

PUBLIC REVIEW DRAFT

**PROGRESS REPORT FOR THE  
STATE IMPLEMENTATION PLAN  
FOR REGIONAL HAZE**

**ALBUQUERQUE - BERNALILLO COUNTY,  
NEW MEXICO**

**April 8, 2016**

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**List of Abbreviations and Acronyms**

A BC RH SIP	Albuquerque - Bernalillo County Section 309 Regional Haze SIP
AQP	Air Quality Program, Environmental Health Department, City of Albuquerque
BART	Best Available Retrofit Technology
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	Carbon monoxide
dv	Deciviews
EGU	Electrical generating unit
EHD	Environmental Health Department, City of Albuquerque
EPA	Environmental Protection Agency
Fed. Reg.	Federal Register
GCVTC	Grand Canyon Visibility Transport Commission
IMPROVE	Interagency Monitoring of Protective Visual Environments
NAAQS	National Ambient Air Quality Standards
NEI	National Emissions Inventory
NM	New Mexico
NM RH	New Mexico Regional Haze (Progress Report)
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMSA	New Mexico Statutes Annotated

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NO <sub>2</sub>	Nitrogen dioxide
NO <sub>x</sub>	Nitrogen oxides
PM	Particulate matter
PM <sub>2.5</sub>	Particulate matter 2.5
PM <sub>2.5</sub>	Particulate matter 2.5
RH	Regional Haze
ROA	Revised Ordinances of the City of Albuquerque
SIP	State Implementation Plan
SLEIS	State and Local Emissions Inventory System
SO <sub>2</sub>	Sulfur dioxide
TPY (or tpy)	Tons per year
VOCs	Volatile organic compounds
WB	Wind blown
WRAP	Western Regional Air Partnership
WRAP TSS	Western Regional Air Partnership Technical Support System web site

## 1.0 INTRODUCTION

This document is the five year progress report on implementation of the U.S. Environmental Protection Agency's (EPA) Regional Haze Rule in Albuquerque and Bernalillo County, as required by federal regulation at 40 CFR § 309(d)(10). This report builds upon information presented in the five year progress report for the state of New Mexico, which is attached as Appendix B.

This introduction describes the background and general requirements of the Regional Haze Rule, as well as the specific requirements that must be addressed in this progress report. The introduction concludes with a brief overview of visibility conditions at parks and wilderness areas in New Mexico protected under the Regional Haze Rule.

Regional haze is pollution that impairs visibility over a large region, including national parks, forests, and wilderness areas. Regional haze is caused by sources and activities emitting fine particles and their precursors, often transported over large regions. Particles affect visibility through the scattering and absorption of light. Reducing fine particles in the atmosphere is an effective method of improving visibility. In New Mexico, the most important sources of haze-forming emissions are coal-fired power plants, oil and gas development, wildland fires, and windblown dust.

Visibility impairment is tracked using a Haze Index in units of deciviews (dv). A deciview is the measure of visibility used in the Regional Haze Rule. It quantifies changes in visibility along a human being's line of sight: a one deciview change in visibility is approximately equivalent to a 10% change in the fraction of light lost along a sight path due to scattering and absorption by gases and particles. A one deciview change in visibility is generally considered to be the minimum change the average person can detect.<sup>1</sup> A deciview is related to the cumulative sum of visibility impairment from individual aerosol species (i.e., pollutants) as measured by monitors in the Interagency Monitoring of Protective Visual Environments (IMPROVE) network. Emissions which affect visibility include a wide variety of natural (e.g., wildland fires) and anthropogenic, or man-made, sources (e.g., industrial sources and vehicles).

In Section 169A of the 1977 Amendments to the Clean Air Act (CAA), Congress established a program for protecting visibility in 156 mandatory Federal "Class I" areas. Class I areas consist of national parks exceeding 6000 acres, wilderness areas and national memorial parks exceeding 5000 acres, and all international parks that were in existence on August 7, 1977. In the 1990 Amendments to the CAA, Congress added Section 169B and called on the U.S. Environmental Protection Agency (EPA) to issue rules addressing regional haze impairment from manmade air pollution and establishing a comprehensive visibility protection program for Class I areas.

The EPA promulgated the Regional Haze Rule on July 1, 1999.<sup>2</sup> States are required under 40 CFR § 51.308 to submit state implementation plans (SIPs) to the EPA that set out each state's plan for complying with the Regional Haze Rule. States must demonstrate reasonable progress toward meeting the national goal of a return to natural visibility conditions by 2064. The rule directs states to graphically show what would be a "uniform rate of progress", also known as the "glide path," toward natural conditions for each Class I area within the state and certain ones outside the state.

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<sup>1</sup> The explanation of the deciview metric in this paragraph is based on Western Regional Air Partnership Regional Haze Rule Summary Report, June 28, 2013, p. iv, available at <http://www.wrapair2.org/RHRPR.aspx>. For a general overview of the science of measuring visibility at national parks and wilderness areas, see William C. Malm, *Introduction to Visibility*, available at <http://www.epa.gov/visibility/pdfs/introvis.pdf>.

<sup>2</sup> 64 Fed. Reg. 35,714 (July 1, 1999).

Under 40 CFR § 51.309, the rule also provides an optional SIP approach to nine western states, and local air agencies within those states, to implement programs based on an alternative to the “uniform rate of progress approach” described above. This alternative approach is based on incorporating emission reduction strategies developed by the Grand Canyon Visibility Transport Commission (GCVTC). These strategies were designed primarily to improve visibility in 16 Class I areas on the Colorado Plateau, including San Pedro Parks Wilderness Area in New Mexico. This was the first phase of Regional Haze Rule requirements. Its effect was to require that a Section 309 SIP adopt the control measures recommended by the GCVTC. Adoption of these control measures would be deemed sufficient to constitute “reasonable progress” toward improving visibility at the 16 Class I areas on the Colorado Plateau,<sup>3</sup> with each Section 309 SIP required to project visibility improvement that would occur at these areas as a result of implementing the GCVTC measures.<sup>4</sup> In their original form, the Section 309 requirements did not require a state to address visibility improvement at any other Class I area.

To implement these initial requirements of 40 CFR § 51.309, Albuquerque - Bernalillo County submitted a Regional Haze SIP (Section 309 SIP) to EPA in December 2003.<sup>5</sup> This 2003 Section 309 SIP focused primarily on stationary source sulfur dioxide (SO<sub>2</sub>) emission reductions, in order to achieve the original Regional Haze goal of improving visibility at the 16 Class I areas on the Colorado Plateau identified by the GCVTC, including San Pedro Parks Wilderness in New Mexico.

Later, as a result of litigation, EPA required Section 309 SIPs also to address visibility conditions at additional Class I areas, besides the 16 Colorado Plateau areas, under 40 CFR § 51.309(g). These additional areas are: (1) those that are located within the state and (2) those located outside the state but may potentially be affected by the state’s emissions of haze causing pollutants.<sup>6</sup> These areas were to be identified by the states in their proposed SIPs, which were subject to EPA approval. In identifying these areas, states had significant discretion to determine which areas were potentially impacted by the state’s emissions, but the determination had to be made according to criteria and methods set by EPA.<sup>7</sup> Note that Albuquerque - Bernalillo County is treated like a “state” for purposes of implementing the Regional Haze Rule.<sup>8</sup>

To meet these requirements, Albuquerque and Bernalillo County revised its Section 309 SIP (in 2008 and 2011) so that it now has the following additional features (beyond the control strategies recommended by the GCVTC). First, the Section 309 SIP for Albuquerque - Bernalillo County does not formulate specific visibility improvement goals, referred to as “reasonable progress goals,” for particular Class I areas, because there are no such areas within the city or county.<sup>9</sup> Second, the Albuquerque - Bernalillo County Section 309 SIP nevertheless addresses its emissions impact on reasonable progress goals, and related emission reduction

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<sup>3</sup> 40 CFR § 309(a).

<sup>4</sup> 40 CFR § 309(d)(2).

<sup>5</sup> The State of New Mexico submitted a separate Section 309 SIP, also in December 2003.

<sup>6</sup> 77 Fed. Reg. 24,768, 24,775 (April 25, 2012) (EPA proposed rule approving Albuquerque - Bernalillo County Section 309 SIP, describing requirements of 40 CFR § 309(g)).

<sup>7</sup> *Id.*

<sup>8</sup> On the definition of Albuquerque - Bernalillo County as a “state” for Regional Haze Rule purposes, see Section 309 Regional Haze State Implementation Plan Element, Albuquerque - Bernalillo County New Mexico, Adopted by Air Quality Control Board June 8, 2011, (cited hereafter as A-BC RH SIP), pp. 4-6.

<sup>9</sup> 77 Fed. Reg. 24,768, 24,790 (Apr. 25 2012) (EPA proposed rule approving Section 309 SIP for Albuquerque - Bernalillo County).

goals, for Class I areas outside city and county borders that may be affected by emissions from within those borders.<sup>10</sup> The revised SIP made a determination that these areas, which are addressed in this progress report, are: the San Pedro Parks Wilderness Area and eight additional Class I areas in New Mexico: Bandelier Wilderness, Bosque del Apache Wilderness, Carlsbad Caverns National Park, Gila Wilderness, Pecos Wilderness, Salt Creek Wilderness, Wheeler Peak Wilderness, White Mountain Wilderness.<sup>11</sup>

EPA approved these revisions to the Albuquerque - Bernalillo County Regional Haze Section 309 SIP in November 2012.<sup>12</sup> The SIP is attached to this progress report as Appendix A.

### **1.1 State Implementation Plan Requirements for the 5-Year Progress Report**

While the preceding paragraphs described the background and general requirements of the Regional Haze Rule, this subsection addresses the particular topics that must be addressed in this five year progress report.

Provisions of the Regional Haze Rule contained in 40 CFR § 51.308(g) and (h) and 40 CFR § 51.309(d)(10) require that each state submit a progress report five years after the submittal of their initial Regional Haze SIP. The progress report must be treated as if it were a SIP revision, subject to federal requirements regarding notice and an opportunity for hearing that provide the public with the opportunity to comment upon the progress report and request a public hearing.<sup>13</sup> The progress report must include a determination regarding the adequacy of the existing Section 309 Regional Haze SIP. Note that even though this report is considered a “SIP revision” for purposes of notice and opportunity to comment and request a hearing, and must be submitted to EPA as such, the determination of adequacy may still conclude that no revisions to the Section 309 Regional Haze SIP are necessary.

This progress report for Albuquerque and Bernalillo County has been prepared to fulfill all applicable requirements pertaining to the five year progress report for the Section 309 Regional Haze SIP. In sum, this report must determine whether or not the existing SIP is adequate to assure reasonable progress toward visibility improvement at New Mexico’s nine class I areas and related emission goals, or, in the alternative, whether the SIP is or may be inadequate to achieve such progress.<sup>14</sup> To make this determination, this report must assess whether emissions from within the city and county are or may be impeding the ability of the state of New Mexico to meet its own, separate reasonable progress goals for emissions and for visibility at the nine mandatory Class I areas within New Mexico’s borders.<sup>15</sup> If this assessment reaches such a conclusion,

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<sup>10</sup> 77 Fed. Reg. 24,768, 24,790 (Apr. 25, 2012).

<sup>11</sup> A-BC RH SIP, pp. 104-105. Note that the Section 309 SIP for the city and county describes control measures that do not directly address visibility at Class I areas beyond the boundaries of the State of New Mexico, other than the 16 Class I areas of the Colorado Plateau identified by the GCVTC.

<sup>12</sup> 77 Fed. Reg. 71,119 (November 29, 2012).

<sup>13</sup> 40 CFR §§ 51.102 and 51.103.

<sup>14</sup> 40 CFR §§ 309(d)(10)(i), 309(d)(10)(i)(F), 309(d)(10)(ii)(A), 309(d)(10)(ii)(D).

<sup>15</sup> 40 CFR § 309(d)(10)(i)(F). EPA’s approval of the Section 309 SIP for Albuquerque and Bernalillo County makes clear that the city - county SIP acts as a component within the overall regional haze plan for the state as a whole. 77 Fed. Reg. 24,768, 24,769 (Apr. 25, 2012) (the SIP “is a necessary component of the regional haze plan for the entire State of New Mexico and is also necessary to ensure the requirements of section 110(a)(2)(D) of the of the CAA are satisfied for the entire State of New Mexico”). Thus, the purpose of the Albuquerque - Bernalillo County SIP is not to address city and county emissions in isolation but to assure reasonable progress goals for visibility, and related emissions goals, at the nine Class I areas located within New Mexico. 77 Fed. Reg. 24,768, 74,790 (Apr. 25, 2012). This progress report, therefore, must assess not trends in emissions from the city and county in and of themselves but



then the Section 309 SIP for the city and county must be revised in order to assure that emissions and visibility goals will be met.<sup>16</sup>

Consistent with the above regulatory framework, this progress report concludes that the current Section 309 SIP for Albuquerque and Bernalillo County is adequate to address emissions and visibility goals for New Mexico's nine Class I areas. As already noted in the New Mexico progress report prepared separately by the New Mexico Environment Department (NMED), the state has determined that its regional haze plan is able to achieve statewide reasonable progress goals. Building upon the NMED report, this new report for Albuquerque - Bernalillo County finds that emissions of key haze causing pollutants from within the city and county will not alter the determination made by the state and will not impede statewide emissions and visibility progress. Based on that assessment, this progress report for Albuquerque and Bernalillo County concludes that the city - county Regional Haze SIP is sufficient to ensure continued reasonable progress toward overall emissions and visibility goals for the rest of the state. Therefore, no revisions to the SIP are needed at this time.<sup>17</sup>

Under 40 CFR 309(d)(10), a Regional Haze five year progress report must address the following topics: 1) the status of implementation of control measures included in the Section 309 SIP; 2) a summary of emission reductions achieved through the implementation of control measures; 3) an assessment of visibility conditions at Class I areas; 4) an analysis of the changes in emissions of visibility impairing pollutants; 5) an assessment of significant changes in emissions that may have limited or impeded progress in improving visibility; 6) an assessment of whether the current SIP elements and strategies are sufficient to meet reasonable progress goals; and 7) a review of the state's visibility monitoring strategy.

Note that, according to EPA's Guidance on preparation of the five year progress reports, this report for Albuquerque - Bernalillo County is not required to address the above item 3), an assessment of visibility conditions, because there are no federal Class I areas within the city or county.<sup>18</sup> Similarly, this progress report is not required to address item 7), a review of the state's visibility monitoring strategy, because there are no Class I areas to be monitored in the city or county.<sup>19</sup> Where reference to visibility conditions at Class I areas in New Mexico or the Colorado Plateau is necessary, this report relies on information and data presented in other sources, as explained below and in the main body of the report.

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instead whether those emissions are likely to impact reasonable progress goals for statewide emissions and for visibility at New Mexico's Class I areas. *Id.* at 24,789 (Apr. 25, 2012) (stating that the progress report "will assess whether current programs are achieving reasonable progress in Class I areas outside [Albuquerque and] Bernalillo County that are affected by emissions from within [Albuquerque and] Bernalillo County," i.e. the nine New Mexico Class I areas listed in the city - county's Section 309 SIP).

<sup>16</sup> 40 CFR § 309(d)(10)(ii)(D).

<sup>17</sup> The contents of the five year progress report must provide "[a]n assessment of whether the current implementation plan elements and strategies are sufficient to enable the State, or other States with mandatory Federal Class I areas affected by emissions from the state, to meet all established reasonable progress goals." 40 CFR 309(d)(10)(i)(F). Section 3.7 of this progress report makes this assessment, finding that the current SIP is sufficient. If such an assessment of sufficiency is made, the report "must provide to the Administrator (of EPA) a negative declaration that further revision of the existing implementation plan is not needed at this time." 40 CFR 309(d)(10)(ii)(A). Section 3.9 of this progress report makes this negative declaration.

<sup>18</sup> U.S. Environmental Protection Agency, General Principles for the 5-Year Regional Haze Progress Reports for the Initial Regional Haze State Implementation Plans (Intended to Assist States and EPA Regional Offices in Development and Review of the Progress Reports), April 2013, p. 8. Available at [http://www.4cleanair.org/Documents/haze\\_5year\\_4-10-13.pdf](http://www.4cleanair.org/Documents/haze_5year_4-10-13.pdf) (hereafter referred to as EPA Guidance).

<sup>19</sup> EPA Guidance, p. 17.

The technical data on emissions and visibility discussed in this progress report are primarily from three sources. The first is the New Mexico five year progress report, attached to this report as Appendix B. The second is the “*Western Regional Air Partnership Regional Haze Rule Reasonable Progress Summary Report*” (Appendix F) developed by the Western Regional Air Partnership (WRAP)<sup>20</sup> in June of 2013. The third is the WRAP Technical Support System (TSS), an online database available to the public at <http://vista.cira.colostate.edu/TSS/Default.aspx?code=1>. Together, these three sources provide extensive data and information on visibility conditions at western Class I areas and emission of haze causing pollutants in western states and in Albuquerque and Bernalillo County.

This report also draws upon emissions data from the State and Local Emissions Inventory System (SLEIS) and the National Emissions Inventory (NEI) and on related data kept internally by the City of Albuquerque Environmental Health Department.

The WRAP *Summary Report* was prepared specifically for use with Regional Haze Rule progress reports. The WRAP compiled it on behalf of the 15 western state members in the WRAP region to provide the technical basis for use by states to develop the 2013 five year reasonable progress reports for the 116 Federal Class I areas located in the western states. Data are presented in this report, and the progress report for New Mexico, on a regional, state, and Class I area specific basis. This data characterizes the difference between 2000-2004 baseline conditions and current conditions, which are represented by more recent available data at the time the WRAP *Summary Report* was prepared. The WRAP *Summary Report* data presents a successive 5-year average for the period 2005-2009. Note that the New Mexico five year progress report also includes certain visibility data for Class I areas through 2011. The reader should refer to the New Mexico progress report for that data, and to the WRAP TSS web site for additional data.

In addition to the requirements of 40 CFR § 309(d)(10), this progress report must adhere to 40 CFR § 51.308(i), which mandates continuing consultation between the States and federal land managers (FLMs) on the implementation of the visibility protection program. Such consultation must address preparation of the five year progress reports, development and review of implementation plan revisions, and the implementation of other programs having the potential to contribute to impairment of visibility in any mandatory Federal Class I area within the State. This progress report is being prepared in consultation with federal managers, as required by 40 CFR § 51.308(i).

Pursuant to the Tribal Authority Rule, any Tribe whose lands are within the boundaries of Albuquerque or Bernalillo County has the option to develop a Regional Haze Tribal Implementation Plan (TIP) for their lands to assure reasonable progress in the nine (9) Class I areas in New Mexico. Accordingly, no provisions of this progress report shall be construed as being applicable to Indian Country.

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<sup>20</sup> The WRAP is a collaborative effort of tribal governments, state governments and various federal agencies, including the U.S. Environmental Protection Agency. The goal of WRAP is to provide data and advice on implementation of air quality regulation across the western states, on a variety of regulatory issues and topics. WRAP provides technical and policy tools for the western states and tribes to comply with the Regional Haze Rule. EPA is a participant in the process of developing WRAP data and information resources. See the WRAP Charter, <http://www.wrapair2.org/pdf/WRAP%20Charter%20approved%20by%20the%20WRAP%20Membership%20July%202014.pdf>. Further detailed information regarding WRAP support of air quality management issues for western states is provided on the WRAP website ([www.wrapair2.org](http://www.wrapair2.org)). Data summary descriptions and tools specific to Regional Haze Rule support are available on the WRAP Technical Support System website (<http://vista.cira.colostate.edu/tss/>).

## 2.0 NEW MEXICO CLASS I AREAS

This section briefly examines trends in visibility at Class I areas within New Mexico. Although the Section 309 SIP for Albuquerque and Bernalillo County is not required to include reasonable progress goals for visibility improvement in these areas, the SIP is nevertheless required to include control measures that will address visibility improvements at Class I areas in New Mexico (in addition to visibility at areas on the Colorado Plateau).<sup>21</sup> Thus, a general overview of New Mexico visibility trends is presented here to provide context for the main body of this report. The reader should consult the full text of the New Mexico five year reasonable progress report for further details.

New Mexico has nine Class I areas within its borders: Bandelier Wilderness, Bosque del Apache National Wildlife Refuge, Carlsbad Caverns National Park, Gila Wilderness, Pecos Wilderness, Salt Creek Wilderness, Wheeler Peak Wilderness, White Mountain Wilderness, and San Pedro Parks Wilderness (Figure 2.1). San Pedro Parks Wilderness is the only Class I area in New Mexico that is located on the Colorado Plateau.

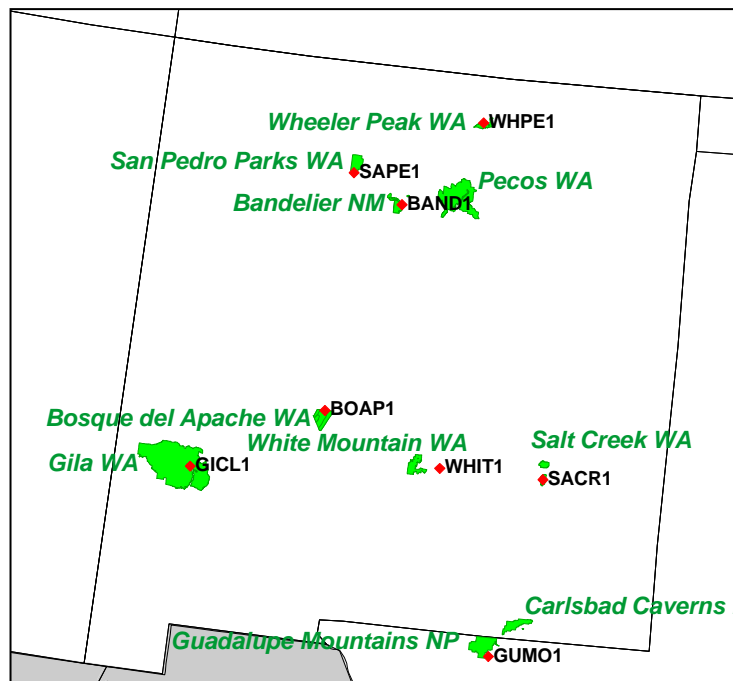


Figure 2.1. Map Depicting Federal Class I Areas and Representative IMPROVE Monitors in New Mexico.<sup>22</sup>

In order to address the potential impact of Albuquerque and Bernalillo County emissions on Class I areas not only in New Mexico but in other states as well, the Albuquerque - Bernalillo County Air Quality Control Board (Air Board) and Albuquerque Environmental Health Department (EHD) work with the WRAP. Through WRAP, western states work together to assess state-by-state contributions to visibility impairment across inter-state borders. This progress report and that of the state of New Mexico address the impact of emissions on class I areas both within and beyond New Mexico's borders.

