Arizona Department of Environmental Quality

DRAFT: 2025 Arizona Regional Haze Progress Report

Air Quality Division
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1 Introduction

1.1 Background on Visibility Protection

Good visibility is important to the enjoyment of National Parks, National Monuments, and Wilderness Areas where each year millions of visitors enjoy the spectacular vistas, recreational opportunities, and unique ecosystems of these protected natural areas. Unfortunately, pollution in the atmosphere from a wide range of both natural and human-caused sources can degrade visibility, resulting in what is known as regional haze (RH). This haze is composed of small particles that absorb and scatter light, affecting the clarity and color of what we see and reducing view distances. The pollutants that create this haze are fine particles and gaseous pollutants, including nitrogen oxides (NOx), sulfur dioxide (SO_2), particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$), ammonia (NH_3), and volatile organic compounds (VOCs).

In 1977, Congress amended the Clean Air Act (CAA) to include provisions to protect the scenic vistas of the nation’s national parks and wilderness areas. In these amendments, Congress declared as a national visibility goal:

> “*The prevention of any future, and the remedying of any existing impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution.*” (Clean Air Act Section 169A)

When the CAA was amended in 1990, Congress added §169B, authorizing further research and regular assessments of the progress to improve visibility in the federal Class I areas, which are federal public lands including national parks, national wilderness areas, and national monuments that are granted special air quality protections under the CAA.

1.2 Arizona's Class I Areas

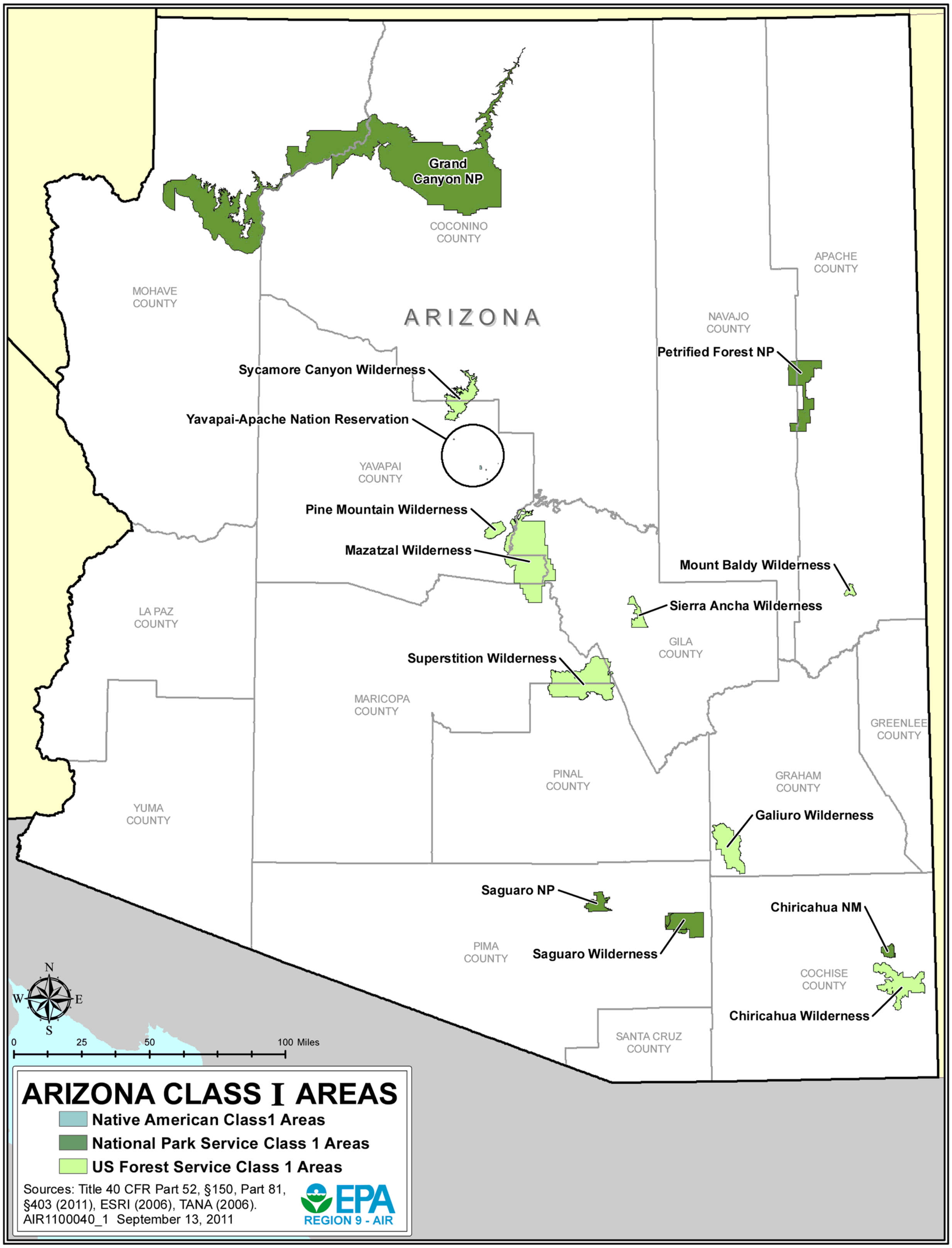
As codified at 40 CFR 81.403, Arizona’s Class I areas are:

