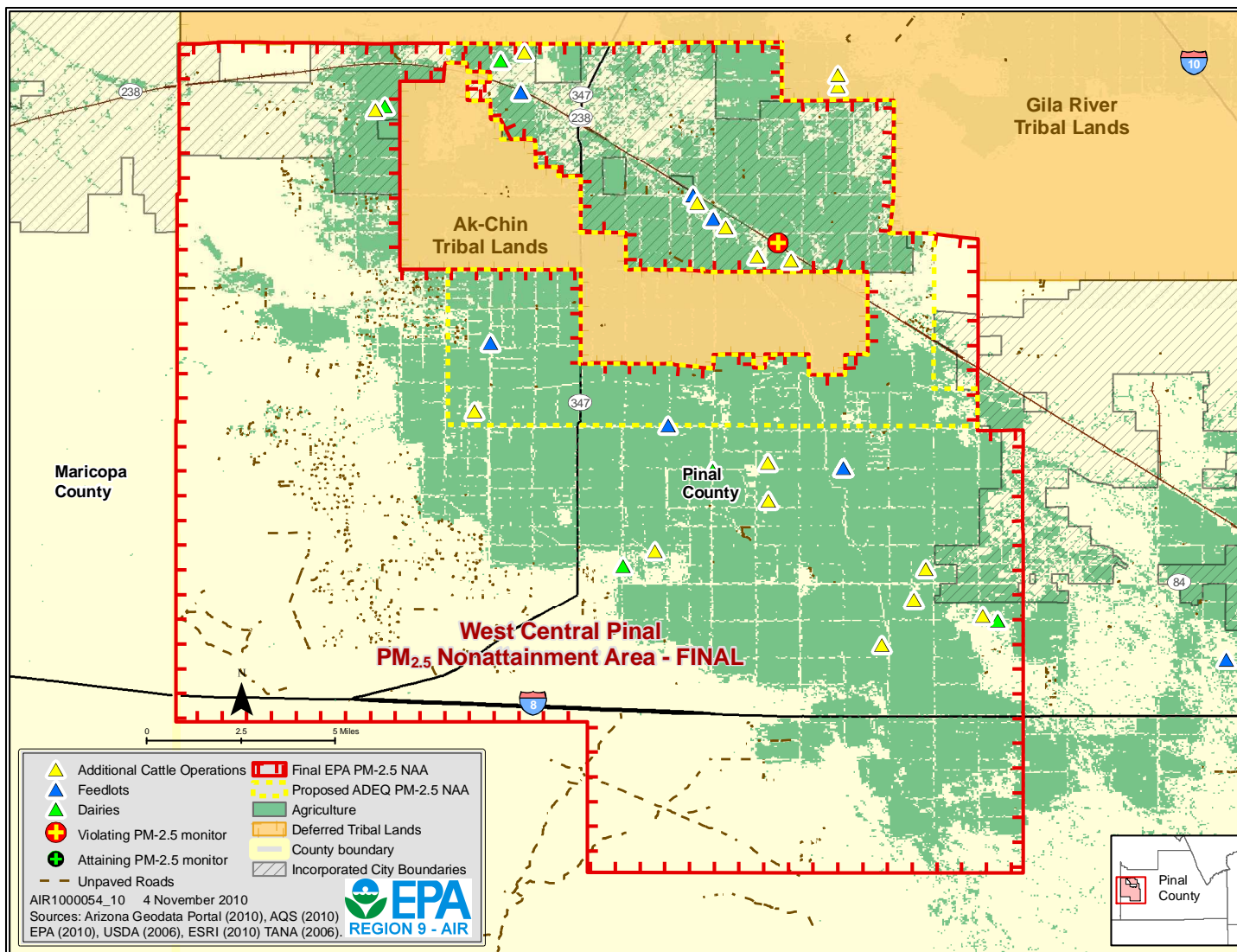




Figure 6-A. Pinal County and West-Central Pinal PM<sub>2.5</sub> Nonattainment Area.