<sup>21</sup> A-BC RH SIP, pp. 5-8, 103-111; 77 Fed. Reg. 24,778, 24,790-24,791 (April 25, 20113) (proposing EPA approval of the SIP and discussing requirements that it address impact of city and county emissions on New Mexico Class I areas).

<sup>22</sup> NM RH Progress Report, p. 4.

## **2.1 Progress Towards Reasonable Progress Goals (40 CFR § 51.309(d)(10)(i))**

The Section 309 and 309(g) Regional Haze SIPs for the state of New Mexico (Appendices E and F) establish reasonable progress goals for 2018, specifying quantitative visibility improvement goals for each Class I area in the state. These goals consist of numerical targets that each area must meet by 2018 on the 20% worst days for visibility and on the 20% best days. Progress toward meeting these goals is measured by data gathered from a nationwide monitoring network, the Interagency Monitoring of Protected Visual Environment (IMPROVE) network.

The state of New Mexico's five year reasonable progress report presented IMPROVE monitoring data indicating that all of New Mexico's Class I areas show visibility improvement on the 20% worst and best days. The progress report stated that, based on available data, all but two of the Class I areas, San Pedro Parks and Salt Creek wilderness areas, had already surpassed the 2018 Reasonable Progress Goal established in the New Mexico's Section 309 and 309(g) Regional Haze SIPs for the 20% worst days.

This Albuquerque - Bernalillo County progress report includes updated visibility data from the WRAP that became available after the New Mexico Environment Department submitted the state of New Mexico progress report to EPA. Section 3.4 of this report presents this updated visibility in detail.

Additional data on visibility trends at Class I areas throughout the western states, including the 16 areas on the Colorado Plateau, can be found in the 2013 Regional Haze Progress Report for the state of New Mexico (attached as Appendix B to this Albuquerque - Bernalillo County progress report) and the 2013 WRAP *Summary Report* (Appendix F). The reader should also refer to the WRAP TSS web site, <http://vista.cira.colostate.edu/TSS/Default.aspx?code=1>.

### **3.0 REGIONAL HAZE PROGRESS REPORT**

The requirements for the contents of this progress report are outlined in 40 CFR 51.309(d)(10)(i). For those states that have Section 309 Regional Haze SIPs, the state must submit a report to the EPA in 2013 and 2018 evaluating progress towards the reasonable progress goal for each Class I area located within the state and in each Class I area located outside the state which may be affected by emissions from within the state.

The effect of this requirement on Albuquerque - Bernalillo County, as noted in the introduction to this report, is that this five year progress report must describe how emissions from the city and county may affect statewide emission trends and the nine class I areas in New Mexico.<sup>23</sup>

The progress report for Section 309 Regional Haze SIPs must contain the following elements:

#### **3.1 40 CFR § 51.309(d)(10)(i) Progress Report Requirements**

- (1) A description of the status of implementation of all measures included in the SIP for achieving reasonable progress goals for Class I areas both within and outside the state.
- (2) A summary of the emission reductions achieved throughout the state through implementation of the measures described in (1) above.
- (3) States with Class I areas within their borders must assess certain visibility conditions and changes, by computing numerical annual values for most impaired and least impaired days expressed in terms of 5-year averages of these annual values. Note that the progress report for Albuquerque and Bernalillo County is not required to address this element, because the city and county contain no Class I areas within their boundaries.<sup>24</sup>
- (4) An analysis tracking the change over the past 5 years in emissions of pollutants contributing to visibility impairment from all sources and activities with the state.
- (5) An assessment of any significant changes in anthropogenic emissions within or outside the state that have occurred over the past 5 years that have limited or impeded progress in reducing pollutant emissions and improving visibility.
- (6) An assessment of whether the current SIP elements and strategies are sufficient to enable the state, or other states with Class I areas affected by emissions from the state, to meet all established reasonable progress goals.
- (7) A review of the state's visibility monitoring strategy and any modifications to the strategy as necessary. Note that the progress report for Albuquerque and Bernalillo County is not required to address this element, because the city and county contain no Class I areas to monitor within their boundaries.<sup>25</sup>

In the sections to follow, this progress report will address the requirements outlined above.

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<sup>23</sup> 77 Fed. Reg. 24,768, 24,790 (Apr. 25 2012) (EPA proposed rule approving Section 309 SIP for Albuquerque - Bernalillo County).

<sup>24</sup> EPA Guidance, p. 7.

<sup>25</sup> EPA Guidance, p. 17.

**3.2 Status of Implementation Control Measures: 40 CFR § 51.309(d)(10)(i)(A)**

40 CFR § 51.308(g)(1) requires “a description of the status of implementation of all measures included in the implementation plan for achieving reasonable progress goals for Class I areas both within and outside the State.”

This section describes control measures in the Albuquerque - Bernalillo County Regional Haze SIP that were implemented or relied upon to regulate sources of haze causing pollutants in the city or county. For each control measure, this section describes the pollutant being controlled, the method of control and how it affects visibility, the type of source affected, and the extent to which any applicable compliance date for sources has come into effect.

As determined in the Section 309 and 309(g) SIPs for New Mexico and Albuquerque and Bernalillo County, ammonium sulfate, particulate organic matter, and coarse mass are the largest contributors to visibility impairment at New Mexico’s Class I areas.<sup>26</sup> Many of the contributing sources to visibility impairment in New Mexico are natural, rather than anthropogenic, in nature, and are not controllable. The primary sources of ammonium sulfate are point sources and on- and off-road mobile source emissions. For particulate organic matter, the primary sources of emissions are from natural and anthropogenic fire. The primary sources of coarse mass emissions in New Mexico are windblown and fugitive dust.

This section of the progress report discusses the implementation status of control measures directed at one or more of the above pollutants. This section, and later sections of the progress report, will focus only on those emission sources that are anthropogenic in nature and how control measures are applied to these types of sources in Albuquerque and Bernalillo County, as described in the Section 309 SIP for the city and county.

***Description of Control Measures******SO<sub>2</sub> Milestone and Backstop Trading Program***

The Regional Haze Rule requires Section 309 states to develop an emissions reduction program for major sources of sulfur dioxide (SO<sub>2</sub>).<sup>27</sup> SO<sub>2</sub> emissions contribute to atmospheric formation of ammonium sulfate, a pollutant species involved in formation of regional haze. Albuquerque and Bernalillo County have only two major sources of SO<sub>2</sub> within their borders. One is the GCC Rio Grande facility in Tijeras, New Mexico, which manufactures Portland cement. The other is the Southside Water Reclamation Facility, operated by the Albuquerque Bernalillo County Water Utility Authority.

Under its Regional Haze SIP, Albuquerque - Bernalillo County cooperates with its WRAP partners to maintain an inventory of regional SO<sub>2</sub> emissions, across the Section 309 states.<sup>28</sup> Annual regional emissions must not exceed specific milestones for each year, which gradually decrease over time.<sup>29</sup>

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<sup>26</sup> NM RH Progress Report, p. 7. The other sentences in this paragraph also are based on this source.

<sup>27</sup> 40 CFR § 51.309(d)(4).

<sup>28</sup> AQP monitors SO<sub>2</sub> ambient air concentrations in Bernalillo County, consistent with EPA regulations that require such monitoring. *See, e.g.*, City of Albuquerque Environmental Health Department, 2015 Annual Network Review for Ambient Air Monitoring (June 6, 2013), available at <http://www.cabq.gov/airquality/download-air-data/annual-network-review-for-ambient-air-monitoring>.

<sup>29</sup> The Section 309 SIP contains an additional SO<sub>2</sub> related control measure, referred to as “geographic enhancement,” per A-BC RH SIP p. 101. Under this measure, the City of Albuquerque Environmental Health Department will consult with the federal land manager at a particular Class I area if visibility at this Class I area

If an annual regional milestone is exceeded, then a regional backstop trading program will be triggered to bring emissions below the levels in the milestones. Once triggered, the trading program would require the Albuquerque Environmental Health Department to allocate “allowances” to each source for specific maximum permissible amounts of SO<sub>2</sub> emissions. Sources would be allowed to trade allowances in order to comply with source specific emissions targets. A tracking system would be used to manage emissions monitoring, allowances allocation, and allowances trading. This backstop SO<sub>2</sub> trading program has been adopted in a currently effective Albuquerque - Bernalillo County regulation, 20.11.46 NMAC. However, the program, by design, will not be implemented unless the annual regional SO<sub>2</sub> milestones are exceeded. Only at that time would applicable compliance dates for specific regulatory provisions under 20.11.46 become effective. Albuquerque - Bernalillo County is prepared to implement the SO<sub>2</sub> backstop trading program if it becomes necessary in the future.<sup>30</sup>

Actual regional emissions are already well below the 2018 target amount, and thus it appears likely that the 2018 milestone will be met.<sup>31</sup> No triggering of the backstop trading program has been necessary.<sup>32</sup> The likelihood of meeting the 2018 target also means no changes in the SO<sub>2</sub> milestone and backstop trading program are necessary at present.<sup>33</sup>

To help WRAP document that regional emissions remain below the annual milestones, the Albuquerque Environmental Health Department has filed annual reports with the WRAP on SO<sub>2</sub> emissions within

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reasonably appears to be impaired by a specific nearby source in Albuquerque or Bernalillo County. This procedure for addressing “Reasonably Attributable Visibility Impairment” (RAVI) is described in A-BC RH SIP, pp. 101-103. This RAVI provision was included in the A-BC RH SIP pursuant to 40 CFR §§ 302(c), 309(f)(4). No consultation under this provision has occurred or been necessary since the 2011 Regional Haze SIP element was adopted.

<sup>30</sup> Specific steps to be taken to implement the program if it is triggered are described in 20.11.46 NMAC, *Sulfur Dioxide Emissions Inventory Requirements: Western Backstop Sulfur Dioxide Trading Program*. Further detailed description of the program and its role in controlling regional haze appears in: A-BC RH SIP, pp. 32-54.

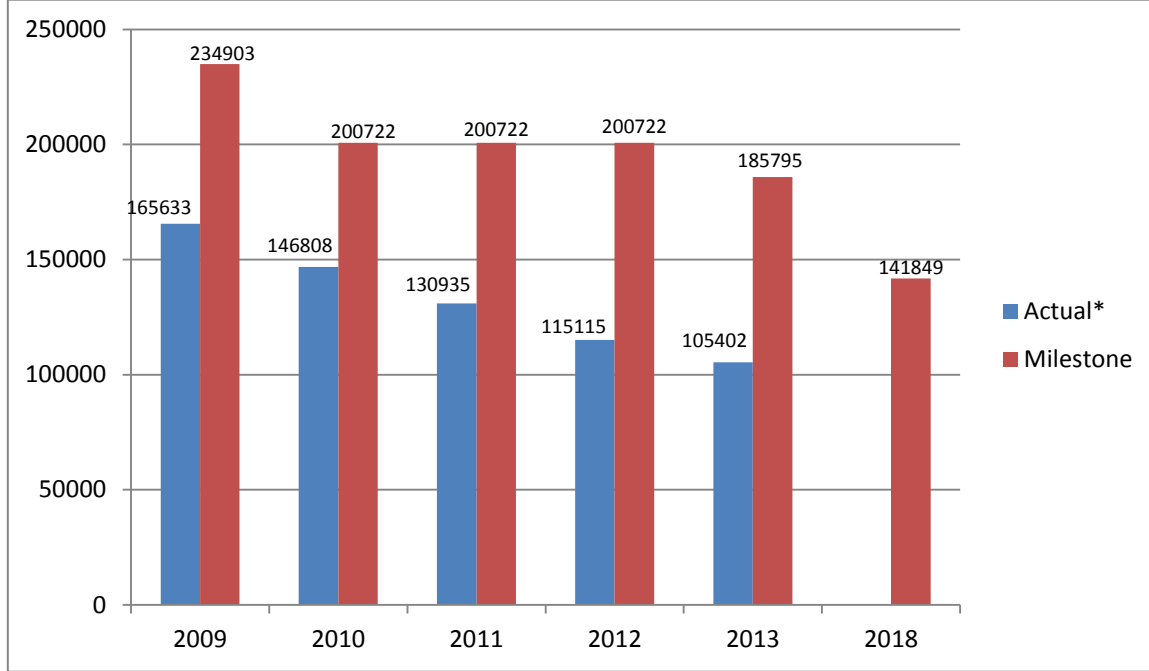
<sup>31</sup> A-BC RH SIP, pp. 29-30. The SIP requires an assessment in 2013 of whether or not the 2018 milestone is likely to be met. This progress report concludes it is likely to be met, based on emissions information presented in this report and in an emissions inventory projection performed by the WRAP. This inventory projection was provided in the WRAP regional emissions milestone report for 2010, issued in March 2012 [Western Regional Air Partnership, 2010 Regional SO<sub>2</sub> Emissions and Milestone Report (March 22, 2012), available at <http://www.wrapair2.org/pdf/2010%20Milestone%20Report.pdf>]. This WRAP report concluded that the 2018 milestone would likely be met, and thus the report did not recommend an early triggering of the WEB based trading program. The WRAP report did not anticipate any events that would lead to higher than expected SO<sub>2</sub> emissions prior to 2018 and, instead, found the likelihood of continued reductions as new SO<sub>2</sub> regulations took effect on a national scale. Since this WRAP report was issued, regional SO<sub>2</sub> emissions have in fact continued to decline, and the most recent data indicates that they are already significantly below the 2018 milestone, as discussed in the body of this progress report. Therefore, this progress report notes the continued likelihood that the 2018 milestone will be met.

<sup>32</sup> The Section 309 SIP for Albuquerque and Bernalillo County describes requirements that apply to this progress report in the event that the backstop trading program is triggered. Because it has not been triggered, this report does not address those requirements. See A-BC RH SIP, pp 29-30, 53, 55.

<sup>33</sup> This sentence addresses 40 CFR 51.309(d)(4)(i) and (iv) and A-BC RH SIP, p. 23, which require that a 2013 assessment address whether any revisions in the SO<sub>2</sub> milestones or back stop trading program are necessary. This report finds no such revisions are necessary. This requirement is separate from the one addressed in Section 3.9 of this report, 40 CFR § 309(d)(10)(ii). This latter provision requires a five year regional haze progress report to determine whether any revisions to the Regional Haze SIP and its control measures are necessary in any regard whatsoever, not only with respect to the SO<sub>2</sub> milestones but to any other aspect of the SIP.

Bernalillo County.<sup>34</sup> To date, the annual regional milestones have never been exceeded and regional SO<sub>2</sub> emissions have in fact declined substantially since record keeping began in 2003. Figure 3.1, below, illustrates this trend for the most recent five years of available data. In each year, actual reported emissions were below the milestone for that year. Reported emissions since 2011 have been below the milestone for 2018 to an increasing degree.

Figure 3.1. Annual regional SO<sub>2</sub> emissions compared to annual milestones, 2009-2013, in tons per year.



\* For purposes of this chart, “actual emissions” are the average of adjusted region-wide reported emissions for the most recent three years. For example, the 2013 “actual emissions” number of 105,402 shown in this chart was obtained by calculating the average of adjusted region-wide reported emissions for 2011, 2012, and 2013.

Special assessment of control strategies for NO<sub>x</sub> and PM

The 2011 Regional Haze SIP for Albuquerque and Bernalillo County stated that the progress report for 2013 would assess the need for new control measures to address new contributions to regional haze due to NO<sub>x</sub> and PM emissions from stationary sources in the city and county.<sup>35</sup> At present, available evidence does not support a conclusion that such contributions have impaired statewide progress toward emissions and visibility goals. New Mexico’s Regional Haze progress report presented data showing visibility improvements over time at all nine New Mexico Class I areas and reductions in statewide emissions of key haze causing pollutants in areas of the state outside Albuquerque and Bernalillo County. Later sections of this progress report for the city and county present additional visibility and emissions data that became available from the WRAP after New Mexico submitted its report. The additional WRAP data shows some

<sup>34</sup> Regional SO<sub>2</sub> milestone reports are available from the WRAP at <http://www.wrapair2.org/reghaze.aspx>. According to 20.11.46.9, this annual report must document SO<sub>2</sub> emissions by sources with *actual* emissions of one hundred tons per year or more. Since the submission of Albuquerque - Bernalillo County’s first milestone report in 2004, no SO<sub>2</sub> source in Bernalillo County has exceeded the 100 tons per year threshold. Further details on the annual milestone reports can be found at A-BC RH SIP, pp. 24-29.

<sup>35</sup> A-BC RH SIP, pp. 55-56.



new indications of visibility reduction at certain Class I areas, most likely due to wildfire and wind events. At the same time, as discussed in Sections 3.3, 3.5, and 3.6 of this Albuquerque - Bernalillo County progress report, new WRAP emissions inventory estimates suggests apparent increases in PM and particulate organic aerosol emissions from Albuquerque and Bernalillo County from 2008 to 2011. However, the apparent increases appear likely to result from the methodology of emissions inventories rather than real world increases in actual emissions. The City of Albuquerque is working with other local agencies to improve emissions inventory estimates and reporting, in order to obtain more accurate assessments of the relevant emissions. In any case, even the existing WRAP estimates of NO<sub>x</sub> and PM from sources in the city and county suggest emissions have remained modest in scale as a percentage of overall statewide emissions. The foregoing information indicates that NO<sub>x</sub> and PM emissions have not impeded reasonable progress on emissions and visibility in New Mexico as a whole and are not likely to do so. Therefore, this progress report does not find new control measures necessary for NO<sub>x</sub> and PM from stationary sources.

*Best Available Retrofit Technology (BART)*

The Regional Haze Rule provides that a state with an SO<sub>2</sub> milestone and backstop trading program must demonstrate that these measures provide greater reasonable progress toward visibility goals than would be achieved by requiring eligible air pollutant sources to install Best Available Retrofit Technology (BART).<sup>36</sup> To implement this provision, a state must first determine whether it has any sources that are “BART eligible,” and thus might be subject to the requirement to install BART controls.<sup>37</sup> If the state determines that one or more sources is BART eligible, the state must identify which of them are actually required to install BART controls.

The Section 309 SIP for Albuquerque - Bernalillo County determined that no sources in the city or county were eligible for BART and thus none were required to install BART.<sup>38</sup> EHD is not aware of any new BART eligible major stationary sources as defined in the Regional Haze Rule<sup>39</sup> that have been constructed in Albuquerque or Bernalillo County, or been created via reconstruction or modification of an existing source, since EPA approval of the Section 309 SIP in 2012.

Nevertheless, even if a state or locality implementing a Section 309 SIP has no BART eligible sources, it must still specifically demonstrate that its SO<sub>2</sub> milestone and backstop trading program will achieve greater reasonable progress than would be achieved by implementation of BART controls.<sup>40</sup>

Albuquerque - Bernalillo County worked with other Section 309 states to conduct this demonstration, as documented in its Section 309 SIP.<sup>41</sup> The SIP concluded that the SO<sub>2</sub> milestone and backstop trading program adopted along with the other Section 309 participating states would in fact achieve greater reasonable progress than BART by meeting the milestone targets. Since that demonstration was made and EPA approved the SIP, regional SO<sub>2</sub> emissions in the Section 309 states have continued to decline at a faster

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<sup>36</sup> 40 CFR § 309(d)(4)(i).

<sup>37</sup> 40 CFR § 308(e)(1). Even though this BART requirement falls under the Section 308 of the Regional Haze Rule, states implementing the provisions of Section 309 alternative implementation option are still required to follow the BART provisions of Section 308. *See* A-BC RH SIP, p. 112.

<sup>38</sup> A-BC RH SIP, pp 112-124.

<sup>39</sup> 40 CFR § 301.

<sup>40</sup> 40 CFR § 309(d)(4)(i).

<sup>41</sup> A-BC RH SIP, pp. 125-146.

pace than called for by the SO<sub>2</sub> milestones (see the discussion of the milestone program earlier in this section). Thus, as anticipated, the milestone program has actually continued to achieve greater reasonable progress than would be the case if BART were implemented.

Mobile Sources

The Section 309 Regional Haze SIP for Albuquerque and Bernalillo County stated that the SIP would rely upon federal mobile source standards to achieve declines in mobile source emissions that contribute to regional haze. The SIP projected that such reliance would achieve substantial reductions through 2018 in mobile source emissions in New Mexico and in the Albuquerque urban area.<sup>42</sup> The SIP also committed to monitoring mobile source emissions to assure a continuous decline in mobile source emissions as defined in 40 CFR § 309(b)(6).<sup>43</sup>

Through the WRAP, Albuquerque - Bernalillo County works to monitor the contribution of mobile source emissions to regional haze at Class I areas. As noted in the 2013 Regional Haze Progress report for New Mexico, WRAP monitoring indicates that visibility at Class I areas is generally improving in New Mexico and across the West.<sup>44</sup> The WRAP 2013 *Summary Report*, compiled to assist states in preparing 2013 progress reports under the Regional Haze Rule, includes extensive emissions inventory data on mobile sources for New Mexico and the role of such sources in visibility impairment at Class I areas.<sup>45</sup>

The City of Albuquerque Environmental Health Department will continue to work with WRAP and also with EPA to monitor and assess mobile source emissions and their potential contribution to visibility impairment at Class I areas in New Mexico and elsewhere.

Fire/Smoke Management

40 CFR § 309(d)(6) requires that a Regional Haze SIP element include programs for management of visibility-impairing emissions caused by anthropogenic fire sources. The Albuquerque-Bernalillo County Regional Haze Section 309 SIP element addresses this requirement by providing for fire and smoke management programs under 20.11.21 NMAC, *Open Burning*, in order to help control anthropogenic fire-related emissions of VOCs, NO<sub>x</sub>, elemental carbon, organic carbon, and PM<sub>2.5</sub>.<sup>46</sup> The City of Albuquerque Environmental Health Department currently implements this regulation on an ongoing basis. The regulation requires that most open burning in Bernalillo County be conducted under a permit from EHD subject to specific requirements, including: reporting of emissions for use in emissions inventories; consideration of alternatives to burning; use of enhanced smoke management techniques recommended by the WRAP; and use of specific emission reduction techniques. As detailed in the Section 309 Regional Haze SIP,<sup>47</sup> EHD

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<sup>42</sup> A-BC RH SIP, pp. 56-58. The Section 309 SIP for Albuquerque - Bernalillo County listed as a haze-control measure 20.11.104 NMAC, Emission Standards for New Motor Vehicles. This regulation was adopted in 2007 to implement California's "clean car" standards, which were at the time more stringent than federal motor vehicle emission standards. The state of New Mexico adopted a parallel clean car regulation of its own at the same time. Subsequently, however, the federal government adopted standards equivalent to California's. Thus, 20.11.104 NMAC is currently superfluous and is not being implemented.

<sup>43</sup> A-BC RH SIP, p. 59.

<sup>44</sup> NM RH Progress Report, pp. 4-5, 10-33, 45-59 and Appendix C of the New Mexico report.

<sup>45</sup> See, for example, WRAP 2013 Summary Report, pp. 3-11 to 3-20, 4-1 to 4-2, 6-222 to 6-233.