- Chiricahua National Monument and Wilderness Area
- Galiuro Wilderness Area
- Grand Canyon National Park
- Mazatzal Wilderness Area
- Mount Baldy Wilderness Area
- Petrified Forest National Park
- Pine Mountain Wilderness Area
- Saguaro National Park and Wilderness Area
- Sierra Ancha Wilderness Area

- Superstition Wilderness Area, and
- Sycamore Canyon Wilderness Area

Error! Reference source not found. below shows the location of each of the federal Class I areas across Arizona and the responsible Federal Land Manager (FLM) for each area. While there are three different FLMs, the National Park Service (NPS), the U.S. Fish and Wildlife Service (FWS), and the U.S. Forest Service (FS), Arizona does not have any Class I Federal areas managed by the FWS.

Figure 1: Arizona Class I Areas and Responsible Federal Land Managers



1.3 Regional Haze Rule and Amendments

The EPA promulgated the 1999 Regional Haze Rule (RHR) on July 1, 1999.[1] The rule's objective was to achieve the national visibility goal of restoring natural visibility conditions to Class I Federal areas by 2064. The rulemaking addressed the combined visibility effects of sources over a broad geographic region, and established that all states must participate in haze reduction efforts, including those without Class I Federal areas.

On January 10, 2017, the EPA published the 2017 Regional Haze Rule amendments to update aspects of the reasonably available visibility impairment (RAVI) and regional haze programs including:

- Revising the requirement for states to consult with FLMs;
- Detailing a new way in which states select a set of days during each year for purposes of tracking progress toward natural visibility conditions;
- Extending the RAVI requirements so that all states must address situations where a single source or small number of sources is affecting visibility at a Class I Federal area;
- Adjusting the interim progress report submission deadlines so that second progress reports will be due by January 31, 2025.[2]
- Changed the requirement that states submit progress reports as formal SIP revisions to documents that need not comply with the procedural requirements of 40 Code of Federal Regulations (CFR) 51.102, 40 CFR 51.103, and Appendix V to Part 51.

1.4 Requirements for Periodic Progress Report

The RHR requires that each state with regional haze planning obligations:

> periodically submit a report to the Administrator evaluating progress towards the reasonable progress goal for each mandatory Class I Federal area located within the State and in each mandatory Class I Federal area located outside the State that may be affected by emissions from within the State.[3]

Table 1 below lists each of the progress report elements required under 40 CFR §51.308(g)-(h) and identifies the section in this progress report that addresses each requirement.