<sup>46</sup> A-BC RH SIP, pp. 60-69.

<sup>47</sup> *Id.*

developed and implemented the specific provisions of 20.11.21 NMAC in order to follow WRAP recommended policies on management of fire and smoke sources under the EPA Regional Haze Rule. EHD will continue to work with WRAP and the Section 309 states to implement fire and smoke management measures necessary to achieve reasonable progress goals under the Regional Haze Rule.

Fugitive and Unpaved Road Dust

The Albuquerque - Bernalillo County Regional Haze Section SIP element provides for control of PM<sub>10</sub> and PM<sub>2.5</sub> emissions from unpaved roads and from stationary fugitive dust sources.<sup>48</sup> EHD implements this requirement through 20.11.20 NMAC, Fugitive Dust Control, which requires the use of reasonably available control measures (RACM) to prevent fugitive dust from leaving the site on which it is produced and to reduce the amount of those emissions.<sup>49</sup> The regulation requires sources of fugitive and unpaved road dust to obtain permits and pay related fees. It also limits the construction of new unpaved roads longer than ¼ mile in length. EHD has an active enforcement program in place to implement these and other provisions of 20.11.20 NMAC, including detailed requirements for specific control measures, on an ongoing basis.

Additional Control Measures

The Section 309 SIP for Albuquerque - Bernalillo County lists several additional specific local regulations, all of which are in effect, that aid in controlling emissions contributing to the formation of regional haze at Class I areas.<sup>50</sup> These regulations, and the pollutants targeted by them, appear in the table below. The Environmental Health Department implements and enforces these regulations on an ongoing basis.

Table 3.1  
Additional Albuquerque - Bernalillo County Regulations  
Applicable to Pollutants Causing Regional Haze

Regulation	Description	Pollutant Controlled
20.11.22 NMAC	Woodburning	CO, PM
20.11.65 NMAC	Volatile Organic Compounds	VOCs
20.11.66 NMAC	Process Equipment	PM
20.11.67 NMAC	Equipment, Emissions, Limitations	SOx, NOx, PM
20.11.71 NMAC	Municipal Solid Waste Landfills	NMOC (Nonmethane Organic Compounds) (i.e. CO)
20.11.100 NMAC	Motor Vehicle Inspection, Decentralized	CO, PM, HC (hydrocarbons)
20.11.102 NMAC	Oxygenated Fuels	CO
20.11.103 NMAC	Motor Vehicle Visible Emissions	PM

<sup>48</sup> A-BC RH SIP, pp. 70-71.

<sup>49</sup> The City of Albuquerque Environmental Health Department also has delegated authority to enforce applicable federal standards related to particulate matter, as promulgated in 40 CFR §§ 60, 61, and 63.

<sup>50</sup> A-BC RH SIP, p. 111.

***Enforceability of Control Measures***

40 CFR § 51.309(d)(9) of the RH rule requires states to ensure that emission limitations and control measures used to meet reasonable progress goals are enforceable.

All emissions limitations and control measures used to meet reasonable progress goals for which Albuquerque-Bernalillo County is responsible are enforceable under the New Mexico Air Quality Control Act, NMSA 1978 §§ 74-2-1 to 74-2-17 (Air Act). This enforcement authority exists via provision in the Air Act authorizing Albuquerque and Bernalillo County to assume jurisdiction as a local authority by adopting appropriate ordinances. NMSA 1978 § 74-2-4. Albuquerque and Bernalillo County passed parallel ordinances to implement this provision of the state Air Act. These ordinances are codified at Revised Ordinances of the City of Albuquerque (ROA) §§ 9-5-1 to -99 and Bernalillo County Ordinance 94-5 §§ 1 to -20 [codified at Art. II, Ch. 30, §§ 30-31 to 47. These ordinances create the Albuquerque-Bernalillo County Air Quality Control Board (“Air Board”) to adopt rules, among other duties, and authorize the Environmental Health Department to administer and enforce those rules, among other responsibilities. The Air Board promulgates regulations to implement federal and state air quality standards in Albuquerque and Bernalillo County, including standards under the EPA’s Regional Haze Rule. The Environmental Health Department, via its Air Quality Program, administers permitting and enforcement actions, which require individual sources to abide by the Air Board’s rules. These regulations are codified in the New Mexico Administrative Code (NMAC). Certain state and local statutes, regulations, ordinances, programs, and policies are approved by EPA as part of New Mexico’s State Implementation Plan, codified at 40 CFR §§ 52.1620 to 1640. The State Implementation Plan is enforceable by EPA as federal law under CAA § 113.

Under the above regulatory framework, Albuquerque-Bernalillo County has legal authority to enforce emission limitations and control measures used to help meet reasonable progress goals under the Regional Haze Rule. The descriptions below of specific control measures include additional citations to legal authority for each measure.

**3.3 Summary of Emissions Reductions Achieved 40 CFR § 51.309(d)(10)(i)(B)**

40 CFR § 51.309(d)(10)(i)(B) requires *“a summary of the emissions reductions achieved throughout the state through implementation of the measures in paragraph (g)(1).”*

This section addresses emissions reductions resulting from implementation of control measures discussed in Section 3.2, above. It does so, first, by summarizing key information from the New Mexico Regional Haze progress report. This information shows, first, that the pollutant species historically most contributing to haze at New Mexico Class I areas have been ammonium sulfate, ammonium nitrate, particulate organic mass, and coarse mass. Second, the New Mexico report shows that such pollutants have generally been contributing less to visibility impairment at New Mexico Class I areas over time. Third, anthropogenic point source emissions related to these pollutants have generally been declining in areas of the state outside Albuquerque and Bernalillo County. After summarizing the foregoing information from the New Mexico report, this section of the report for Albuquerque and Bernalillo County shows that anthropogenic emissions of haze related pollutants from stationary point sources in the city and county are unlikely to reverse larger, favorable statewide emission trends, because over time such local emissions have remained at a fraction of levels seen in the rest of the state. Moreover, such city and county emissions are under or close to WRAP 2018 projections for those pollutants.

In order to be consistent with the progress report for New Mexico, this section focuses on point source emissions data. Sections 3.5 and 3.6, later in this report, provide further data on emissions from both point and nonpoint sources, again mirroring the presentation in the New Mexico report. Section 3.5 and 3.6 sections add further data showing that Albuquerque and Bernalillo County emissions trends are unlikely to impede larger statewide progress toward emissions and visibility goals.

The discussion of emissions in this section, and in Sections 3.5 and 3.6, does not precisely link quantitative emission reductions to individual control measures discussed in Section 3.2, above. The City of Albuquerque Environmental Health Department does not undertake such precise quantitative linkage due to the limited number of major sources of haze causing pollutants. However, the overall information presented in this report provides a qualitative overview of such linkage, showing that generally favorable statewide emissions trends coincide with the implementation of the control measures discussed in Section 3.2.

This report will briefly summarize the New Mexico progress report information related to emissions before presenting more specific emissions data for Albuquerque and Bernalillo County. In addressing the requirements of 40 CFR § 51.309(d)(10)(i)(B), the New Mexico progress report examines three key factors:

- 1) sources of overall visibility impairment over time across the state;
- 2) the effect of decreases in the amounts of individual pollutant species on overall visibility improvement; and
- 3) overall reductions in emissions of those pollutant species.

Figures 3.2 and 3.3, reproduced from the New Mexico report,<sup>51</sup> show that visibility has generally improved over time at Class I areas across the WRAP states.<sup>52</sup> Visibility improvement is expressed as a change in deciview extinction, from the 2000-2004 baseline period to the 2005-2009 planning period, on the 20% worst and 20% best visibility days.

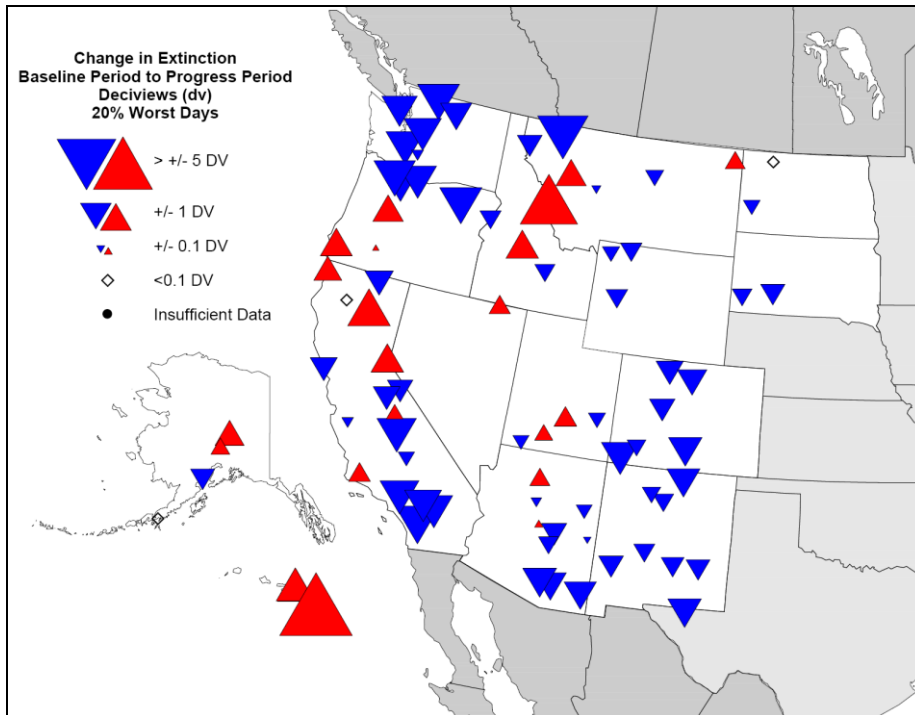


Figure 3.2. Change in Deciview Extinction between Baseline Period Average (2000-2004) and the First Progress Period Average (2005-2009) for the 20% Worst Visibility Days. Source: NM RH SIP, p. 11 (from WRAP 2013 Summary Report, p. 4-1).

<sup>51</sup> Note that figures and tables in this report are numbered differently than in the New Mexico report.

<sup>52</sup> Additional, more recent visibility data is presented in Section 3.4 of this report.

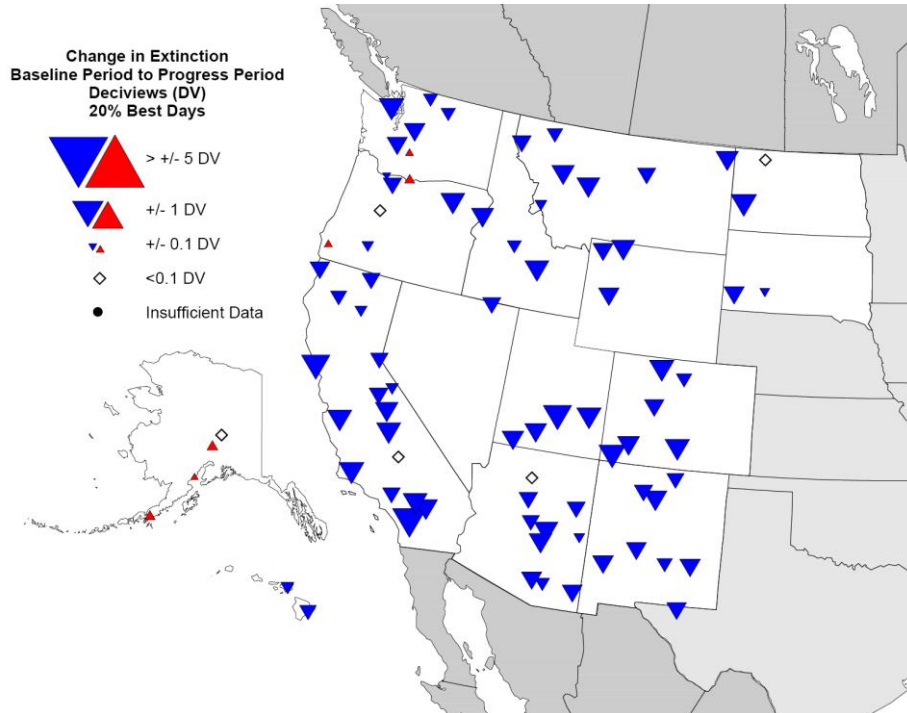


Figure 3.3. Change in Deciview Extinction between Baseline Period Average (2000-2004) and the First Progress Period Average (2005-2009) for the 20% Best Visibility Days. Source: NM RH SIP, p. 11 (from WRAP 2013 Summary Report, p. 4-3).

Figures 3.4 and 3.5, reproduced from the New Mexico report, show how much individual pollutant species have proportionally contributed to overall visibility impairment. The figures do this by showing average aerosol extinction, which measures the fraction of light lost per unit length along a sight path due to scattering and absorption by particular pollutants. The size of an individual pie chart on the figures is related to magnitude of visibility impairment: a larger pie indicates greater impairment. Colors within each pie chart represent the relative contribution of specific pollutants to visibility impairment. For example, a larger pie slice colored yellow shows a greater contribution by ammonium sulfate to visibility impairment. Note that these pie charts do not indicate which pollutant species are increasing or decreasing over time in absolute amounts of pollutants in the air. The pie charts simply show how much of an impact a particular pollutant has on visibility along a line of sight.

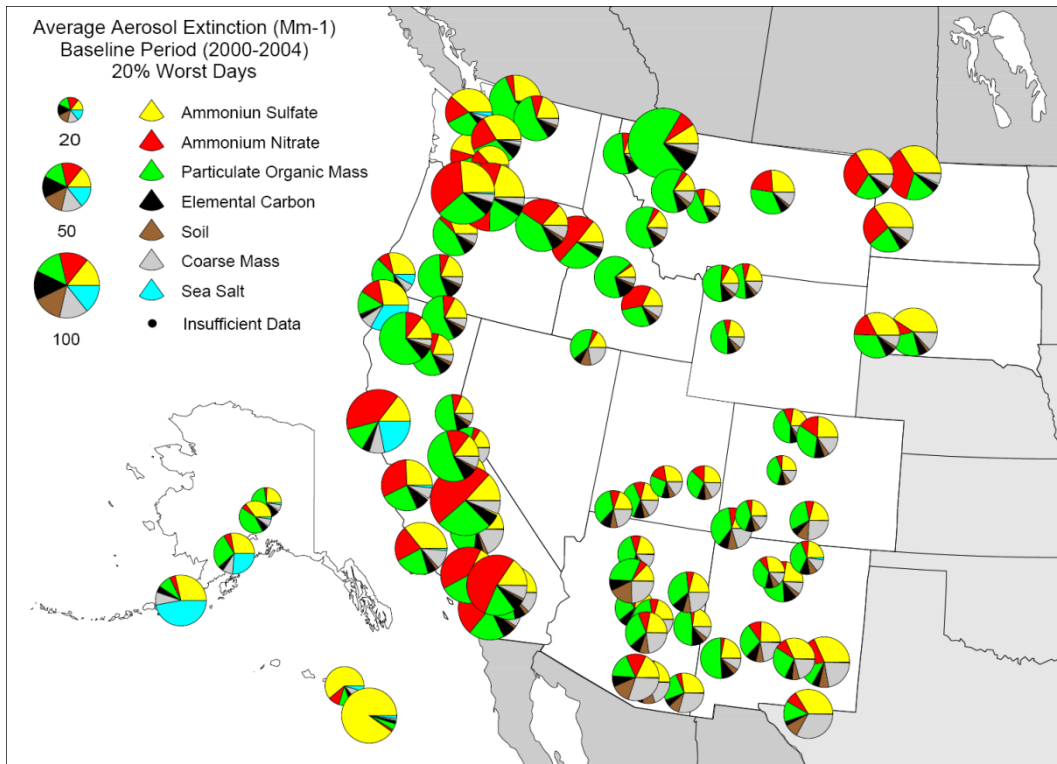


Figure 3.4. Regional Average of Aerosol Extinction by Pollutant for Baseline Period Average (2000-2004) for 20% Worst Days. Source: NM RH SIP, p. 12 (from WRAP 2013 Summary Report, p. 4-4).

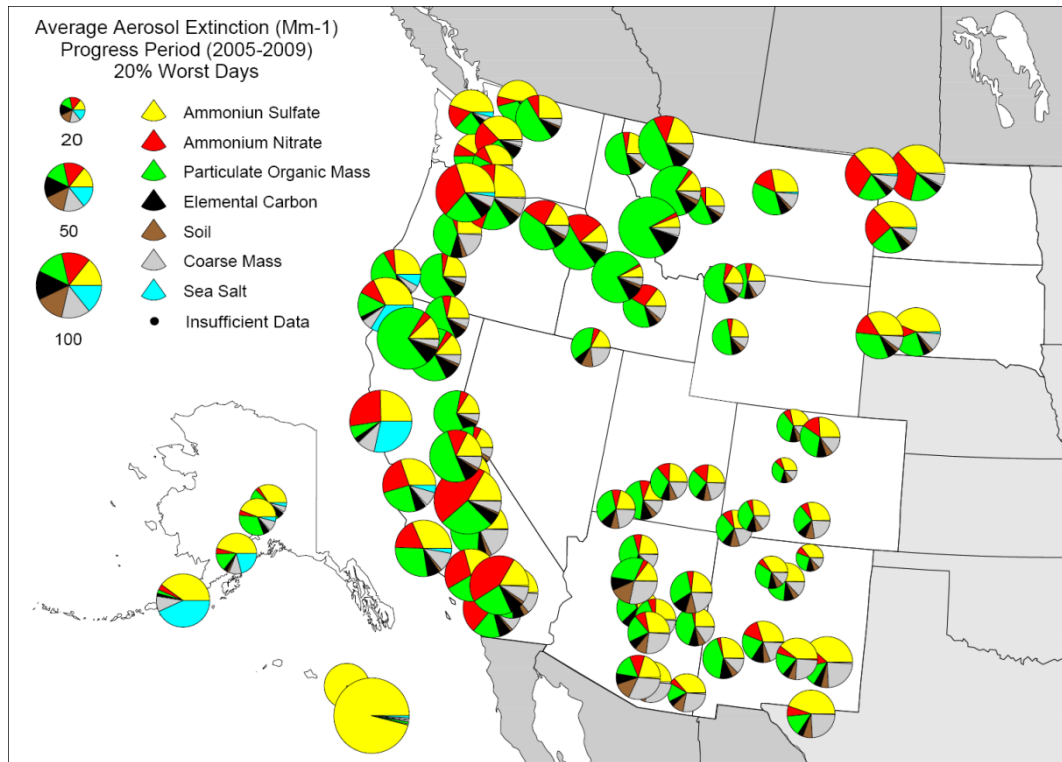


Figure 3.5. Regional Average of Aerosol Extinction by Pollutant for the First Progress Period Average (2005-2009) for 20% Worst Days. Source; NM RH SIP, p. 13 (from WRAP 2013 Summary Report, p. 4-5).

Figure 3.6, reproduced from the New Mexico report, goes beyond the earlier figures to show which pollutant species have decreased over time in amount present in the air. If the color for a pollutant species appears in a

pie chart on Figure 3.6, then the amount of that pollutant species in the air has decreased over time on the 20% worst visibility days at a particular Class I area. If the pie chart is surrounded by a blue-gray circle, overall visibility at the site has also improved over time. Thus, Figure 3.6 provides information as to which decreases in particular pollutant species have generally coincided with visibility improvements.

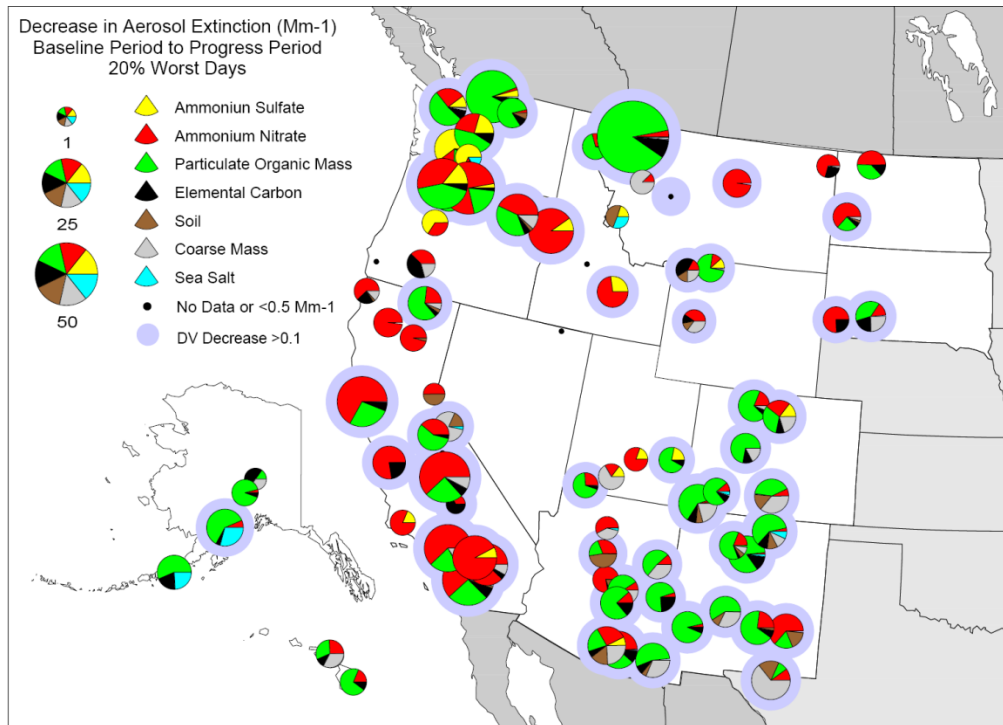


Figure 3.6. Magnitude of Aerosol Extinction Species That Have Decreased Between the Baseline Average (2000-2004) and the First Progress Period Average (2005-2009) for the 20% Worst Days. Source: NM RH SIP, p. 14 (from WRAP 2013 Summary Report, p. 4-6).

According to the New Mexico report, Figure 3.6 depicts most of the decreases in deciview averages (i.e., improvements in visibility) as associated with decreases in ammonium nitrate, coarse mass, and particulate organic matter. The decrease in ammonium nitrate, the report states, is most likely due to federal mobile source regulations. For coarse mass and particulate organic matter, the report states that the decrease is likely due to the decreasing effect of natural events, such as windblown dust storms and wild fires.<sup>53</sup>

The New Mexico report correlates the above visibility improvements with decreases of  $\text{NO}_2$ ,  $\text{SO}_2$ , and PM point source actual emissions from 2008 to 2012 outside of Albuquerque and Bernalillo County. Figure 3.7, reproduced from the New Mexico report,<sup>54</sup> shows these decreases. The decreases in actual point source emissions are significantly greater for  $\text{NO}_2$  and  $\text{SO}_2$  than projected by WRAP's regional modeling for New Mexico's 2018 emissions, which established 2018 emissions inventory projections to be met in achieving reasonable progress goals for visibility at New Mexico class I areas. Particulate matter emissions do not show such dramatic reductions but are nevertheless below 2018 WRAP projections. Because actual New Mexico emissions outside Albuquerque and Bernalillo County are below WRAP projections and have decreased over time, New Mexico has successfully reduced point source emissions beyond its regional commitments with WRAP states for the first progress period.

<sup>53</sup> NM RH Progress Report, p. 13.

<sup>54</sup> NM RH Progress Report, p. 15.



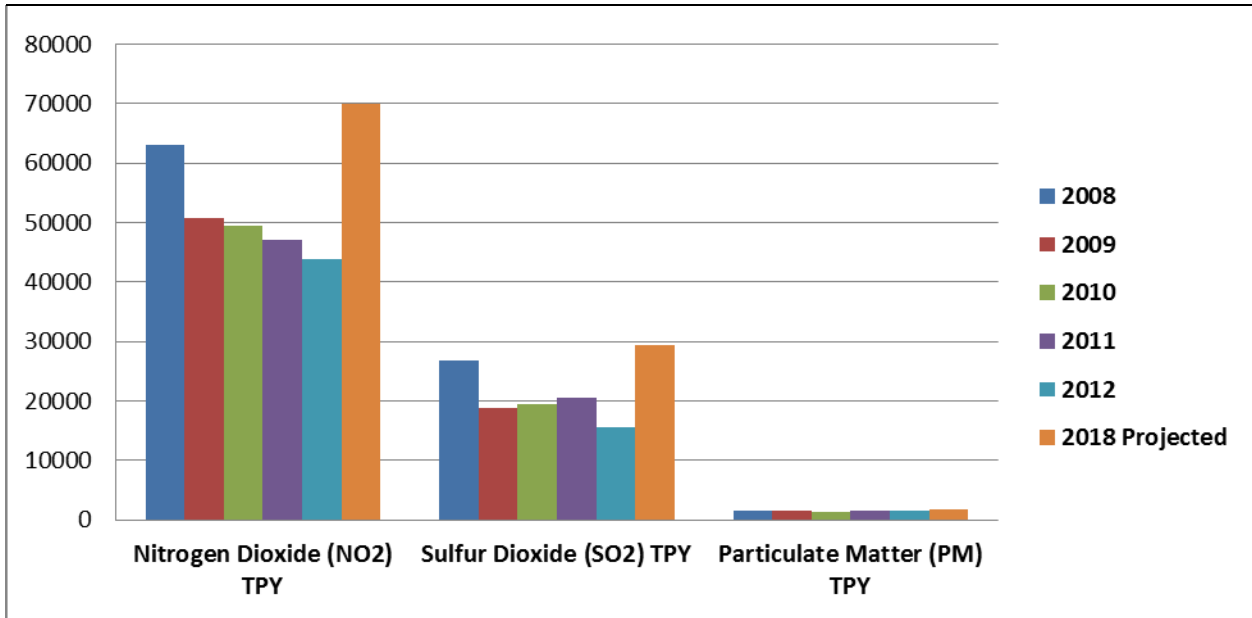


Figure 3.7. Point Source Emission Reductions for SO<sub>2</sub>, NO<sub>2</sub> and PM from 2008-2012 Compared to WRAP’s Projected 2018 Emissions for New Mexico (excluding Albuquerque and Bernalillo County). Actual Point Source Emission Data Based on New Mexico’s 2008-2012 Emission Inventories. Source: NM RH SIP, p. 15.

As New Mexico’s statewide emissions outside Albuquerque and Bernalillo County have decreased, reported emissions from the city and county have remained small in comparison to the levels shown in Figure 3.7. Table 3.2, below, presents reported total emissions from Albuquerque and Bernalillo County of NO<sub>x</sub>, SO<sub>2</sub>, and PM from 2009 to 2013, compared to WRAP’s projected 2018 emissions for the city and county.

**Table 3.2**  
**Albuquerque and Bernalillo County stationary point source emissions,<sup>55</sup>**  
**in tons per year, compared to WRAP 2018 projections**

Year	NOx	SO <sub>2</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
2008	1,139.11	56.81	1222.39*	238.78*
2011	1,120.34	73.86	186.39	109.89
2012	1,167.03	132.23	351.42	115.91
2013	1,401.06	164.93	323.07	117.22
<b>2018 WRAP projected**</b>	<b>3,420.12</b>	<b>1,611.95</b>	<b>410.68</b>	<b>22.76</b>

\*2008 data for PM<sub>10</sub> and PM<sub>2.5</sub> likely in error due to anomalous reporting from a single facility.<sup>56</sup>

\*\*WRAP PRPb scenario

The data in Table 3.2 indicate that point source pollutant emissions in Albuquerque and Bernalillo County have not impeded emission reductions in the rest of New Mexico. Emission levels from the city and county for SO<sub>2</sub> and NOx have remained well below the WRAP 2018 projections for point sources, coinciding with broader emissions reduction progress across the state. City and county emissions for both of these pollutants have also remained at a fraction of levels observed in the rest of the state and described in the New Mexico regional haze progress report. PM<sub>10</sub> levels remain below WRAP 2018 projections, while PM<sub>2.5</sub> levels are currently above the levels predicted by WRAP for point sources. However, the overall amount of reported PM<sub>2.5</sub> emissions remains low compared to those of the rest of the state; these emissions have not shown any sudden, substantial increases that would give cause for concern about possible contributions to visibility impairment. Moreover, PM<sub>2.5</sub> emissions from Albuquerque and Bernalillo County have not prevented overall visibility improvements over time at New Mexico's Class I areas, as described in the New Mexico regional haze progress report and elsewhere in this report for the city and county. Finally, Albuquerque - Bernalillo County emissions of SO<sub>2</sub> and NOx, which are PM<sub>2.5</sub> precursors, remain well below the WRAP 2018 targets

<sup>55</sup> Point source emissions data in this table are based on emissions inventory data reported to EPA by EHD. EHD does not have quality assured data available for 2009 and 2010. Note, however, that this table still follows EPA guidance on how to meet the regulatory requirement of 40 CFR § 51.309(d)(10)(i)(D) to report data "over the past five years" using "the most recent updated emissions inventory." The EPA Guidance, p. 11, states that the Regional Haze progress report should compare the most recent available data over at least two specific years that are at least five years apart. Table 3.2 meets this requirement because it presents data for 2008 and 2013, which are five years apart, along with data from additional years in that period. In addition, Table 3.2 is based on the most recent available data, which covers the years for 2013 and earlier. See Sections 3.5 and 3.6 of this report for additional discussions of emissions data which provide further information responsive to requirements of 40 CFR § 51.309(d)(10)(i)(D).

<sup>56</sup> 2008 National Emissions Inventory data included reported emissions from a Portland Cement manufacturing facility, the GCC Rio Grande facility in Tijeras, New Mexico. For 2008, this facility reported 904.17 tons of PM<sub>10</sub> emitted and 130.70 tons of PM<sub>2.5</sub>. This level of emissions does not represent normal operations for this facility. Compare to data reported for the same facility for the 2011 National Emissions Inventory, which showed 107.61 tons of PM<sub>10</sub> emitted and 51.52 tons of PM<sub>2.5</sub>.

Because visibility at all Class I areas in New Mexico has generally shown improvement over time, mirroring generally favorable visibility trends across the West, it is unlikely that emissions from within Albuquerque and Bernalillo County have hindered or will hinder reasonable progress goals for those areas. Of special note, particulate matter and ammonium sulfate have (as discussed earlier in this section) been contributing less over time to visibility impairment at New Mexico’s Class I areas, further indicating the unlikelihood that emissions of related pollutants (PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>x</sub> and SO<sub>2</sub>) from Albuquerque and Bernalillo County have hindered or will hinder visibility progress at these areas.

Further information on emissions reductions is presented in Sections 3.5 and 3.6 of this report, addressing the requirements of 40 CFR § 51.309(d)(10)(i)(D) and (E).

Note that the Section 309 SIP for Albuquerque - Bernalillo County identified inaccuracies in the emissions estimates used by the WRAP to model 2002 baseline emissions and 2018 projected future emissions of NO<sub>x</sub> and SO<sub>2</sub> for the city and county.<sup>57</sup> At the time the SIP was prepared, the WRAP did not provide county-specific emissions inventories and projections (such emissions data were for entire states only). Thus, WRAP estimated 2002 inventories and 2018 projections for Bernalillo County (including the city of Albuquerque) by scaling down statewide models to the county level, rather than directly generating county-level inventories. The result was a rough, approximate estimate of possible county emissions in 2002 and 2018. This approximation substantially overestimated past and likely future emissions of NO<sub>x</sub> and SO<sub>2</sub> for Albuquerque and Bernalillo County. The overestimates used implausible economic assumptions and, even at the time the SIP was prepared, were in fact contradicted by a key non-WRAP source -- the reported actual emissions in the National Emissions Inventory (NEI).

The following table, taken from EPA’s 2012 proposed approval of the Albuquerque - Bernalillo county Section 309 SIP, shows the discrepancies between WRAP overestimates and reported NEI data.<sup>58</sup>

Table 3.3  
Reported emissions from all sources versus WRAP estimated emissions  
for Albuquerque and Bernalillo County  
as of EPA proposed approval of Section 309 SIP, April 2012

	Albuquerque - Bernalillo County reported emissions (tons per year)			WRAP estimated emissions (tons per year)	
	2002	2005	2008	2002	2018
NO <sub>x</sub>	24,930.6	23,231.3	13,570.9	33,856.36	26,878.08
SO <sub>2</sub>	1,574.9	1,594.9	261.1	4,996.01	14,073.54

Since the above table was produced, the WRAP has compiled county level emissions inventories and 2018 projections. This data set provides direct 2018 emissions projections for Albuquerque and Bernalillo County, rather than rough estimates derived from state-level models. The WRAP 2018 projections for point sources are shown in Table 3.3, above. Additional county level emissions inventories and projections are discussed in Sections 3.5 and 3.6 of this report.

Considered as a whole, the emissions data presented in Sections 3.2, 3.5, and 3.6 of this report continue to show that the earlier WRAP overestimates were in fact overestimates of actual future emissions. Albuquerque and Bernalillo County reported emissions of NO<sub>x</sub> and SO<sub>2</sub> remain far below the very large WRAP estimates shown in Table 3.3 and discussed in EPA’s 2012 proposed rule approving the Section 309 SIP.

<sup>57</sup> A-BC RH SIP, pp. 107-108.

<sup>58</sup> 77 Fed. Reg. 24,768, 24,790 (Apr. 25, 2012). This table is taken directly from the EPA proposed rule.

**3.4 Assessment of Visibility Conditions: 40 CFR § 51.309(d)(10)(i)(C)**

40 CFR § 51.309(d)(10)(i)(C) requires “for each mandatory Class I Federal area within the State, the state must assess the following visibility conditions and changes, with values for most impaired and least impaired days expressed in terms of 5-year averages of these annual values

- (i) *The current visibility conditions for the most impaired and least impaired days;*
- (ii) *The difference between current visibility conditions for the most impaired and least days and baseline visibility conditions;*
- (iii) *The changes in visibility impairment for the most impaired and least impaired days over the past 5-years.*

EPA has stated that “[t]his requirement applies only to states with Class I areas within their borders.<sup>59</sup>” For purposes of implementing the Regional Haze rule, Albuquerque and Bernalillo County are treated as a state and operate under the Clean Air Act as if under the jurisdiction of a state-level air agency.<sup>60</sup> Because Albuquerque and Bernalillo County have no Class I areas within their borders, they are not required to address this section in their 2013 progress report.

Detailed information addressing this provision of the Regional Haze rule appears in the New Mexico Regional Haze Progress Report.<sup>61</sup> Based in large part on data compiled by the WRAP to support the development of regional haze progress reports, the New Mexico report shows generally favorable visibility trends at all New Mexico Class I areas. Although contributions of specific pollutants to haze have varied over time at specific sites, overall visibility impairment decreased at all New Mexico Class I areas between the 2000 to 2004 base planning period and the 2007 to 2011 progress period.

Although not required to do so under the regulation, the remainder of this section of the Albuquerque - Bernalillo County Regional Haze progress report will present updated visibility to supplement the information contained in New Mexico’s earlier progress report.

Additional information on visibility conditions and progress at New Mexico Class I areas is available in:

- the WRAP 2013 Summary Report, <http://www.wrapair2.org/RHRPR.aspx>, prepared to assist states in completing their 2013 Regional Haze progress reports;
- the WRAP TSS web site, <http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx>.

The tables in the remainder of this section, Tables 3.4 to 3.20, provide the information specified by 40 CFR § 51.309(d)(10)(i)(C). For each Class I area in New Mexico, the tables show data from the WRAP on visibility conditions for the current -- i.e., most recent available -- time interval, which is the 2009-2013 progress period. The tables also compare this visibility data to the visibility data for the baseline period, 2000-2004.

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<sup>59</sup> EPA Guidance (April 2013), p. 8.

<sup>60</sup> A-BC RH SIP, pp. 4-6.

<sup>61</sup> NM RH Progress Report, pp. 15-33.

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Finally, the tables show the change in visibility data over the past five years, from the 2005-2009 progress period through the 2009-13 progress period. The first table, 3.4, shows overall visibility conditions at each Class I area over time compared to the 208 Reasonable Progress Goals. The remaining tables in this section present data on contributions of particular pollutant species to visibility conditions at each Class I area. All tables are adapted from the WRAP TSS web site, using the “Class I Area Summary Table” feature of the “Haze Planning Tool,” <http://vista.cira.colostate.edu/TSS/Results/HazePlanning.aspx>.

Table 3.4  
New Mexico Class I Area IMPROVE Sites Visibility Conditions  
20% Worst and Best Days, in deciviews

	2004-2009 Baseline	2005-2009 Progress Period	2006-2010 Progress Period	2007-2011 Progress Period	2008-2012 Progress Period	2009-2013 Progress Period	2018 Reasonable Progress Goal*
Bandelier National Monument (BAND1)	12.2 worst 5.0 best	11.8 worst 4.2 best	11.3 worst 4.0 best	12.0 worst 3.9 best	11.8 worst 3.9 best	11.9 worst 4.0 best	11.9
Bosque del Apache Wilderness Area (BOAP1)	13.8 worst 6.3 best	13.4 worst 5.8 best	12.7 worst 5.5 best	13.1 worst 5.5 best	13.7 worst 5.6 best	14 worst 5.7 best	13.59
Gila Wilderness Area (GICL1)	13.1 worst 3.3 best	12.5 worst 2.7 best	11.6 worst 2.6 best	11.3 worst 2.4 best	11.1 worst 2.4 best	11.2 worst 2.5 best	12.99
Carlsbad Caverns National Park (GUMO1)	17.2 worst 5.9 best	15.9 worst 5.4 best	15.1 worst 5.0 best	15.3 worst 4.9 best	15.2 worst 5.2 best	15.3 worst 5.2 best	16.93
Salt Creek Wilderness Area (SACR1)	18.0 worst 7.8 best	17.5 worst 7.3 best	16.9 worst 6.8 best	17.3 worst 7.0 best	17.3 worst 7.2 best	17.4 worst 7.4 best	17.33
San Pedro Parks Wilderness Area (SAPE1)	10.2 worst 1.5 best	9.9 worst 1.0 best	9.4 worst 1.0 best	10.1 worst 1.0 best	10 worst 1.1 best	10 worst 1.2 best	9.8
Wheeler Peak Wilderness Area & Pecos Wilderness Area (WHPE1)	10.4 worst 1.2 best	9.1 worst 0.9 best	8.8 worst 1.0 best	9.6 worst 0.9 best	10.1 worst 0.7 best	9.9 worst 0.6 best	10.23
White Mountain Wilderness Area (WHIT1)	13.7 worst 3.6 best	13.2 worst 3.3 best	12.9 worst 3.3 best	13.9 worst 3.3 best	14.3 worst 3.3 best	14.2 worst 3.3 best	13.27

Table 3.5  
 Bandelier National Monument  
 Worst 20% Days: Reasonable Progress

	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	6.9	8.4	7.3	7.0	6.6	6.4
Nitrate	2.5	2.4	2.4	2.4	2.0	1.9
Organic Carbon	14.2	7.6	6.9	11.1	10.4	10.9
Elemental Carbon	3.1	2.1	1.9	2.5	2.3	2.2
Fine Soil	1.1	1.2	1.3	1.4	1.6	1.5
Coarse Material	2.9	3.2	3.3	3.9	4.4	4.8
Sea Salt	0.2	0.1	0.1	0.1	0.1	0.1
Total Light Extinction	40.1	33.9	32.2	37.4	36.4	36.9
Deciview	12.2	11.8	11.3	11.9	11.8	11.9

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Table 3.6  
 Bandelier National Monument  
 Best 20% Days: Reasonable Progress

	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	2.4	2.1	2.0	1.9	1.8	1.9
Nitrate	0.7	0.6	0.5	0.6	0.5	0.6
Organic Carbon	2.1	1.8	1.7	1.7	1.6	1.5
Elemental Carbon	0.9	0.8	0.7	0.6	0.6	0.6
Fine Soil	0.3	0.2	0.2	0.2	0.3	0.3
Coarse Material	0.9	0.8	0.8	0.8	0.9	0.9
Sea Salt	0.0	0.0	0.0	0.0	0.0	0.0
Total Light Extinction	16.5	15.2	15.0	14.9	14.8	14.9
Deciview	5.0	4.2	4.0	3.9	3.9	4.0

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Table 3.7  
 Bosque del Apache Wilderness Area  
 Worst 20% Days: Reasonable Progress

	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	7.5	8.9	7.5	7.0	6.3	5.8
Nitrate	3.2	4.2	4.3	4.0	2.5	2.8
Organic Carbon	8.7	6.5	6.0	6.2	11.9	12.7
Elemental Carbon	2.6	2.8	2.6	2.4	2.7	2.9
Fine Soil	1.9	1.6	1.5	1.8	2.1	2.2
Coarse Material	6.7	5.5	5.3	7.9	9.4	9.7
Sea Salt	0.2	0.2	0.2	0.2	0.2	0.2
Total Light Extinction	40.9	39.8	37.4	39.5	45.0	46.4
Deciview	13.8	13.4	12.7	13.1	13.7	14.0



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Table 3.8  
 Bosque del Apache Wilderness Area  
 Best 20% Days: Reasonable Progress

1	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	2.8	2.6	2.5	2.4	2.3	2.3
Nitrate	0.8	0.6	0.6	0.6	0.6	0.6
Organic Carbon	2.1	1.8	1.7	1.7	1.6	1.6
Elemental Carbon	1.1	0.9	0.8	0.8	0.8	0.7
Fine Soil	0.3	0.4	0.4	0.4	0.5	0.5
Coarse Material	1.6	1.4	1.4	1.5	1.9	2.0
Sea Salt	0.1	0.1	0.1	0.1	0.1	0.1
Total Light Extinction	18.9	17.9	17.5	17.5	17.7	17.8
Deciview	6.3	5.8	5.5	5.5	5.6	5.7

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Table 3.9  
 Gila Wilderness Area  
 Worst 20% Days: Reasonable Progress

	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	6.9	8.0	7.5	7.4	6.8	6.6
Nitrate	0.9	0.8	0.8	0.8	0.8	0.8
Organic Carbon	16.0	12.5	10.5	9.3	7.9	8.6
Elemental Carbon	3.2	2.9	2.2	2.1	1.7	1.8
Fine Soil	1.5	1.5	1.6	1.6	1.7	1.5
Coarse Material	2.8	3.6	3.8	4.0	3.9	3.9
Sea Salt	0.1	0.1	0.1	0.1	0.2	0.2
Total Light Extinction	40.3	38.3	35.5	34.2	32.0	32.6
Deciview	13.1	12.5	11.6	11.4	11.1	11.2

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Table 3.10  
 Gila Wilderness Area  
 Best 20% Days: Reasonable Progress

	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	1.9	1.7	1.6	1.6	1.6	1.6
Nitrate	0.3	0.2	0.2	0.2	0.2	0.3
Organic Carbon	1.5	1.1	1.0	0.9	0.9	0.9
Elemental Carbon	0.6	0.4	0.4	0.3	0.3	0.3
Fine Soil	0.2	0.2	0.2	0.2	0.2	0.2
Coarse Material	0.4	0.5	0.5	0.5	0.5	0.5
Sea Salt	0.0	0.0	0.0	0.0	0.0	0.0
Total Light Extinction	14.0	13.2	13.0	12.8	12.8	12.8
Deciview	3.3	2.7	2.6	2.4	2.4	2.5

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Table 3.11  
 Carlsbad Caverns National Park  
 Worst 20% Days: Reasonable Progress

	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	16.5	18.6	15.8	14.2	12.8	12.0
Nitrate	3.8	2.9	2.5	2.3	1.9	1.7
Organic Carbon	6.7	5.9	5.4	6.3	6.7	6.9
Elemental Carbon	1.3	1.5	1.3	1.4	1.3	1.3
Fine Soil	4.4	2.7	2.9	3.7	4.0	4.4
Coarse Material	16.0	9.9	9.9	11.2	11.7	12.7
Sea Salt	0.1	0.1	0.1	0.2	0.2	0.2
Total Light Extinction	57.9	50.6	47.0	48.3	47.6	48.2
Deciview	17.2	15.9	15.1	15.3	15.2	15.3

Table 3.12  
 Carlsbad Caverns National Park  
 Best 20% Days: Reasonable Progress

	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	3.4	3.1	2.9	2.7	2.7	2.7
Nitrate	1.1	0.9	0.8	0.9	0.9	1.0
Organic Carbon	1.6	1.5	1.4	1.3	1.3	1.3
Elemental Carbon	0.7	0.7	0.6	0.5	0.5	0.5
Fine Soil	0.4	0.5	0.5	0.6	0.7	0.7
Coarse Material	2.0	1.7	1.6	1.5	1.8	1.8
Sea Salt	0.1	0.0	0.0	0.0	0.0	0.1
Total Light Extinction	18.4	17.4	16.7	16.5	17.0	17.1
Deciview	5.9	5.4	5.0	4.9	5.2	5.2

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Table 3.13  
Salt Creek Wilderness Area  
Worst 20% Days: Reasonable Progress

	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	16.7	18.9	15.4	15.1	15.0	14.0
Nitrate	11.1	7.4	7.1	6.6	6.3	6.1
Organic Carbon	7.5	6.4	5.7	6.2	6.2	6.1
Elemental Carbon	2.3	2.3	2.0	1.8	1.8	1.8
Fine Soil	3.3	2.3	2.5	3.2	3.1	3.3
Coarse Material	11.5	11.4	12.8	15.7	15.5	17.8
Sea Salt	0.2	0.5	0.2	0.4	0.4	0.4
Total Light Extinction	62.7	59.1	55.8	59.1	58.2	59.5
Deciview	18.0	17.5	16.9	17.4	17.3	17.4