[1] 64 FR 35714 (July 1, 1999)
[2] 82 FR 3078 (January 10, 2017)
[3] 40 CFR §51.308(g)-(h)

Table 1: Required Progress Report Elements and Corresponding Section

Progress Report Element	Section Addressing this Element
40 CFR §51.308(g)(1): A description of the status of implementation of all measures included in the implementation plan for achieving reasonable progress goals for mandatory Class I Federal areas both within and outside the State.	Section 2: Status of Control Strategies in the Regional Haze SIP
40 CFR §51.308(g)(2): A summary of the emissions reductions achieved throughout the State through implementation of the measures described in paragraph (g)(1) of this section.	Section 3: Emissions Reductions from Regional Haze SIP Strategies
40 CFR §51.308(g)(3): For each mandatory Class 1 federal area within the state, the state must assess the following visibility conditions and changes, with values for most impaired, least impaired, and/or clearest days as applicable expressed in terms of 5-year averages of these annual values. The period for calculating current visibility conditions is the most recent 5-year period preceding the required date of the progress report for which data are available as of a date 6 months preceding the required date of the progress report.	Section 4: Assessment of Baseline, Natural, and Current Visibility Conditions

40 CFR §51.308(g)(4): An analysis tracking the change over the period since the period addressed in the most recent plan required under paragraph (f) of this section 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. With respect to all sources and activities, the analysis must extend at least through the most recent year for which the state has submitted emission inventory information to the administrator in compliance with the triennial reporting requirements of subpart A of this part as of a date 6 months preceding the required date of the progress report. With respect to sources that report directly to a centralized emissions data system operated by the administrator, the analysis must extend through the most recent year for which the administrator has provided a state-level summary of such reported data or an internet-based tool by which the state may obtain such a summary as of a date 6 months preceding the required date of the progress report. The state is not required to back cast previously reported emissions to be consistent with more recent emissions estimation procedures, and may draw attention to actual or possible inconsistencies created by changes in estimation procedures.	Section 5: Statewide Emission Trends in Arizona;
40 CFR §51.308(g)(5): An assessment of any significant changes in anthropogenic emissions within or outside the state that have occurred since the period addressed in the most recent plan required under paragraph (f) of this section, including whether or not these changes in anthropogenic emissions were anticipated in that most recent plan, and whether they have limited or impeded progress in reducing pollutant emissions and improving visibility.	Section 6: Assessment of Significant Changes in Anthropogenic Emissions

40 CFR §51.308(g)(6): An assessment of whether the current implementation plan elements and strategies are sufficient to enable the State, or other States with mandatory Class I Federal areas affected by emissions from the State, to meet all established reasonable progress goals for the period covered by the most recent plan required under paragraph (f) of this section.	Section 8: Determination of the Adequacy of Existing Implementation Plan
40 CFR §51.308(g)(8): For a state with a long-term strategy that includes a smoke management program for prescribed fires on wildland that conducts a periodic program assessment, a summary of the most recent periodic assessment of the smoke management program including conclusions if any that were reached in the assessment as to whether the program is meeting its goals regarding improving ecosystem health and reducing the damaging effects of catastrophic wildfires.	Section 6.4.1: The Role of Fire in Arizona Emission Trends; Section 8.2: Periodic Assessment of Arizona's Smoke Management Program
40 CFR §51.308(h): At the same time the State is required to submit any progress report to the EPA in accordance with paragraph (g) of this section, the State must also take one of the actions listed in this section based upon the information presented in the progress report.	Section 8: Determination of the Adequacy of Existing Implementation Plan

1.5 Data Sources

In Chapter 6 of the 2022 Arizona regional haze SIP, ADEQ analyzed four different Emission Inventory scenarios, including 2014v2, RepBase2, 2028OTBa2, and 2028LTS.[4]

Three of those scenarios (2014v2, RepBase2, 2028OTBa2) were developed by WRAP utilizing methods agreed upon by member states, local air agencies, and western tribal organizations and in coordination with federal land managers and the EPA. The final scenario (2028LTS) was developed by applying Arizona's regional haze long term strategy control scenario to the 2028OTBa2 emission scenario.

The WRAP 2014v2 inventory is based on the 2014v2 National Emissions Inventory (NEI)[5] plus updates provided by western states[6] through WRAP Regional Haze workgroup's Emissions and Modeling Protocol subcommittee.

[4] Arizona State Implementation Plan Revision: Regional Haze Program (2018-2028), August 15, 2022.
[5] EPA, *2014v2 National Emission Inventory*, *available at* https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-data (last accessed Dec. 29, 2021).
[6] WRAP Regional Haze Planning Workgroup – Emissions Inventory & Modeling Protocol Subcommittee, *Recommendations for Base Year Modeling* (Feb. 1, 2019) *available at* (last accessed Dec. 29, 2021)

The Representative Baseline (RepBase2) emissions scenario updates the 2014v2 inventory to account for changes and variation in emissions between 2014 and 2018 for key WRAP source sectors, as defined by the WRAP Emissions and Modeling Protocol subcommittee.

The WRAP 2028OTBa emissions inventory projection follows the methods applied by the EPA in the September 2019 Technical Support Document for updated 2028 regional haze modeling.[7] The WRAP states updated source sectors to account for implementation of all applicable federal and state requirements for U.S. anthropogenic emissions by 2028.

The 2028LTS is an emission inventory developed by ADEQ with the 2028OTBa2 as a base. The scenario adjusts 2028OTBa2 emissions to account for those controls included within ADEQ's long-term strategy for which statewide emission reductions could be estimated.

In order to support this analysis and ensure compliance with each progress report element required under § 51.308(g), ADEQ further analyzed statewide emission inventory trends from two sources:

Sections 5 and 1 of this document conducts emission inventory (EI) trends analysis with the data from the National Emissions Inventory (NEI) in 2014, 2017, and 2020 for the following visibility-impairing pollutants: nitrogen oxides (NOx), sulfur dioxide (SO_2), particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$), ammonia (NH_3), and volatile organic compounds (VOCs).

Sections 3.1 and 3.2 of this document conduct emission inventory trends analysis with the annual emission data from electric generating units (EGUs) obtained from the Clean Air Markets Program Data (CAMPD) in 2014, 2017, and 2020 for NOx and SO_2.

Section 4 of this document provides the required analysis of visibility conditions at each Arizona Class I area and compares those conditions to the baseline, long term trend, and the goals set in Arizona's regional haze plans using data from the Western Regional Air Partnership Technical Support System or "WRAP TSS".[8]

[7] EPA, *Availability of Modeling Data and Associated Technical Support Document for the EPA's Updated 2028 Visibility Air Quality Modeling* (Sept. 19, 2019), *available at* https://www.epa.gov/sites/default/files/2019-10/documents/updated_2028_regional_haze_modeling-tsd-2019_0.pdf (last accessed Dec. 29, 2021).

[8] https://views.cira.colostate.edu/tssv3/

2 Status of Control Strategies in the Regional Haze SIP

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 (RPGs) for Class I Federal areas both within and outside the state. The following sections detail the measures included in Arizona's SIP for achieving reasonable progress goals for Class I federal areas both within and outside the state.

Arizona's strategy for achieving its RPGs during the initial regional haze planning period included the following categories of controls strategies:

1) control measures at stationary sources required to implement Best Available Retrofit Technology (BART),
2) "reasonable progress" emission limitations or voluntary limits at certain non-BART sources,
3) the closure of certain stationary sources, and
4) existing federal and state regulations, including Arizona's enhanced smoke management program.

For the second implementation period, Arizona has added an additional category of regional haze control measures, intended to reduce visibility impairing pollutant emissions from nonpoint sources.

However, Arizona does not yet claim RPG emission reduction credit for these new nonpoint source controls as ADEQ collects further data on implementation rates and control effectiveness in order to more accurately estimate emission reductions. Further, the new rule created to control fugitive dust from the construction sector does not become fully effective until 2025.

Successful and ongoing implementation of Arizona's regional haze control strategy discussed below has contributed to substantial reductions in visibility impairing pollutants from stationary sources subject to these requirements, as discussed in Section 3, Emissions Reductions from Regional Haze SIP Strategies.