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Table 3.14  
Salt Creek Wilderness Area  
Best 20% Days: Reasonable Progress

	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	3.4	3.4	3.1	3.1	3.0	3.0
Nitrate	2.0	1.3	1.0	1.2	1.2	1.4
Organic Carbon	2.3	2.0	1.9	1.8	1.8	1.8
Elemental Carbon	1.1	0.9	0.8	0.7	0.7	0.7
Fine Soil	0.7	0.5	0.5	0.6	0.6	0.6
Coarse Material	2.5	2.7	2.7	2.9	3.4	3.6
Sea Salt	0.1	0.1	0.1	0.1	0.1	0.1
Total Light Extinction	22.1	20.9	20.1	20.4	20.8	21.2
Deciview	7.8	7.3	6.8	7.0	7.2	7.4

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Table 3.15  
 San Pedro Parks Wilderness Area  
 Worst 20% Days: Reasonable Progress

	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	5.8	6.8	5.8	5.8	5.4	5.2
Nitrate	1.6	1.2	1.1	1.2	1.2	1.3
Organic Carbon	7.7	6.3	5.8	8.9	8.4	9.3
Elemental Carbon	1.6	1.6	1.3	1.8	1.7	1.8
Fine Soil	1.5	1.3	1.5	1.6	1.7	1.5
Coarse Material	2.7	2.5	2.8	3.0	3.2	3.2
Sea Salt	0.1	0.1	0.1	0.1	0.2	0.2
Total Light Extinction	28.9	27.7	26.4	30.4	29.9	30.5
Deciview	10.2	9.9	9.5	10.1	10.0	10.0



Table 3.16  
 San Pedro Parks Wilderness Area  
 Best 20% Days: Reasonable Progress

	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	1.6	1.5	1.5	1.4	1.4	1.5
Nitrate	0.4	0.4	0.4	0.3	0.4	0.4
Organic Carbon	0.7	0.6	0.6	0.6	0.6	0.6
Elemental Carbon	0.4	0.2	0.2	0.2	0.2	0.2
Fine Soil	0.2	0.1	0.2	0.2	0.2	0.3
Coarse Material	0.3	0.3	0.3	0.3	0.3	0.3
Sea Salt	0.0	0.0	0.0	0.0	0.0	0.0
Total Light Extinction	11.6	11.1	11.1	11.1	11.2	11.3
Deciview	1.5	1.0	1.0	1.0	1.1	1.2

Table 3.17  
 Wheeler Peak Wilderness Area  
 Worst 20% Days: Reasonable Progress

	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	5.3	6.2	5.7	5.6	5.5	5.4
Nitrate	1.6	1.4	1.4	1.4	1.5	1.4
Organic Carbon	8.4	4.7	4.4	6.8	7.3	6.6
Elemental Carbon	2.2	1.6	1.5	1.8	2.0	1.9
Fine Soil	1.7	1.1	1.1	1.1	1.3	1.3
Coarse Material	2.8	2.1	2.2	2.5	3.0	3.2
Sea Salt	0.5	0.1	0.1	0.1	0.1	0.1
Total Light Extinction	30.4	25.2	24.4	27.4	28.6	27.9
Deciview	10.4	9.1	8.8	9.6	10.1	9.9

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Table 3.18  
 Wheeler Peak Wilderness Area  
 Best 20% Days: Reasonable Progress

	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	1.2	1.3	1.4	1.3	1.2	1.1
Nitrate	0.3	0.3	0.3	0.3	0.2	0.2
Organic Carbon	0.8	0.7	0.7	0.6	0.5	0.5
Elemental Carbon	0.4	0.3	0.3	0.3	0.2	0.2
Fine Soil	0.1	0.1	0.1	0.1	0.1	0.1
Coarse Material	0.5	0.3	0.3	0.4	0.5	0.4
Sea Salt	0.1	0.0	0.0	0.0	0.0	0.0
Total Light Extinction	11.3	11.0	11.1	11.0	10.8	10.6
Deciview	1.2	0.9	1.0	0.9	0.7	0.6

Table 3.19  
 White Mountain Wilderness Area  
 Worst 20% Days: Reasonable Progress

	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	10.5	11.9	11.5	12.2	11.9	11.2
Nitrate	3.0	1.8	1.7	1.7	1.5	1.3
Organic Carbon	9.0	5.4	5.0	5.9	6.8	6.9
Elemental Carbon	1.8	1.4	1.2	1.1	1.2	1.2
Fine Soil	1.9	1.8	2.1	2.5	2.7	2.9
Coarse Material	6.7	7.4	9.3	12.1	12.9	12.8
Sea Salt	0.2	0.3	0.4	0.6	0.7	0.6
Total Light Extinction	42.1	39.0	40.1	45.2	46.7	45.9
Deciview	13.7	13.2	12.9	14.0	14.3	14.2

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Table 3.20  
 White Mountain Wilderness Area  
 Best 20% Days: Reasonable Progress

	2000-04 Baseline Conditions (Mm-1)	2005-09 Progress Period (Mm-1)	2006-10 Progress Period (Mm-1)	2007-11 Progress Period (Mm-1)	2008-12 Progress Period (Mm-1)	2009-13 Progress Period (Mm-1)
Sulfate	1.9	1.8	1.8	1.8	1.8	1.8
Nitrate	0.5	0.4	0.4	0.4	0.4	0.4
Organic Carbon	1.3	1.1	1.2	1.2	1.1	1.1
Elemental Carbon	0.6	0.4	0.4	0.3	0.3	0.3
Fine Soil	0.2	0.2	0.2	0.2	0.3	0.3
Coarse Material	0.9	1.0	1.0	1.0	1.0	1.0
Sea Salt	0.0	0.0	0.0	0.0	0.0	0.0
Total Light Extinction	14.3	14.0	14.1	14.1	14.0	14.0
Deciview	3.6	3.3	3.3	3.3	3.3	3.3

The summary data in Table 3.4, above, shows the following.

- Overall visibility conditions on the 20% worst days, measured in deciviews, for the most recent reasonable progress period, 2009-2013, are even with or below the 2018 Reasonable Progress Goals at five of the nine Class I areas. Such conditions are above the 2018 Reasonable Progress goals at four of the nine areas.
- Overall visibility conditions on the 20% worst days, measured in deciviews, for the most recent reasonable progress period, 2009-2013, have improved compared to the baseline period, 2000-2004, at seven of the nine Class I areas. Such conditions have worsened at two areas.
- Overall visibility conditions on the 20% worst days, measured in deciviews, have improved compared to five years ago, i.e. the 2005 to 2009 progress period, at three of the nine Class I areas. Such conditions have worsened at six of the areas.
- Overall visibility conditions on the 20% best days, measured in deciviews, for the most recent reasonable progress period, 2009-2013, have improved compared to the baseline period, 2000-2004, at all nine Class I areas.
- Overall visibility conditions on the 20% best days, measured in deciviews, have improved compared to five years ago, i.e. the 2005 to 2009 progress period, at six of the nine Class I areas. Such conditions have worsened at two areas and remained the same at another.

Thus, based on the most recent data, overall visibility conditions at the Class I areas is not as favorable as was the case when the New Mexico Environment Department submitted its Regional Haze progress report to EPA. That report included visibility data through the 2007-2011 progress period.

Based on the more recent visibility data for 2009-2013, visibility conditions at four Class I areas are above the 2018 Reasonable Progress Goal: Bosque del Apache, Salt Creek Wilderness, San Pedro Parks Wilderness, and White Mountain Wilderness. However, the data from Tables 3.5 through 3.20 attributes much of the visibility impairment since 2007-2011 to increased contributions from organic carbon, elemental carbon, fine soil, and coarse mass. These pollutant species are frequently associated in New Mexico with wildfires and windblown dust, which are non-anthropogenic sources of emissions.<sup>62</sup> Contributions to visibility impairment from sulfates and nitrates, which are pollutant species associated primarily with anthropogenic sources, broadly declined at the same four areas. Discussions are ongoing among air agencies in the western states and with EPA regarding the contributions of natural events, which are not controllable by emission reduction measures, to visibility impairment at Class I areas.

The City of Albuquerque Environmental Health Department is not aware of data that would indicate anthropogenic emissions from within Albuquerque and Bernalillo County have contributed to visibility impairment since the 2007-2011 progress period at specific New Mexico Class I areas. Further discussion of emissions within the city and county is presented in Sections 3.5 and 3.6 of this report.

### **3.5 Analyses of Emissions: 40 CFR § 51.309(d)(10)(i)(D)**

40 CFR § 51.309(d)(10)(i)(C) requires “*An analysis tracking the change over the past 5 years in emissions of pollutants contributing to visibility impairment from all sources and activities within the State. Emissions changes should be identified by type of source or activity. The analysis must be based on the most recent*

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<sup>62</sup> WRAP 2013 *Summary Report*, p. 6-223;

*updated emissions inventory, with estimates projected forward as necessary and appropriate, to account for emissions changes during the applicable 5-year period.”*

This section presents an analysis of emissions of haze causing pollutants in Albuquerque and Bernalillo County over time, by type of source or activity, using the most recent updated inventory. EPA’s guidance for the Regional Haze progress reports states that the reports should, ideally, present the most recent available data for emissions inventories performed five years apart, or as approximate as practicable given the methodology and availability of emissions inventories.<sup>63</sup> New Mexico’s progress report met this requirement by offering WRAP 2002 data to represent the 2004-2004 baseline period and WRAP 2008 data to represent the 2005-2009 progress period. This report for Albuquerque and Bernalillo County will also present WRAP data from 2002 and 2008. Because WRAP data from 2011 became available after New Mexico submitted its progress report to EPA, this report for the city and county present the 2011 data as well. Collectively, then, this section will present WRAP data that is the most recent available, covers the most recent period of approximately five years for which data is available in practical terms (2002 to 2008), and provides an additional update for 2011 that presents further information covering approximately two five year periods (2002 to 2011).

The 2002, 2008, and 2011 WRAP data, presented in detail below, shows the following general trends.

- Emission levels for key haze causing pollutants linked primarily (in the Albuquerque-Bernalillo County context) to anthropogenic sources have declined between 2002 and 2011. These pollutants are sulfur dioxide, nitrogen oxides, ammonia, (non-biogenic) volatile organic compounds, and elemental carbon.
- Additionally, the WRAP data shows that emissions from the city and county have remained at the same levels over time as a percentage relative to emissions from elsewhere in the state. Thus, there has not been a drastic, sudden spike in that percentages, which might be cause for concern over potential impact on visibility at Class I areas.<sup>64</sup>

Exceptions to these trends appear to emerge in 2008 and 2011 WRAP data for sulfur dioxide, fine and particulate matter, and particulate organic aerosols. This data seems to show increases in emissions from particular source categories between 2002 and 2011 or between 2008 and 2011.

The City of Albuquerque Environmental Health Department (EHD) has assessed this data and has determined that for each of the affected pollutants, additional information available to EHD suggests that the emissions inventories appear to reflect overestimates of actual emissions in key source categories. Details of these apparent overestimates are presented below. In light of the apparent overestimates, further refinement of local data gathering is necessary before concluding that actual emissions have increased to the extent that the WRAP data would apparently indicate. In any case, EHD notes that even the WRAP data fails to show a substantial increase over time in city and county emissions of the pollutants in question as a percentage relative to those in the rest of the state (see Table 3.30, below). Further, as discussed in Section 3.6 of this report, EHD is not aware of any data indicating that emissions from Albuquerque and Bernalillo County are contributing to visibility impairment at any specific Class I area in New Mexico.

EHD will continue working to improve emission inventory data and methods as part of overall efforts to implement the Regional Haze rule.

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<sup>63</sup> EPA Guidance, pp. 11-12.

<sup>64</sup> On this point, see EPA’s proposed approval of the Albuquerque - Bernalillo County Section 309 Regional Haze SIP, which examined the city and county’s percentage of statewide emissions as a key indicator of emissions progress. 77 Fed. Reg. 24,768, 24,790-24,791 (April 25, 2012).

The WRAP data for 2002, 2008, and 2011 describe emissions inventories for the following pollutants: sulfur dioxide, oxides of nitrogen, ammonia, volatile organic compounds, primary organic aerosols, elemental carbon, fine soil, and coarse mass. The following table from the WRAP 2013 Summary Report<sup>65</sup> provides general information on the sources and behavior of each pollutant. The WRAP provided the table as a reference for understanding emissions trends across the state of New Mexico, rather than specifically within Albuquerque and Bernalillo County, but the table offers useful background for understanding emissions within the city and county as well.

Table 3.21  
New Mexico Pollutants, Aerosol Species, and Major Sources

Emitted Pollutant	Related Aerosol	Key Sources	Notes
Sulfur Dioxide (SO <sub>2</sub> )	Ammonium Sulfate	Point sources; On- and off-road mobile sources	SO <sub>2</sub> emissions are generally associated with anthropogenic sources such as coal-burning power plants, other industrial sources such as refineries and cement plants, and both on- and off-road diesel engines.
Oxides of Nitrogen (NO <sub>x</sub> )	Ammonium Nitrate	On- and off-road mobile sources; Point sources; Area sources	NO <sub>x</sub> emissions are generally associated with anthropogenic sources. Common sources include virtually all combustion activities, especially those involving cars, trucks, power plants, and other industrial processes.
Ammonia (NH <sub>3</sub> )	Amm. Sulfate and Amm. Nitrate	Area sources; On-road mobile sources	Gaseous NH <sub>3</sub> has implications in particle formation because it can form particulate ammonium. Ammonium is not directly measured by the IMPROVE program, but affects formation potential of ammonium sulfate and ammonium nitrate. All measured nitrate and sulfate is assumed to be associated with ammonium for IMPROVE reporting purposes.
Volatile Organic Compounds (VOCs)	Particulate Organic Matter (POM)	Biogenic emissions; vehicle emissions; area sources	VOCs are gaseous emissions of carbon compounds, which are often converted to POM through chemical reactions in the atmosphere. Estimates for biogenic emissions of VOCs have undergone significant updates since 2002, so changes reported here are more reflective of methodology changes than actual changes in emissions (see Section 3.2.1 ). <sup>66</sup>
Primary Organic Aerosol (POA)	POM	Wildfires; Area sources	POA represents organic aerosols that are emitted directly as particles, as opposed to gases. Wildfires in the west generally dominate POA emissions, and large wildfire events are generally sporadic and highly variable from year-to-year.
Elemental Carbon (EC)	EC	Wildfires; On- and off-road mobile sources	Large EC events are often associated with large POM events during wildfires. Other sources include both on- and off-road diesel engines.
Fine soil/fine particulate matter	Soil	Windblown dust; Fugitive dust; Road dust; Area sources	Fine soil is reported here as the crustal or soil components of PM <sub>2.5</sub> .
Coarse Mass/coarse particulate matter	Coarse Mass	Windblown dust; Fugitive dust	Coarse mass is reported by the IMPROVE network as the difference between PM <sub>10</sub> and PM <sub>2.5</sub> mass measurements. Coarse mass is not separated by species in the same way that PM <sub>2.5</sub> is speciated, but these measurements are generally associated with crustal components. Similar to crustal PM <sub>2.5</sub> , natural windblown dust is often the largest contributor to PMC.

Figures 3.8 through 3.15, below, and Tables 3.22 through 3.29, present the 2002, 2008, and 2011 WRAP data.

<sup>65</sup> WRAP 2013 Summary Report, p. 6-223.

<sup>66</sup> This sentence refers to Section 3.2.1 of the WRAP 2013 Summary Report.



Table 3.22

Sulfur Dioxide Emissions and Difference Between Emissions Inventory Totals by Source Category

Source Category	Sulfur Dioxide Emissions (tons/year)				
	2002 (Plan02d)	2008 (WestJump2008)	2011 (WAQDW11v1)	Difference, 2002 vs. 2011 (Percent Change)	WRAP 2018 projection (PRP18b)
<b>Anthropogenic Sources</b>					
Point	1,167	107	761	-406	1,612
Area	2,937	26	430	-2,507	12,033
On-Road Mobile	396	105	52	-344	70
Off-Road Mobile	272	53	7	-265	55
Area Oil and Gas	0	0	0	0	0
Fugitive and Road Dust	0	0	0	0	0
Anthropogenic Fire	0*	0*	0*	0	0*
<b>Total Anthropogenic</b>	<b>4,772</b>	<b>291</b>	<b>1,250</b>	<b>-3,522 (-74%)</b>	<b>13,770</b>
<b>Natural Sources</b>					
Natural Fire	1	0*	1	-1	1
Biogenic	0	0	0	0	0
Wind Blown Dust	0	0	0	0	0
<b>Total Natural</b>	<b>1</b>	<b>0*</b>	<b>1</b>	<b>-1 (-0%)</b>	<b>1</b>
<b>All Sources</b>					
<b>Total Emissions</b>	<b>4,773</b>	<b>291</b>	<b>1,251</b>	<b>-3,522 (-74%)</b>	<b>13,771</b>

\*Positive number less than 1 has been rounded to nearest whole number, resulting in emissions amount of zero.

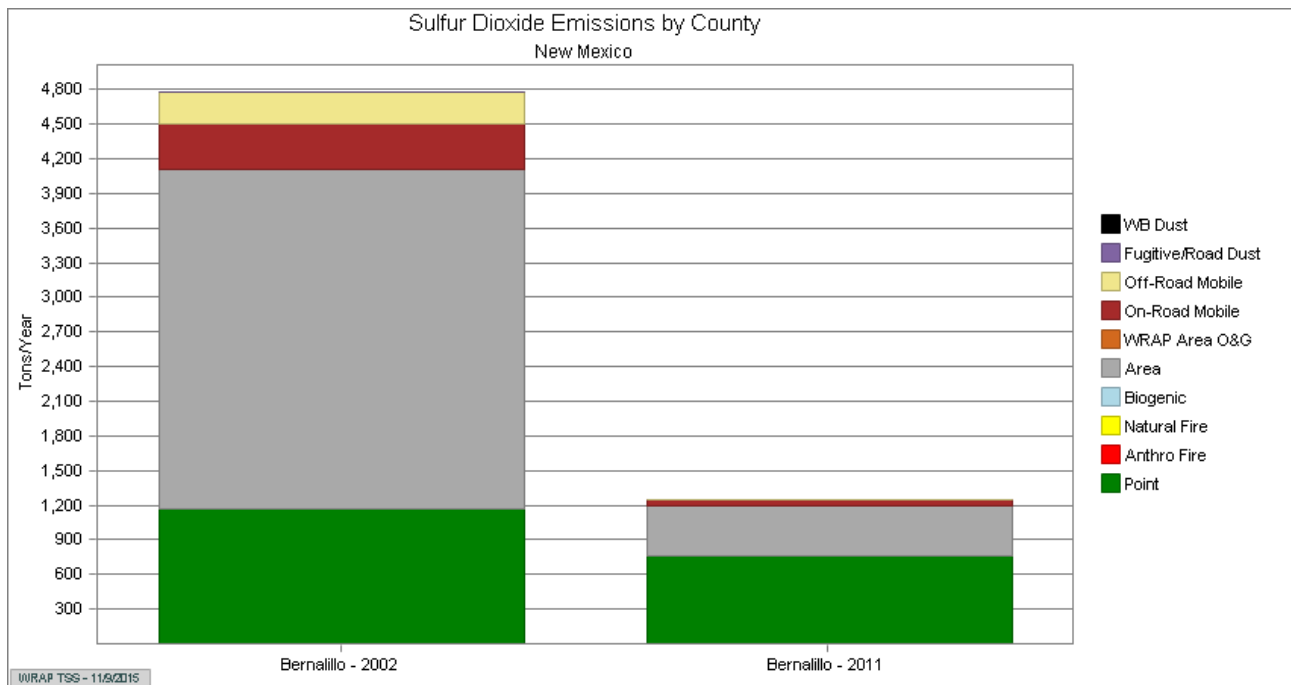


Figure 3.8. 2002 and 2011 Emissions for Sulfur Dioxide by Source Category for Albuquerque and Bernalillo County.

Table 3.23  
 Nitrogen Oxides Emissions and Difference Between  
 Emissions Inventory Totals by Source Category

Source Category	Nitrogen Oxides Emissions (tons/year)				
	2002 (Plan02d)	2008 (WestJump2008)	2011 (WAQDW11v1)	Difference, 2002 vs. 2011 (Percent Change)	WRAP 2018 projection (PRP18b)
<b>Anthropogenic Sources</b>					
Point	2,282	1,651	1,490	-792	3,420
Area	12,118	768	2,323	-9,795	17,148
On-Road Mobile	16,212	11,842	8,662	-7,550	4,386
Off-Road Mobile	3,033	2,698	2,285	-748	1,865
Area Oil and Gas	14	0	0	-14	0
Fugitive and Road Dust	2	0	0	-2	0
Anthropogenic Fire	0*	1	0*	0	0*
<b>Total Anthropogenic</b>	<b>33,661</b>	<b>16,960</b>	<b>14,760</b>	<b>-18,901 (-56%)</b>	<b>26,819</b>
<b>Natural Sources</b>					
Natural Fire	6	1	3	-5	6
Biogenic	189	160	180	-29	189
Wind Blown Dust	0	0	0	0	0
<b>Total Natural</b>	<b>195</b>	<b>161</b>	<b>183</b>	<b>-35 (-18%)</b>	<b>195</b>
<b>All Sources</b>					
<b>Total Emissions</b>	<b>33,856</b>	<b>17,121</b>	<b>14,943</b>	<b>-18,913 (-56%)</b>	<b>27,014</b>

\*Positive number less than 1 has been rounded to nearest whole number, resulting in emissions amount of zero.

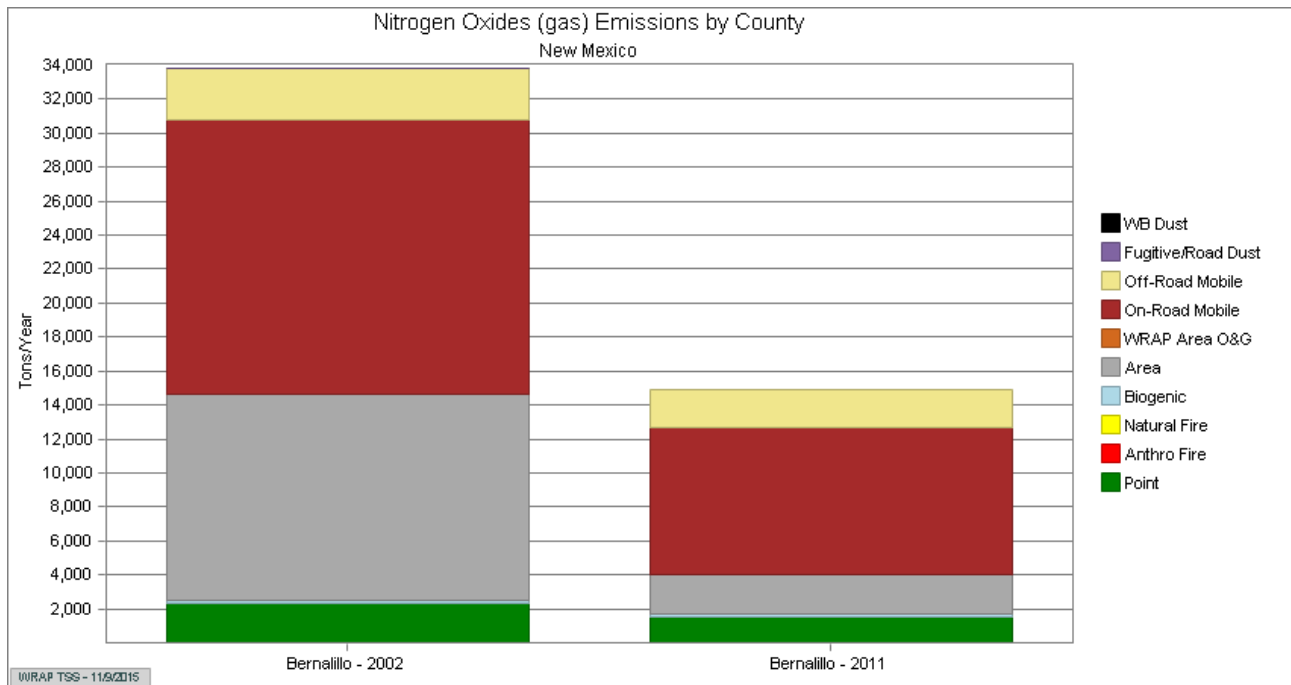


Figure 3.9. 2002 and 2011 Emissions for Nitrogen Oxides by Source Category for Albuquerque and Bernalillo County.

Table 3.24  
 Ammonia Emissions and Difference Between  
 Emissions Inventory Totals by Source Category

Source Category	Ammonia Emissions (tons/year)				
	2002 (Plan02d)	2008 (WestJump2008)	2011 (WAQDW11v1)	Difference, 2002 vs. 2011 (Percent Change)	WRAP 2018 projection (PRP18b)
<b>Anthropogenic Sources</b>					
Point	24	2	2	-22	52
Area	846	626	470	-376	890
On-Road Mobile	527	224	207	-320	738
Off-Road Mobile	3	3	3	0	3
Area Oil and Gas	0	0	0	0	0
Fugitive and Road Dust	0	0	0	0	0
Anthropogenic Fire	0*	1	0*	0	0*
<b>Total Anthropogenic</b>	<b>1,400</b>	<b>856</b>	<b>682</b>	<b>-716 (-51%)</b>	<b>1,683</b>
<b>Natural Sources</b>					
Natural Fire	2	1	1	-1	2
Biogenic	0	0	0	0	0
Wind Blown Dust	0	0	0	0	0
<b>Total Natural</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>-1 (-50%)</b>	<b>2</b>
<b>All Sources</b>					
<b>Total Emissions</b>	<b>1,402</b>	<b>857</b>	<b>683</b>	<b>-717 (-51%)</b>	<b>1,685</b>

\*Positive number less than 1 has been rounded to nearest whole number, resulting in emissions amount of zero.

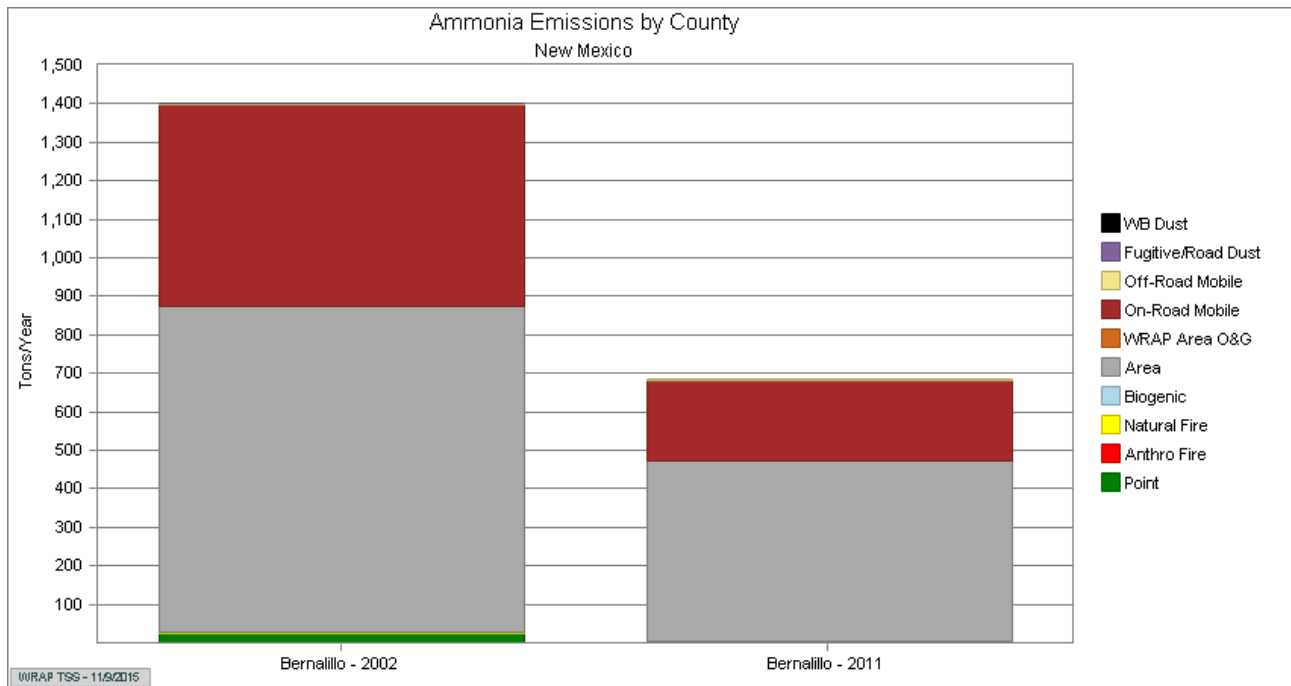


Figure 3.10. 2002 and 2011 Emissions for Ammonia by Source Category for Albuquerque and Bernalillo County.

Table 3.25  
 Volatile Organic Compound Emissions and Difference Between  
 Emissions Inventory Totals by Source Category

Source Category	Volatile Organic Compound Emissions (tons/year)				
	2002 (Plan02d)	2008 (WestJump2008)	2011 (WAQDW11v1)	Difference, 2002 vs. 2011 (Percent Change)	WRAP 2018 projection (PRP18b)
<b>Anthropogenic Sources</b>					
Point	297	491	496	199	436
Area	11,904	10,332	7,645	-4,259	17,403
On-Road Mobile	9,871	5,625	4,019	-5,852	3,875
Off-Road Mobile	3,389	2,689	2,414	-975	2,177
Area Oil and Gas	112	0	0	-112	0
Fugitive and Road Dust	0	0	0	0	0
Anthropogenic Fire	0*	2	0*	0	0
<b>Total Anthropogenic</b>	<b>25,573</b>	<b>19,137</b>	<b>14,574</b>	<b>-10,999 (-43%)</b>	<b>23,891</b>
<b>Natural Sources</b>					
Natural Fire	13	1	21	8	13
Biogenic	9,030	4,678	6,297	-2,733	9,030
Wind Blown Dust	0	0	0	0	0
<b>Total Natural</b>	<b>9,043</b>	<b>4,679</b>	<b>6,318</b>	<b>-2,725 (-30%)</b>	<b>9,043</b>
<b>All Sources</b>					
<b>Total Emissions</b>	<b>34,616</b>	<b>23,816</b>	<b>20,892</b>	<b>-13,724 (-40%)</b>	<b>32,934</b>

\*Positive number less than 1 has been rounded to nearest whole number, resulting in emissions amount of zero.

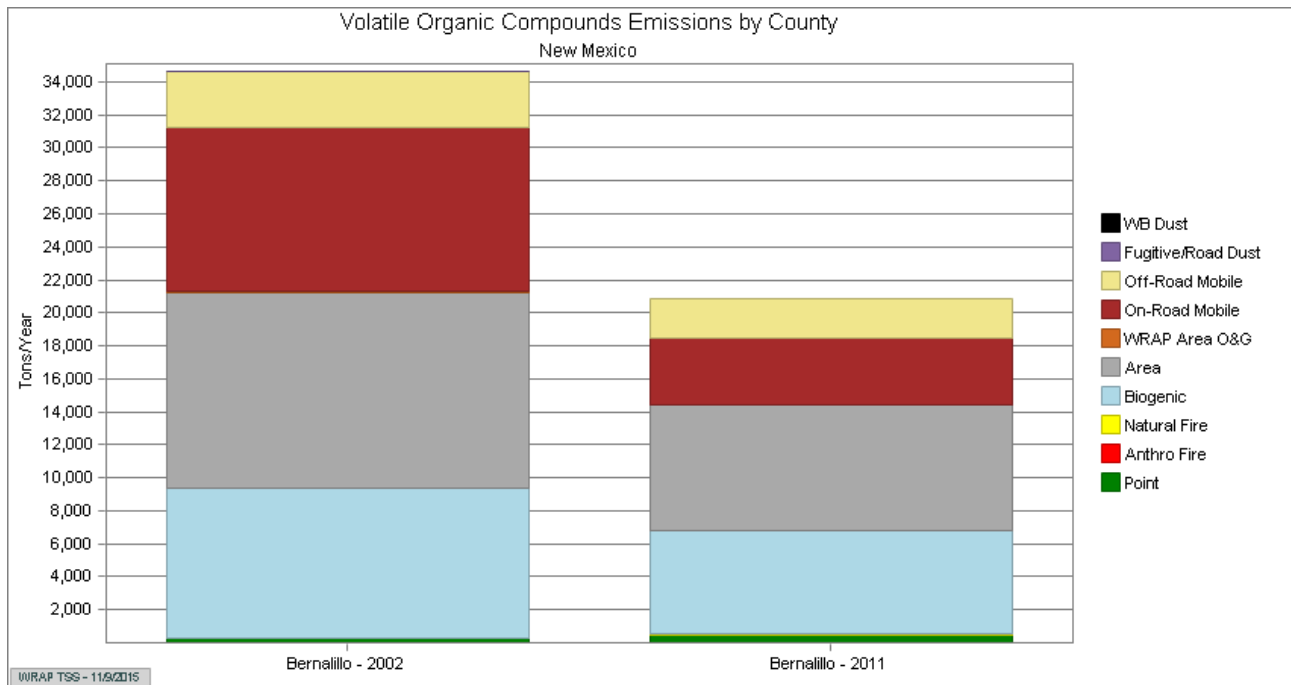


Figure 3.11. 2002 and 2011 Emissions for Volatile Organic Compounds by Source Category for Albuquerque and Bernalillo County.

Table 3.26  
 Primary Organic Aerosol Emissions and Difference Between  
 Emissions Inventory Totals by Source Category

Source Category	Primary Organic Aerosol Emissions (tons/year)				
	2002 (Plan02d)	2008 (WestJump2008 )	2011 (WAQDW11v1)	Difference, 2002 vs. 2011 (Percent Change)	WRAP 2018 projection (PRP18b)
<b>Anthropogenic Sources</b>					
Point	10	1	30	20	3
Area	507	647	1,453	946	569
On-Road Mobile	156	255	163	7	148
Off-Road Mobile	92	106	190	98	77
Area Oil and Gas	0	0	0	0	0
Fugitive and Road Dust	104	263	762	658	91
Anthropogenic Fire	0*	2	0*	0	0*
<b>Total Anthropogenic</b>	<b>869</b>	<b>1,274</b>	<b>2,598</b>	<b>1,729 (199%)</b>	<b>888</b>
<b>Natural Sources</b>					
Natural Fire	15	2	3	-12	15
Biogenic	0	0	0	0	0
Wind Blown Dust	0	0	0	0	0
<b>Total Natural</b>	<b>15</b>	<b>2</b>	<b>3</b>	<b>-12 (-80%)</b>	<b>15</b>
<b>All Sources</b>					
<b>Total Emissions</b>	<b>884</b>	<b>1,276</b>	<b>2,601</b>	<b>1,717 (194%)</b>	<b>903</b>

\*Positive number less than 1 has been rounded to nearest whole number, resulting in emissions amount of zero.

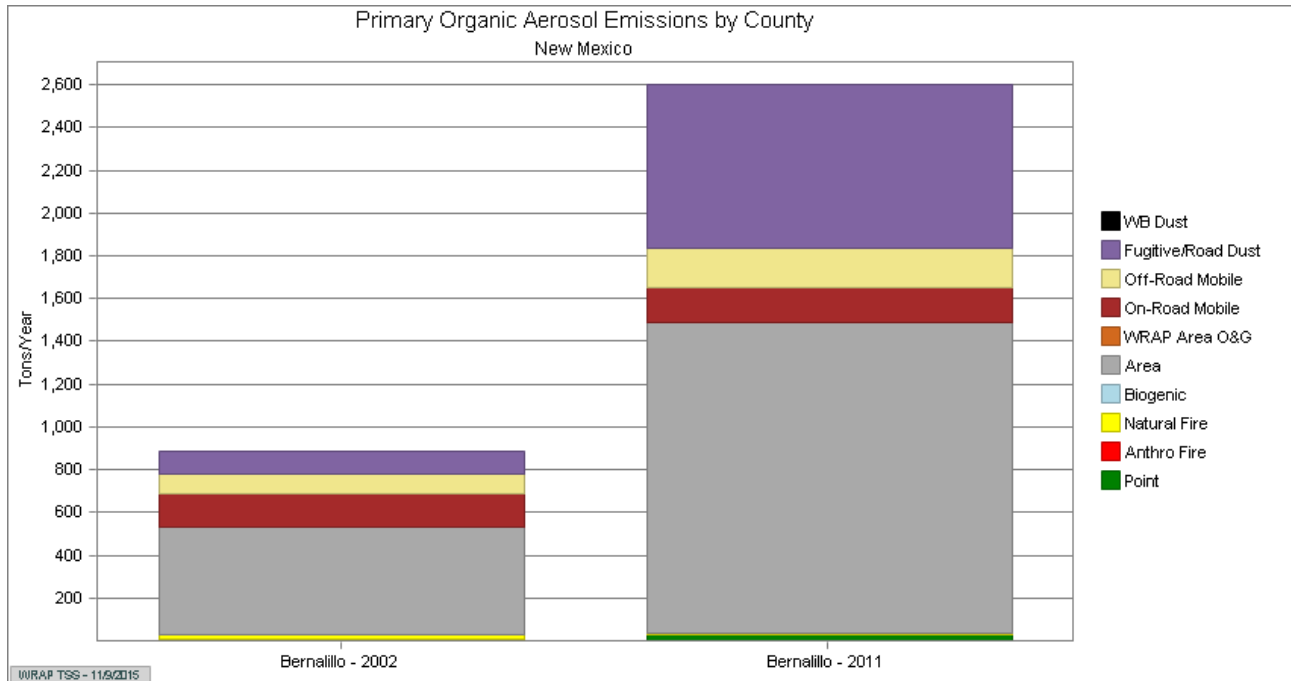


Figure 3.12. 2002 and 2011 Emissions for Primary Organic Aerosol by Source Category for Albuquerque and Bernalillo County.

Table 3.27  
Elemental Carbon Emissions and Difference Between  
Emissions Inventory Totals by Source Category

Source Category	Elemental Carbon Emissions (tons/year)				
	2002 (Plan02d)	2008 (WestJump2008)	2011 (WAQDW11v1)	Difference, 2002 vs. 2011 (Percent Change)	WRAP 2018 projection (PRP18b)
<b>Anthropogenic Sources</b>					
Point	0*	1	20	20	0*
Area	57	62	80	23	87
On-Road Mobile	170	407	164	-6	44
Off-Road Mobile	171	138	124	-47	81
Area Oil and Gas	0	0	0	0	0
Fugitive and Road Dust	7	6	8	1	6
Anthropogenic Fire	0*	0*	0*	0	0*
<b>Total Anthropogenic</b>	<b>405</b>	<b>614</b>	<b>396</b>	<b>-9 (-2%)</b>	<b>218</b>
<b>Natural Sources</b>					
Natural Fire	2	0*	1	1	2
Biogenic	0	0	0	0	0
Wind Blown Dust	0	0	0	0	0
<b>Total Natural</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>-1 (-50%)</b>	<b>2</b>
<b>All Sources</b>					
<b>Total Emissions</b>	<b>407</b>	<b>614</b>	<b>397</b>	<b>-10 (-2%)</b>	<b>220</b>

\*Positive number less than 1 has been rounded to nearest whole number, resulting in emissions amount of zero.

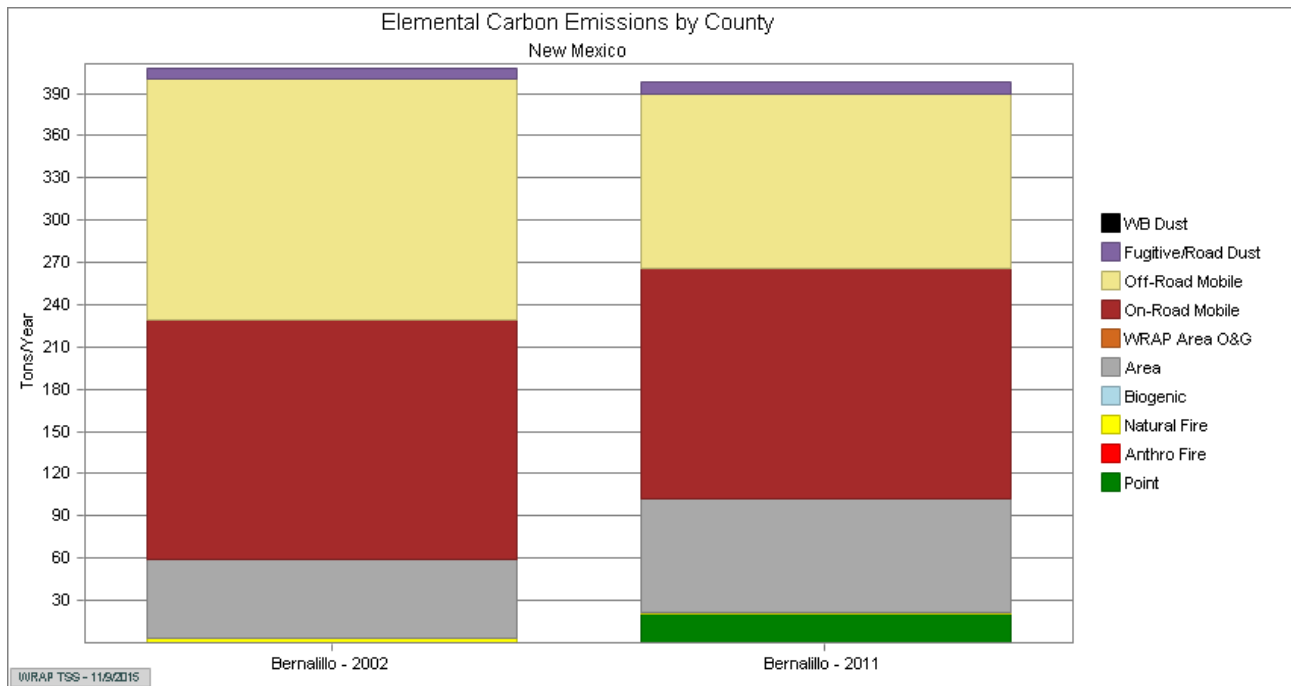


Figure 3.13. 2002 and 2011 Emissions for Elemental Carbon by Source Category for Albuquerque and Bernalillo County.

Table 3.28  
 Fine Particulate Matter Emissions and Difference Between  
 Emissions Inventory Totals by Source Category

Source Category	Fine Particulate Matter Emissions (tons/year)				
	2002 (Plan02d)	2008 (WestJump2008)	2011 (WAQDW11v1)	Difference, 2002 vs. 2011 (Percent Change)	WRAP 2018 projection (PRP18b)
<b>Anthropogenic Sources</b>					
Point	20	1	65	45	23
Area	503	268	42	-461	671
On-Road Mobile	0	48	43	43	0
Off-Road Mobile	0	7	0	0	0
Area Oil and Gas	0	0	0	0	0
Fugitive and Road Dust	1,706	3,787	5,627	3,921	1,739
Anthropogenic Fire	0*	1	0	0	0
<b>Total Anthropogenic</b>	<b>2,229</b>	<b>4,112</b>	<b>5,777</b>	<b>3,548 (159%)</b>	<b>2,433</b>
<b>Natural Sources</b>					
Natural Fire	3	1	0*	-3	3
Biogenic	0	0	0	0	0
Wind Blown Dust	94	142	173	79	94
<b>Total Natural</b>	<b>97</b>	<b>143</b>	<b>173</b>	<b>76 (78%)</b>	<b>97</b>
<b>All Sources</b>					
<b>Total Emissions</b>	<b>2,326</b>	<b>4,255</b>	<b>5,950</b>	<b>3,624 (156%)</b>	<b>2,530</b>

\*Positive number less than 1 has been rounded to nearest whole number, resulting in emissions amount of zero.

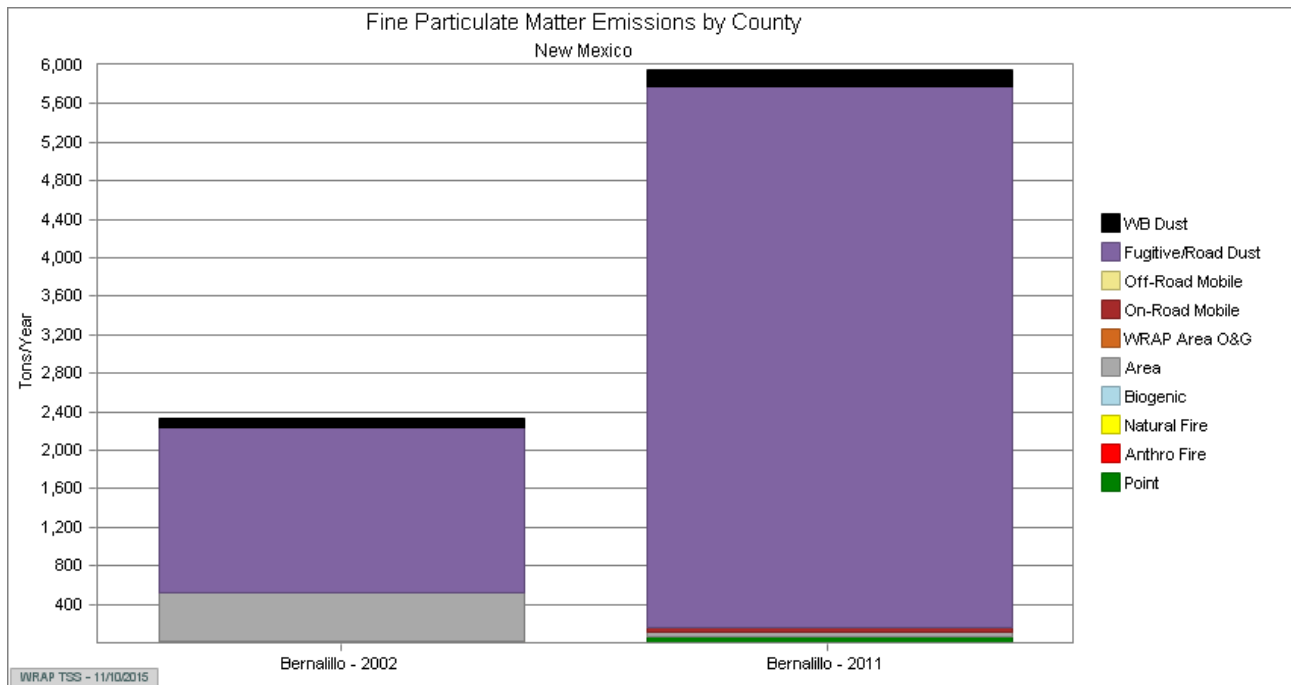


Figure 3.14. 2002 and 2011 Emissions for Fine Particulate Matter by Source Category for Albuquerque and Bernalillo County.