2.1 Stationary Sources Requiring Best Available Retrofit Technology

The first category of controls that contribute to the RPGs contained in Arizona's regional haze plan are the emission limits and control technology requirements for stationary sources that impact visibility at Class I areas under the Best Available Retrofit Technology (BART) standard.[9]

The RHR requires states to identify a stationary source as "BART-eligible" if:

1) it falls within one of twenty-six source categories,

2) it began operation between 1962 and 1977, and

3) has the potential to emit 250 tons per year of any air pollutant.[10]

[9] 40 CFR 51.308(e)
[10] 40 CFR 51.301

Any BART-eligible source that may reasonably be anticipated to cause or contribute to any impairment of visibility in any mandatory Class I Federal area is subject-to-BART.[11] Once facilities are identified as subject-to-BART, states make control determinations on a case-by-case basis and identify which measures, if any, constitute BART for the facility.[12]

The Arizona regional haze plan includes ADEQ's EPA-approved BART determinations, as well as additional determinations imposed through Federal Implementation Plan (FIP) actions by the EPA, initially promulgated in 2013-2014 following submission of the first-round regional haze plan and subject to modifications and withdrawals since.

Specific changes to BART determinations and requirements are discussed in the subsections below for each particular facility. Seven facilities identified in the initial implementation period remain in operation with one or more units requiring BART emission control measures.

- Arizona Electric Power Cooperative (AEPCO) Apache Generating Station
- Arizona Public Service (APS) Cholla Generating Station
- Salt River Project (SRP) Coronado Generating Station
- Freeport-McMoRan Miami Smelter
- ASARCO Hayden Smelter
- Tucson Electric Power (TEP) Irvington Generating Station (IGS)[13]
- Nelson Lime Plant

Emission information demonstrating reductions that result from these controls for these facilities is available in Section 3.2, NO_x & SO_2 from Arizona EGUs Subject to BART and Section 3.3, NO_x, SO_2, & PM_{10} from Other Non-EGU BART Sources.

2.1.1 Arizona Electric Power Cooperative (AEPCO) Apache Generating Station

There are three emission units at the AEPCO Apache Station subject to BART, referred to here as Apache Units 1, 2, and 3. These units comply with the "BART alternative" (also known as "better-than-BART") control requirements approved into the Arizona SIP on April 10, 2015[14]and included in the facility's permit revision issued on July 25, 2018.[15] The facility's permit lists the control measures that went into effect according to the SIP compliance dates listed below in Table 1.[16]

Table 2: AEPCO Apache BART Alternative Compliance Dates

Source	BART Compliance Dates		
	NO_x	PM_{10}	SO_2

[11] *Supra* note 9.
[12] *Id.*
[13] Also known as Sundt Generating Station
[14] 80 FR 19220 (April 20, 2015).
[15] "*Arizona Electric Power Cooperative, Inc. – Apache Generating Station,* Permit Revision No. 69734 (July 25, 2018).
[16] *Id.*

Apache Unit 1	12/5/2017	12/5/2016	12/5/2016
Apache Unit 2	12/5/2017	12/5/2016	12/5/2016
Apache Unit 3	12/5/2017	12/5/2016	12/5/2016

Unit 1:

Apache Unit 1 includes Steam Unit 1 (75 MW) and Gas Turbine 1 (10.51 MW). As outlined in its air quality permit, the BART Alternative limits for Apache Unit 1 are:

1. Steam Unit 1 shall combust only pipeline natural gas.
2. Steam Unit 1 shall not emit more than 0.00064 lb SO_2/MMBTU heat input in stand-alone operation or in combined cycle operation with Gas Turbine 1, averaged over 30 boiler-operating days.
3. Steam Unit 1 shall not emit more than 0.0075 lb PM_{10}/MMBTU heat input in stand-alone operation or in combined cycle operation with Gas Turbine 1, averaged over 30 boiler-operating days.
4. Effective December 5, 2017, Steam Unit 1 shall not emit NOx in stand-alone operation in excess of 0.056 lb/MMBTU heat input, averaged over 30 boiler operating days.
5. Effective December 5, 2017, Steam Unit 1 and Gas Turbine 1 in combined cycle operation shall not emit NOx in excess of 0.10 lb/MMBTU heat input averaged over 30 boiler operating days.
6. Effective December 5, 2017, Steam Unit 1 in stand-alone operation Steam Unit 1, and Gas Turbine 1 in combined cycle operation shall not emit NOx in excess of 1205 lb/day, averaged over 30 calendar days. [17]