Table 3.29  
Coarse Particulate Matter Emissions and Difference Between  
Emissions Inventory Totals by Source Category

Source Category	Coarse Particulate Matter Emissions (tons/year)				
	2002 (Plan02d)	2008 (WestJump2008)	2011 (WAQDW11v1)	Difference, 2002 vs. 2011 (Percent Change)	WRAP 2018 projection (PRP18b)
<b>Anthropogenic Sources</b>					
Point	33	992	77	44	411
Area	162	19	195	33	508
On-Road Mobile	97	466	127	30	108
Off-Road Mobile	0	12	12	12	0
Area Oil and Gas	0	0	0	0	0
Fugitive and Road Dust	16,095	35,493	56,244	40,149	16,342
Anthropogenic Fire	0	0*	0*	0	0
<b>Total Anthropogenic</b>	<b>16,387</b>	<b>36,982</b>	<b>56,655</b>	<b>40,268 (246%)</b>	<b>17,369</b>
<b>Natural Sources</b>					
Natural Fire	2	0*	0	-2	2
Biogenic	0	0	0	0	0
Wind Blown Dust	842	1,275	1,553	711	842
<b>Total Natural</b>	<b>844</b>	<b>1,275</b>	<b>1,533</b>	<b>709 (84%)</b>	<b>844</b>
<b>All Sources</b>					
<b>Total Emissions</b>	<b>17,231</b>	<b>38,257</b>	<b>58,188</b>	<b>40,977 (238%)</b>	<b>18,213</b>

\*Positive number less than 1 has been rounded to nearest whole number, resulting in emissions amount of zero.

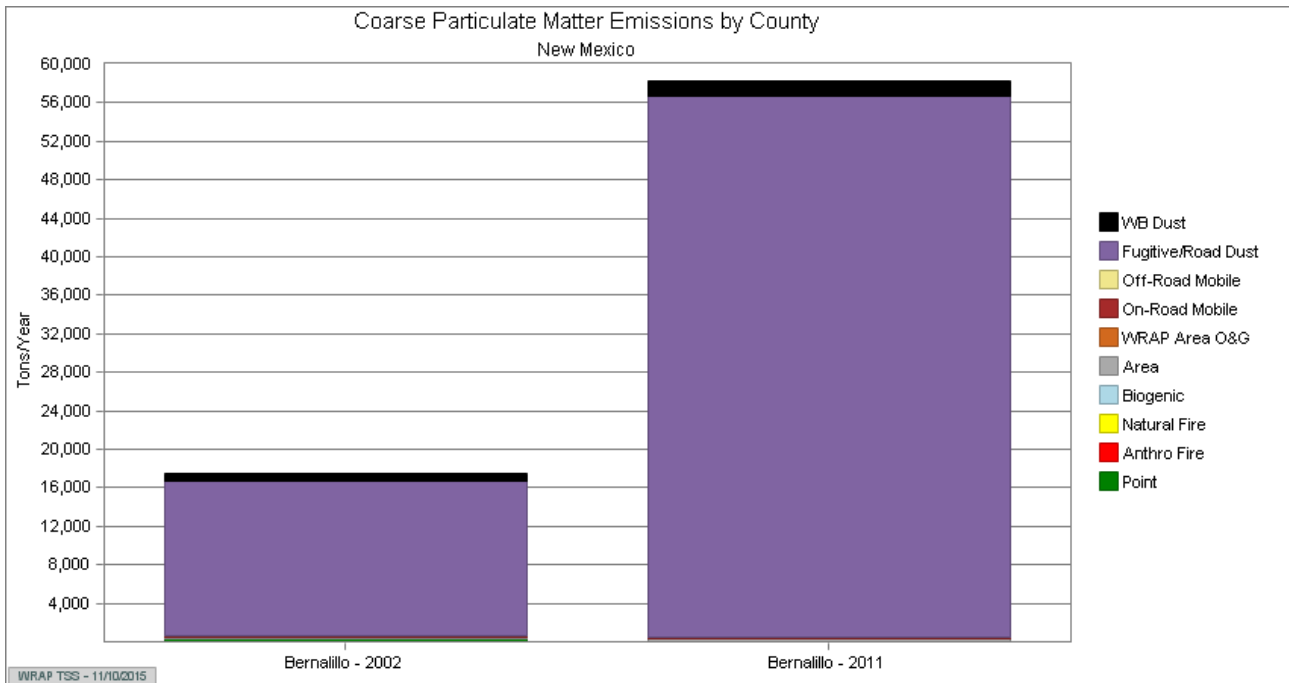


Figure 3.15. 2002 and 2011 Emissions for Coarse Particulate Matter by Source Category for Albuquerque and Bernalillo County.



Table 3.30, below, shows the percentage of statewide emissions accounted for by emissions from inside Albuquerque and Bernalillo County. The emission totals for Albuquerque and Bernalillo County are taken from Tables 3.22 through 3.29, above. Emission totals for the entire state of New Mexico are taken from the WRAP TSS web site and the New Mexico Regional Haze progress report.

Table 3.30  
 Albuquerque - Bernalillo County Anthropogenic Emissions<sup>67</sup>  
 as Percentage of New Mexico Anthropogenic Emissions  
 Outside City and County: WRAP Data (in tons per year)

Pollutant	2002 (Plan02d)		2008 (WestJump2008)		2011 (WAQDW11v1)	
	Total emissions	A/BC % of total NM emissions	Total emissions	A/BC % of total NM emissions	Total emissions	A/BC % of total NM emissions
Sulfur Dioxide	A/BC: 4,772 NM: 48,354	10%	A/BC: 291 NM: 27,392	1%	A/BC: 1,250 NM: 21,624	6%
Oxides of Nitrogen	A/BC: 33,661 NM: 295,266	11%	A/BC: 16,960 NM: 211,132	8%	A/BC: 14,760 NM: 168,008	9%
Ammonia	A/BC: 1,400 NM: 32,266	4%	A/BC: 856 NM: 43,840	2%	A/BC: 682 NM: 37,071	2%
Volatile Organic Compounds	A/BC: 25,573 NM: 344,077	7%	A/BC: 19,137 NM: 268,792	7%	A/BC: 14,574 NM: 214,360	7%
Primary Organic Aerosol	A/BC: 869 NM: 5,879	15%	A/BC: 1,276 NM: 17,678	7%	A/BC: 2,598 NM: 18,085	14%
Elemental Carbon	A/BC: 405 NM: 2,753	15%	A/BC: 614 NM: 5,979	10%	A/BC: 396 NM: 2,605	15%
Fine Particulate Matter	A/BC: 2,229 NM: 12,573	18%	A/BC: 4,112 NM: 61,587	7%	A/BC: 5,777 NM: 85,576	7%
Coarse Particulate Matter	A/BC: 16,387 NM: 66,096	25%	A/BC: 36,982 NM: 511,327	7%	A/BC: 56,655 NM: 830,697	7%

Albuquerque - Bernalillo County emissions for all pollutants have either remained essentially constant or have declined relative to emissions from the rest of the state. At the same time, between 2002 and 2011 absolute amounts of city and county emissions declined for several pollutants. Declines in this period occurred for sulfur dioxide, nitrogen oxides, ammonia, volatile organic compounds, and elemental carbon.<sup>68</sup>

However, as mentioned at the outset of this section, the WRAP data for particulate organic aerosols, fine particulate matter, and coarse particulate matter appear to show substantial increases in emissions of these pollutants between 2002 and 2011. Additionally, sulfur dioxide emissions from point sources, according to

<sup>67</sup> Emissions are from anthropogenic sources.

<sup>68</sup> The 2002 to 2011 decline in elemental carbon emissions shown by the WRAP was slight, due primarily to emissions from on- and off-road mobile sources. EHD expects that continued implementation of federal mobile source standards will over time reduce emissions from this category.

the WRAP inventories,<sup>69</sup> appeared to increase significantly between 2008 and 2011. However, additional information available to the City of Albuquerque Environmental Health Department suggests that these WRAP emissions inventories appear to reflect overestimates of actual emissions in key source categories. The basis for that determination in regard to each pollutant is as follows.

**Sulfur Dioxide**

Table 3.22, above, shows what appears to be a substantial increase in local point source emissions of SO<sub>2</sub> from 2008 to 2011. However, this increase is likely due to a reporting over estimation by a regulated source. That source reported its emissions estimate based on the permitted limits rather than the actual emissions. The permitted amount was much larger than the actual amount. The resulting over estimation was reported into EPA emissions inventories, affecting the final contents of the 2011 National Emissions Inventory (NEI). The NEI provides input data for the WRAP emissions inventories.<sup>70</sup> Thus, it appears likely that the over estimation influenced the result of the 2011 WRAP inventory. EHD has since worked with the source and with EPA to correct the reporting over estimation.

EHD’s most current emissions inventory data for point sources in Bernalillo County differs substantially from the results of the WRAP inventory. That information is presented below. It should be noted that the over estimation issue was identified in 2014 and is being corrected as part of the 2014 Emissions Inventory. The significant increase in SO<sub>2</sub> for years 2012 and 2013 identified in the table below is also the result of a change in methodology of estimating that is currently considered to be a potential over estimation but has yet to be corrected.

Table 3.31: Point source emissions of SO<sub>2</sub> in Albuquerque and Bernalillo County

Year	SO <sub>2</sub> emissions, in tons per year
2008	56.81
2011	73.86
2012	132.23
2013	164.93

Source: EHD data assembled for reporting to NEI and the State and Local Emissions Inventory System (SLEIS).

In view of the above information, EHD has determined there is no indication of substantial point source emissions increases of SO<sub>2</sub> within Albuquerque and Bernalillo County on the scale shown by the WRAP inventory.

<sup>69</sup> See Section 3.3, above, for information on EHD’s local data on SO<sub>2</sub> point source emissions.

<sup>70</sup> On the methodology for WRAP emissions inventories, see, for example, Zac Adelman and B.H. Baek, Three-State Air Quality Modeling Study Emissions Modeling Report: Simulation Years 2008 and 2011 (University of North Carolina at Chapel Hill, Institute for the Environment and ENVIRON Corporation), available by contacting the Western Regional Air Partnership, <http://wrapair2.org/>; Cyndi Loomis, Zac Adelman, and Ralph Morris, Technical Memorandum No. 1: Point Source Emissions (March 15, 2013) (addressing the subject of “Point Source Emissions, including Electricity Generating Units (EGUs) and non EGUs, for the WestJumpAQMS 2008 Photochemical Modeling”), available at [http://www.wrapair2.org/pdf/Memo1\\_PointSources\\_Mar15\\_2013final.pdf](http://www.wrapair2.org/pdf/Memo1_PointSources_Mar15_2013final.pdf).

**Particulate Organic Matter**

Tables 3.28 and 3.29, above, show what appear to be substantial increases in both fine and particulate matter between 2002 and the later WRAP inventories in 2008 and 2011, due overwhelmingly to apparent major increases in fugitive and road dust emissions.

EHD has compared this data to a comprehensive inventory that it performed of PM<sub>10</sub> emissions during the year 2004, based on locally available land use data from state and local government agencies.<sup>71</sup> According to the WRAP inventories, and the NEI data used as input for those inventories, emissions of PM<sub>10</sub> from fugitive and road dust have increased drastically since EHD performed its inventory of 2004 PM<sub>10</sub> emissions. A comparison of fugitive and road dust emissions data from these various inventories appears in Table 3.32, below.<sup>72</sup>

Table 3.32: Comparison of fugitive and road dust PM<sub>10</sub> inventories (tons per year)

Source Subcategory	2004 EHD	2008 NEI	2011 NEI	2008 WRAP	2011 WRAP
<b>TOTAL Fugitive &amp; road</b>	10,593	55,479	55,278	35,493	56,244
<b>Unpaved roads*</b>	1,439	36,952	44,443	Not available	
<b>Paved roads</b>	2,274	1,135	1,089		
<b>Construction</b>	6,851	17,206	9,497		
<b>Agriculture</b>	29	50	55		
<b>Mining/quarrying</b>	Not applicable	136	194		

\* The unpaved roads subcategory includes city and county public roads, private roads, and roads on federal land.

Sources for data in table: City of Albuquerque Environmental Health Department, Bernalillo County PM<sub>10</sub> Emission Inventory for 2004 (April 27, 2006), available at [https://www.dri.edu/images/stories/editors/eafeditor/Duboisetal2006\\_BernalilloCountyEmissInv.pdf](https://www.dri.edu/images/stories/editors/eafeditor/Duboisetal2006_BernalilloCountyEmissInv.pdf); NEI data from EPA, <http://www3.epa.gov/ttn/chief/eiinformation.html>; WRAP data from WRAP TSS web site, <http://vista.cira.colostate.edu/TSS/Results/Emissions.aspx>;

According to the above table, NEI and WRAP data show an increase in PM<sub>10</sub> fugitive and road dust emissions from 2004 to 2011 of over 400%.

The NEI and WRAP data show similar dramatic increases for PM<sub>2.5</sub>, per table 3.33, below.

<sup>71</sup> City of Albuquerque Environmental Health Department, Bernalillo County PM<sub>10</sub> Emission Inventory for 2004 (April 27, 2006), available at [https://www.dri.edu/images/stories/editors/eafeditor/Duboisetal2006\\_BernalilloCountyEmissInv.pdf](https://www.dri.edu/images/stories/editors/eafeditor/Duboisetal2006_BernalilloCountyEmissInv.pdf) ;

<sup>72</sup> Note that the City of Albuquerque Environmental Health Department 2004 inventory covered PM<sub>s</sub> only and did not specifically inventory PM<sub>2.5</sub> emissions.

Table 3.33: Comparison of fugitive and road dust PM<sub>2.5</sub> inventories (tons per year)

Source Subcategory	2004 EHD	2008 NEI	2011 NEI	2008 WRAP	2011 WRAP
<b>TOTAL Fugitive &amp; road</b>		5,708	5,679	3,787	5,627
<b>Unpaved roads*</b>	Inventory was for PM <sub>10</sub> only; PM <sub>2.5</sub> not differentiated	3,677	4,423	Not available	
<b>Paved roads</b>		284	272		
<b>Construction</b>		1,721	950		
<b>Agriculture</b>		10	9		
<b>Mining/quarrying</b>		17	25		

These apparent trends, however, run contrary to other information available to EHD, which is not consistent with the actual occurrence of such drastic PM emissions increases from fugitive and road dust.

Most importantly, design values measuring Albuquerque - Bernalillo compliance with the PM NAAQS have not shown a drastic increase over time. One would expect that emissions increases of the magnitude shown by the WRAP 2008 and 2011 inventories would be reflected by a comparably significant change in the design values. Such a change is not evident, as EPA air quality data shows.<sup>73</sup>

A sampling of PM design value data for Albuquerque and Bernalillo County is presented in Table 3.34, below.

Table 3.34: Albuquerque - Bernalillo County PM design values compared to primary NAAQS (value shown is highest monitor reading within city/county for a given year)

	PM <sub>10</sub> 24 hour reading	1987 PM <sub>10</sub> NAAQS	PM <sub>2.5</sub> 24 hour reading	2012 PM <sub>2.5</sub> NAAQS	2012 PM <sub>2.5</sub> annual reading	2012 PM <sub>2.5</sub> NAAQS (annual)
<b>2008</b>	132	150 micrograms / cubic meter, 24 hour average	Not available*	35 micrograms / cubic meter, 24 hour average	Not available*	12 micrograms / cubic meter, annual average
<b>2009</b>	114		Not available*		Not available*	
<b>2010</b>	106		Not available*		Not available*	
<b>2011</b>	108		18		5.9	
<b>2012</b>	106		19		6.5	
<b>2013</b>	107		20		6.7	
<b>2014</b>	119		16		6.5	

\*Valid design values for these years are not available, due to equipment failures or other technical issues at monitoring sites that resulted in data sets not meeting EPA completeness criteria. The incomplete data and its causes were reported to EPA according to established EPA procedure.

The above data is not consistent with large increases in fugitive and road dust emissions during the indicated time period. While official, validated PM<sub>2.5</sub> data for the period 2008 to 2010 are not available, all the PM<sub>10</sub> and PM<sub>2.5</sub> design value data that are available show air quality in Albuquerque and Bernalillo County remaining well within the applicable NAAQS.

<sup>73</sup> EPA design value data is available at <http://www3.epa.gov/airtrends/values.html>.

Additionally, EHD has examined data on demographic, social, and economic trends in Albuquerque and Bernalillo County, to determine whether or not they are consistent with the occurrence of drastic increases in fugitive and road dust emissions over the approximate time period covered by WRAP inventories and EHD's 2004 inventory of PM<sub>10</sub>. The data examined by EHD related to:

- use of unpaved roads
- use of paved roads
- residential and commercial/industrial construction projects, and
- mining/quarrying.

EHD examined data related to such activities because these are the four broad subcategories of sources used in the NEI to arrive at total emissions in the fugitive and road dust category. This NEI data, in turn, is used by the WRAP as input for further modeling that produces a final WRAP emissions inventory. Methodology in both the NEI and WRAP inventories relies on indirect “surrogates” for source activity to estimate levels of dust emissions from paved/unpaved roads, construction, and mining/quarrying. The NEI and WRAP methodology does not measure such emissions directly.<sup>74</sup>

For example, the NEI for 2008 and 2011 used total rural population in a county as one factor (among others) serving as a partial “stand in” for vehicle miles traveled on unpaved roads. This stand-in was combined with similar surrogate factors, such as an approximation of unpaved road mileage in a county, which in turn was derived indirectly from statewide data rather than counted directly. The result of this indirect approach was an estimate of overall unpaved road dust emissions. This NEI result is a “default” number, used when more direct calculations based on local data sources are unavailable. That number, in turn, becomes the input for further WRAP modeling.

After EPA calculates default emissions data for the NEI, local agencies such as EHD are given an opportunity to review and if necessary correct the NEI estimates. A local agency may submit its own data, from local data sources, to supplement or revise the NEI default estimates. For the 2008 and 2011 NEI, EHD accepted NEI default estimates for unpaved roads, paved roads, construction, and mining/quarrying.

For this Regional Haze progress report, EHD examined additional demographic, social, and economic data related to such activities. Based on EHD's examination, the data related to such source activity is not consistent with the real-world occurrence of drastic increases in PM emissions from fugitive and road dust. A discussion of such data appears below.

- Per table 3.32, above, NEI data on PM<sub>10</sub> emissions, used as inputs for modeling in WRAP inventories, showed a drastic 2,988% increase in Bernalillo County unpaved road dust in 2011 compared to the EHD's PM<sub>10</sub> inventory of 2004. The WRAP inventories, furthermore, used rural population as a surrogate to help estimate unpaved road dust emissions. However, rural population in

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<sup>74</sup> NEI and WRAP methodology for estimating fugitive and road dust emissions is more fully described in the following sources: Zac Adelman and B.H. Baek, Three-State Air Quality Modeling Study Emissions Modeling Report: Simulation Years 2008 and 2011 (University of North Carolina at Chapel Hill, Institute for the Environment and ENVIRON Corporation); Zac Adelman, Ralph Morris, Cyndi Loomis, Technical Memorandum No. 6: Dust Source Emissions (ENVIRON Corporation, Alpine Geophysics LLC, and University of North Carolina at Chapel Hill, Institute for the Environment: March 11, 2013), available at [http://www.wrapair2.org/pdf/Memo6\\_Dust\\_Mar11\\_2013review\\_draft.pdf](http://www.wrapair2.org/pdf/Memo6_Dust_Mar11_2013review_draft.pdf); U.S. Environmental Protection Agency, 2011 National Emissions Inventory, version 2, Technical Support Document (August 2015), available at <http://www3.epa.gov/ttn/chief/net/2011inventory.html#inventorydoc>; Western Regional Air Partnership, Emissions Modeling (June 2011), available at <http://vista.cira.colostate.edu/TSS/Results/Emissions.aspx>; Western Regional Air Partnership, Fugitive Dust Emissions (June 2011), available at <http://vista.cira.colostate.edu/TSS/Results/Emissions.aspx>.

Albuquerque increased by only a small amount from 2000 to 2010, from 24,343 to 27,798.<sup>75</sup> It appears implausible that such a modest increase could be consistent with a 2,988% increase in dust produced by use of unpaved roads. Further, the land area of the Albuquerque urban area increased by 11.9% between 2000 and 2010, from 22.95 square miles to 250.57 square miles.<sup>76</sup> This increase in urban land area, not rural, is inconsistent with a drastic expansion of unpaved rural road mileage that could produce a drastic increase in dust emission from such roads.

- While direct measurements of actual mileage of unpaved roads in Bernalillo County are not available, other transportation related trends can be observed. The rest of New Mexico, which is far more rural in character than Bernalillo County and thus more likely to make use of unpaved roads, showed only a modest increase in actual mileage of unpaved roads between 2004 and 2011, from 28,911 miles to 38,742. It appears implausible that Bernalillo County would experience a far more drastic increase in the availability of unpaved roads that might in turn help explain a 2,988% increase in dust from the use of such roads.
- Overall vehicle miles traveled in Bernalillo County from 2004 to 2012 increased by only 13% from 2004 to 2012, from 16,735,195 to 18,966,203. It appears implausible that such a modest increase could be consistent with a 2,988% increase in dust produced by use of unpaved roads.
- Data on vehicle usage in Bernalillo County from 2005 to 2011 shows only modest increases in such usage.<sup>77</sup> The number of persons commuting to work by car, truck, or van, driving alone, increased by only 9.9%, from 220,509 to 242,390 (the number of persons carpooling to work by such means decreased 13.2%, from 38,547 to 33,445). The number of persons in households that had access to one or more vehicles for transportation to work increased by 7.3%, from 277,984 to 298,142. The aggregate number of vehicles available among all occupied housing units (owned and rented) increased by 6.4%, from 438,668 to 466,684. Although this data does not capture whether or not vehicle use occurred on paved or unpaved roads, it appears implausible that modest increases in certain types of vehicle use would be linked to a drastic increase in dust from unpaved roads in particular.
- The number of business establishments in Bernalillo County that might be linked to fugitive dust emissions from construction, agriculture, or mining activities increased only modestly, or actually decreased, from 2005 to 2011.<sup>78</sup> Establishments related to agriculture, forestry, fishing, or hunting increased from 7 to 9. Those related to mining or oil and gas decreased from 27 to 18. Those related to construction decreased from 1,719 to 1,397. While this data does not capture the size of the establishments or the scale of activity at their location, the absence of a major increase in the number of fugitive dust-causing establishments is not consistent with a major increase in such dust.

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<sup>75</sup> U.S. Census, American Fact Finder, 2000 and 2010 Census Summary File 1, <http://factfinder.census.gov/>. For technical documentation on obtaining county-level US Census data using American Fact Finder, see [http://factfinder.census.gov/faces/affhelp/jsf/pages/metadata.xhtml?lang=en&type=dataset&id=dataset.en.DEC\\_10\\_SF\\_1#](http://factfinder.census.gov/faces/affhelp/jsf/pages/metadata.xhtml?lang=en&type=dataset&id=dataset.en.DEC_10_SF_1#).

<sup>76</sup> U.S. Census, 2010 Urban-Rural Classification Data, <https://www.census.gov/geo/reference/ua/urban-rural-2010.html>.

<sup>77</sup> U.S. Census, American Community Survey 2011, 5-year estimates; American Community Survey 2008, 3-year estimates; American Community Survey 2005, <http://factfinder.census.gov>.

<sup>78</sup> U.S. Census, Annual County Business Patterns, <http://factfinder.census.gov>.

- The number of persons employed in construction, a key potential source of fugitive dust, decreased from 24,419 in 2005 to 24,154 in 2011.<sup>79</sup> The absence of a major increase in such employment is not the type of evidence one would expect to find if economic activity in construction were contributing to major increases in fugitive dust emissions. Agricultural employment increased from 1,295 to 2,964, but agriculture was not a significant source of fugitive dust emissions in the 2008 and 2011 NEI.<sup>80</sup>
- General population and economic growth in Bernalillo County have not been as drastic as the apparent increases in fugitive and road dust emissions. The county's population increased 19% between 2000 and 2010, from 556,678 to 662,564.<sup>81</sup> Mean household income increased by 13.3% between 2005 and 2011, from \$57,608 to \$65,263.<sup>82</sup> Per capita family income increased by 8.4% between 2005 and 2011, from \$24,567 to \$26,638.<sup>83</sup> None of these increases suggest population or economic growth that might help explain substantial increases in fugitive and road dust emissions.

In light of the information discussed above, EHD has concluded that the WRAP 2008 and 2011 inventories, and the NEI default estimates which provided input data for those inventories, likely produced overestimates of local PM emissions due to fugitive and road dust.

EHD is working with other New Mexico local government entities, through the Mid Region Council of Governments (MRCOG),<sup>84</sup> to improve data gathering related to emissions inventories. In particular, EHD and MRCOG are cooperating to gather socioeconomic data that can be used for more reliable estimates of fugitive and road dust emissions. Those estimates can then be submitted to EPA for use in the NEI or in other emissions inventories, replacing the previous practice of accepting the rough, default estimates used by EPA in the absence of more detailed, locally specific information provided by a local agency. Access to such data will enable preparation of emissions inventories that more closely and precisely approximate local environmental, land use, and socioeconomic conditions than is currently the case for the rough default estimates produced by the NEI and WRAP inventories. Examples of more precise, locally specific data that might be submitted to EPA in the future include appropriate quantification of vehicle miles traveled, road surface mileage, and specific types of land use patterns.

### ***Primary Organic Aerosols***

According to Table 3.26, above, the 2011 WRAP inventory showed apparent significant increases in emissions of primary organic aerosols (POA). According to the WRAP data, the major causes of the apparent increase were a rise in both area source emissions and fugitive/road dust emissions.

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<sup>79</sup> U.S. Census, American Community Survey 2011, 5-year estimates; American Community Survey 2008, 3-year estimates; and American Community Survey 2005 <http://factfinder.census.gov>.

<sup>80</sup> *Id.*

<sup>81</sup> U.S. Census, American Fact Finder, 2000 and 2010 Census Summary File 1, <http://factfinder.census.gov/>. For technical documentation on obtaining county-level US Census data using American Fact Finder, see [http://factfinder.census.gov/faces/affhelp/jsf/pages/metadata.xhtml?lang=en&type=dataset&id=dataset.en.DEC\\_10\\_SF1#](http://factfinder.census.gov/faces/affhelp/jsf/pages/metadata.xhtml?lang=en&type=dataset&id=dataset.en.DEC_10_SF1#).

<sup>82</sup> U.S. Census, American Community Survey 2011, 5-year estimates; American Community Survey 2008, 3-year estimates; and American Community Survey 2005 <http://factfinder.census.gov>.

<sup>83</sup> *Id.*

<sup>84</sup> For more information on the Mid Region Council of Governments, including its data collection and analysis resources, see the organization's web site, <http://www.mrcog-nm.gov/>.

For reasons similar to those described above, in regard to particulate matter emissions, EHD has concluded that at present there is insufficient evidence of actual increases in POA emissions from Albuquerque and Bernalillo County. The same methodological uncertainty affecting NEI and WRAP estimates of PM fugitive/road dust emissions applies to estimates of POA emissions from fugitive road dust and from area sources. The NEI produces default estimates that rely on indirect social and economic indicators, and the resulting default number becomes input for further WRAP modeling, including speciation of POA from precursor pollutants.

Unlike the case of fugitive and road dust, EHD has in the past submitted some of its own area source estimates to EPA for certain emissions categories, rather than accept the NEI default estimates. Primarily, however, EHD continues to accept EPA default estimates for area sources, currently termed “nonpoint” sources for NEI purposes. As is the case with fugitive and road dust emissions, EHD is working with local agencies and EPA to provide more precise and locally-focused data on area source activity.

***Emissions from Electric Generating Units***

The New Mexico Regional Haze progress report presents data on statewide emissions of SO<sub>2</sub> and NO<sub>x</sub> from electric generating units (EGUs), i.e., power plants that produce electricity for use by homes, businesses, and other facilities. The New Mexico report shows a long-term decline in EGU emissions for both SO<sub>2</sub> and NO<sub>x</sub>, as shown in the following chart.<sup>85</sup>

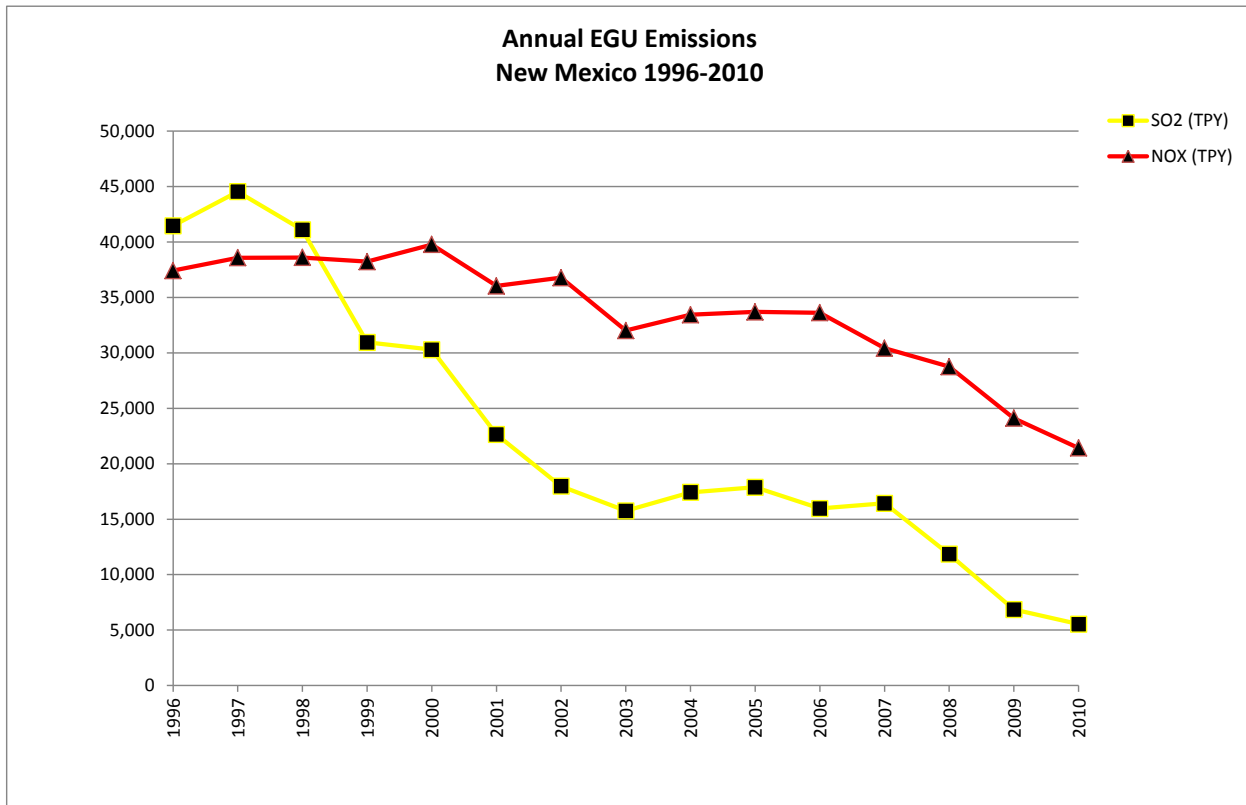


Figure 3.16. Sum of EGU Emissions of SO<sub>2</sub> and NO<sub>x</sub> reported between 1996 and 2010 for New Mexico.

<sup>85</sup> NM RH Progress Report, p. 44.



Albuquerque and Bernalillo County contain only two electric power generating facilities: Reeves Generating Station and Rio Bravo Generating Station, both owned by Public Service Company of New Mexico. These two facilities represent only a small fraction of statewide SO<sub>2</sub> and NO<sub>x</sub> emissions from EGUs, as shown by data from EPA’s Clean Air Markets Division, available at <http://ampd.epa.gov/ampd>. As shown in Table 3.35, reported emissions in Albuquerque and Bernalillo County range from 0 to 697 tons per year over the indicated time span, whereas statewide emissions in Figure 3.16, above, reach many thousands of tons per year.

Table 3.35  
SO<sub>2</sub> and NO<sub>x</sub> emissions from EGUs in Albuquerque and Bernalillo County

	Rio Bravo Generating Station		Reeves Generating Station	
	SO <sub>2</sub>	NO <sub>x</sub>	SO <sub>2</sub>	NO <sub>x</sub>
1997			0	116
1998			0	138
1999			1	224
2000	2	28	1	374
2001	5	105	2	697
2002	0	12	0	173
2003	0	3	1	235
2004	0	2	0	164
2005	0	4	0	151
2006	0	14	0	80
2007	0	21	0	99
2008	0	38	0	98
2009	0	6	0	84
2010	0	3	0	107
2011	1	350	0	114
2012	0	25	0	93
2013	1	15	0	144

### **3.6 Changes to Anthropogenic Emissions: 40 CFR § 51.309(d)(10)(i)(E)**

40 CFR § 51.309(d)(10)(i)(E) requires “an assessment of any significant changes in anthropogenic emissions within or outside the State that have occurred over the past 5 years that have limited or impeded progress in reducing pollutant emissions and improving visibility.”

The 2013 Regional Haze Progress report for the State of New Mexico noted that ammonium sulfate and particulate organic matter have historically been the major concern for visibility impairment at Class I areas in New Mexico.<sup>86</sup> The NMED report also noted the importance of ammonium nitrate as a source of visibility impairment as of the 2000-2004 baseline planning period.<sup>87</sup> The New Mexico report further stated, based on emissions data, that “[t]here do[] not appear to be any anthropogenic emissions within New Mexico that would have limited or impeded progress in reducing pollutant emissions or improving visibility.”<sup>88</sup>

<sup>86</sup> NM RH Progress report, pp. 44-45 and Appendix C of that report.

<sup>87</sup> NM RH Progress report, pp. 12-13.

<sup>88</sup> NM RH Progress Report, p. 45.

This conclusion is supported by data reviewed in this progress report for Albuquerque and Bernalillo County. Based on the emissions data discussed in Sections 3.3 and 3.5, above, EHD has found no indication of significant changes in Albuquerque - Bernalillo County anthropogenic emissions that have limited or impeded statewide progress in reducing pollutant emissions and improving visibility. Local city and county anthropogenic emissions of key pollutants of concern noted in the New Mexico report -- sulfur dioxide and nitrogen oxides -- have declined substantially compared to 2002 or 2008 WRAP inventories in all source categories. At the same time, the contribution of SO<sub>2</sub> and NO<sub>x</sub>-related pollutant species to visibility impairment has generally declined at Class I areas in New Mexico. Additionally, according to WRAP inventories, overall local emissions of all pollutants tracked by the WRAP have not increased relative to those of the rest of the state since the 2002 and 2008 WRAP inventories (see Table 3.30, above).

While WRAP inventory data for 2008 and 2011 has shown apparent increases in particulate matter emissions, primarily due to fugitive and road dust sources, EHD has indications discussed in Section 3.5 of this progress report that the apparent increases point not to the actual occurrence of large emissions increases but instead to the need for improved emissions estimates based on more locally specific data sources. EHD is working with other local government entities to provide such estimates, so that they may replace the rougher default estimates relied upon in the NEI and used also as input data for WRAP modeling. Similar considerations apply to apparent increases in emissions of primary organic aerosols.

Regardless of the trends or amounts in inventories of local emissions over the past five years, EHD has no indication of actual emissions within Albuquerque and Bernalillo County being specifically linked to visibility impairment at particular Class I areas in New Mexico. As noted in Section 3.4, above, WRAP visibility impairment data that became available after New Mexico submitted its Regional haze progress report is links visibility impairment primarily to pollutant species typically showing a significant non-anthropogenic contribution, i.e. particulate matter, organic carbon, elemental carbon, and primary organic aerosols. There is no basis at present to link such visibility impairment specifically to related anthropogenic emissions from Albuquerque and Bernalillo County, given: (A) as noted in Section 3.5, above, the uncertainty in the NEI and WRAP default estimates of particulate matter and organic carbon emissions and (B) the relatively modest, unchanging scale of Albuquerque - Bernalillo County emissions relative to the rest of the state.

**3.7 Assessment of Current SIP Strategy: 40 CFR § 51.309(d)(10)(i)(F)**

40 CFR § 51.309(d)(10)(i)(f) requires “an assessment of whether the current implementation plan elements and strategies are sufficient to enable the State, or other States with mandatory Federal Class I areas affected by emissions from the State, to meet all established reasonable progress goals.”

Based on visibility and emissions data, New Mexico’s progress report on Regional Haze rule implementation concluded that “New Mexico believes that the current control strategies in the state’s Section 309 and 309(g) SIP submittals are sufficient to meet all of the state’s established 2018 reasonable progress goals and will not impede Class I areas outside of New Mexico from meeting their goals.”

This progress report for Albuquerque and Bernalillo County reaches the same conclusion.

The following table shows whether or not the 2018 Reasonable Progress Goal for annual emissions in each source category were being met as of the 2011 (i.e. most recent) WRAP data or whether or not emissions have declined since 2002. If the goal was not being met, or emissions had not declined relative to 2011, the table shows the amount of the pollutant reported emitted in the 2011 data, in tons per year, compared to the amount in tons per year specified in the 2018 goal. Note that the amount of the Reasonable Progress Goal for each source category is shown in Tables 3.22 through 3.29 in Section 3.5, above.

Table 3.36: Status of Reasonable Progress Goals for emissions, by source category, as of 2011

	SO2	NOx	Ammonia	VOCs	EC	POA	Coarse PM	Fine PM
Point source	Goal met	Goal met	Goal met	496 TPY in 2011	20 TPY in 2011	80 TPY in 2011	Goal met	65 TPY in 2011
Area (non-point source)	Goal met	Goal met	Goal met	Goal met	Goal met	1,453 TPY in 2011	Goal met	Goal met
On road mobile	Goal met	Declined since 2002	Goal met	Declined since 2002	Declined since 2002	163 TPY in 2011	127 TPY in 2011	43 TPY in 2011
Off road mobile	Goal met	Declined since 2002	Goal met	Declined since 2002	Declined since 2002	190 TPY in 2011	12 TPY in 2011	Goal met
Area oil & gas	Goal met	Goal met	Goal met	Goal met	Goal met	Goal met	Goal met	Goal met
Fugitive & road dust	Goal met	Goal met	Goal met	Goal met	8 TPY in 20	762 TPY in 2011	56,244 TPY in 2011	5,627 TPY in 2011
Anthropogenic fire	Goal met	Goal met	Goal met	Goal met	Goal met	Goal met	Goal met	Goal met

Of the 56 Reasonable Progress Goals examined in the table, 42 were either being met according to the 2011 WRAP inventory or referred to pollutants that showed declining emissions since 2002. . 14 of the goals, indicated by shaded boxes in the above table, were not yet being met as of the 2011 WRAP inventory. Of those 14 goals, ten referred to pollutants that showed reported emissions of less than 500 tons per year. All but one of these pollutants showed reported emissions levels were less than 200 tons per year. Relative to emissions levels reported in the WRAP inventory for the rest of the state, these reported emissions levels represent a negligible portion of total statewide emissions. Thus, EHD has concluded that Albuquerque and

Bernalillo County emissions for these pollutants are unlikely to impede progress toward achieving New Mexico's statewide goals for emissions and visibility.

The remaining four goals reported as not being met in the 2011 WRAP inventory are indicated in the above table in red font. These goals covered coarse and particulate matter emissions for fugitive/road dust, as well as primary organic aerosol emissions for fugitive/road dust and area (non-point) sources. As discussed in Section 3.5, EHD has indications that these reported emissions levels do not reflect actual emissions but instead point to the need for improved emissions estimates based on more locally specific data, replacing the previous practice of relying on default NEI estimates incorporated as inputs for WRAP modeling. Based on the uncertainty regarding previous inventories from these subcategories, and the relatively constant proportion of those emissions relative to the rest of the state even in the WRAP inventories, EHD finds no current indications that local emissions from these subcategories will impede statewide achievement of New Mexico's reasonable progress goals for visibility at the state's Class I areas.

### **3.8 Assessment of Current Monitoring Strategy: 40 CFR § 51.309(d)(10)(i)(G)**

40 CFR § 51.309(d)(10)(i)(G) requires *“a review of the State's visibility monitoring strategy and any modifications to the strategy as necessary.”*

EPA has stated that “[t]his requirement only applies to states with Class I areas within their borders.”<sup>89</sup> For purposes of implementing the Regional Haze rule, Albuquerque and Bernalillo County are treated as a state and operate under the Clean Air Act as if under the jurisdiction of a state-level air agency.<sup>90</sup> Because Albuquerque and Bernalillo County have no Class I areas within their borders, they are not required to address this section in their 2013 progress report.

Information addressing this provision within the Regional Haze rule appears in the New Mexico Regional Haze Progress Report.<sup>91</sup> The New Mexico report concludes that no changes in the state's visibility monitoring strategy are needed because the IMPROVE network has continued to provide adequate monitoring data to support implementation of the Regional Haze rule.

### **3.9 Assessment of SIP Adequacy: 40 CFR 51.309(d)(10)(ii)**

40 CFR § 51.309(d)(10)(ii) requires *“Determination of the adequacy of existing implementation plan. At the same time the State is required to submit any 5-year progress report to EPA in accordance with paragraph (d)(10)(i) of this section, the State must also take one of the following actions based upon the information presented in the progress report:*

*(A) If the State determines that the existing implementation plan requires no further substantive revision at this time in order to achieve established goals for visibility improvement and emissions reductions, the State must provide to the Administrator a negative declaration that further revision of the existing implementation plan is not needed at this time.*

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<sup>89</sup> EPA Guidance (April 2013), p. 17.

<sup>90</sup> A-BC RH SIP, pp. 4-6.

<sup>91</sup> NM RH Progress Report, pp. 46-47.

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*(B) If the State determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources in another State(s) which participated in a regional planning process, the State must provide notification to the Administrator and to the other State(s) which participated in the regional planning process with the States. The State must also collaborate with the other State(s) through the regional planning process for the purpose of developing additional strategies to address the plan's deficiencies.*

*(C) Where the State determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources in another country, the State shall provide notification, along with available information, to the Administrator.*

*(D) Where the State determines that the implementation plan is or may be inadequate to ensure reasonable progress due to emissions from sources within the State, the State shall revise its implementation plan to address the plan's deficiencies within one year”*

The City of Albuquerque Environmental Health Department has provided the information required under 40 CFR § 51.309(d)(10)(i) in this 5-year progress report. Based upon this information, the Albuquerque Environmental Health Department believes that the current Section 309 Regional Haze SIP is adequate to ensure that established goals for visibility improvement and emissions reductions in New Mexico, other states, and Albuquerque - Bernalillo County are met. Thus, no revision of the current SIP is necessary at this time.

#### **4.0 REGIONAL SUMMARY FOR 309 GCVTC CLASS I AREA SITES**

The Albuquerque and Bernalillo County Regional Haze SIP, along with the SIPs of New Mexico, Utah, and Wyoming, implements the Regional Haze rule under 40 CFR Section 309. Section 309 rules were based on recommendations from the Grand Canyon Visibility Transport Commission (GCVTC) Recommendations report,<sup>92</sup> specific to visibility impacts at the 16 Class I areas on the Colorado Plateau.

Accordingly, the New Mexico 2013 Regional Haze Progress Report presented visibility data from the WRAP for the 16 Colorado Plateau Class I areas during the 2000 to 2004 baseline period and the 2005 to 2009 progress period. This information shows that overall visibility has improved at these Class I areas during the indicated time span. The New Mexico report also presents information on the role of individual pollutant species in changing visibility conditions. The reader should refer to the New Mexico report for a full discussion of the above topics.<sup>93</sup>

Information on emission trends for Albuquerque - Bernalillo County appears in Sections 3.3, 3.5, and 3.6 of this report. These trends, combined with data on improving visibility at the 16 Class I areas on the Colorado Plateau, indicate that visibility progress in these areas is unlikely to be impeded by emissions from Albuquerque and Bernalillo County.

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<sup>92</sup> The Grand Canyon Visibility Transport Commission Recommendations for Improving Western Vistas Report is archived on the WRAP website at [www.wrapair.org/WRAP/reports/GCVTCFinal.PDF](http://www.wrapair.org/WRAP/reports/GCVTCFinal.PDF).

<sup>93</sup> NM RH Progress Report, pp. 49-59.