Unit 2 & 3:

Apache Unit 2 (also known as Steam Unit 2) is a 194.7 MW unit which combusts coal as a primary fuel with the ability to supplement with natural gas as needed. Apache Unit 3 (also known as Steam Unit 3) is a 194.7 MW unit which combusts coal as a primary fuel with the ability to supplement with natural gas as needed. As outlined in its permit, Apache Units 2 and 3 have individual emission limits and control measure requirements, with an optional set of limits, which apply to both units collectively.[18]

The individual BART Alternative requirements for Apache Unit 2 are:

1. Effective December 5, 2016, Steam Unit 2 shall not emit SO_2 in excess of 0.15 lb/MMBTU heat input, averaged over 30 boiler operating days and shall not emit PM_{10} in excess of 0.03 lb/MMBTU heat input (filterable only), averaged over 30 boiler operating days.
2. Effective December 5, 2017, Steam Unit 2 shall burn only pipeline quality natural gas except in the event of an emergency (defined in the permit under Section III.E).
3. Effective December 5, 2017, Steam Unit 2 shall not emit NO_x in excess of 0.085 lb/MMBTU heat input, averaged over 30 boiler operating days, SO_2 in excess of 0.00064 lb/MMBTU heat input,

[17] *Id.*
[18] *Id.*

averaged over 30 boiler operating days, and PM_{10} in excess of 0.01 lb/MMBTU heat input (filterable + condensable), averaged over 30 boiler operating days.

4. Effective December 5, 2018, Steam Unit 2 shall not emit PM_{10} in excess of 0.008 lb/MMBTU heat input (filterable + condensable), averaged over 30 boiler operating days.

The individual BART Alternative requirements for Apache Unit 3 are:

1. Effective December 5, 2016, Steam Unit 3 shall not emit SO_2 in excess of 0.15 lb/MMBTU heat input, averaged over 30 boiler operating days and shall not emit PM_{10} in excess of 0.03 lb/MMBTU heat input (filterable only), averaged over 30 boiler operating days.
2. Effective no later than December 5, 2017, Steam Unit 3 shall install, operate and maintain low NO_x burners, overfire air, and selective non-catalytic reduction (SNCR) technology. The SNCR shall operate at all times that Steam Unit 3 is in operation and exhaust gas temperatures equal or exceed the manufacturer's recommended minimum temperature for operation of the SNCR technology.
3. Effective December 5, 2017, Steam Unit 3 shall not emit NO_x in excess of 0.23 lb/MMBTU heat input, averaged over 30 boiler operating days.[19]

The BART Alternative limits for combined operation of Apache Units 2 and 3:

- Effective December 5, 2017, in lieu of the individual limits set forth for NO_x above (Conditions III.B3 and III.C.3 in the permit), the combined NO_x emissions of Steam Unit 2 and 3, averaged over 30 boiler-operating days, shall not exceed the limit established in the following equation:

$$Limit = \frac{\left[\left(Unit\ 2\ MMBTUgas\ \times 0.085\ \frac{lbs}{MMBTUgas}\right) + \left(Unit\ 2\ MMBTUcoal\ \times 0.37\ \frac{lbs}{MMBTUcoal}\right) + \left(Unit\ 3\ MMBTU\ \times 0.23\ \frac{lbs}{MMBTU}\right)\right]}{Unit\ 2\ MMBTU + Unit\ 3\ MMBTU}$$

2.1.2 Arizona Public Service (APS) Cholla Generating Station

On December 5, 2012, the EPA took final action to disapprove ADEQ's Regional Haze NO_x BART determination for Cholla and promulgated a FIP.[20] Under the FIP, Cholla Units 2, 3, and 4 were subject to a NO_x limit of 0.055 lb/MMBtu, determined as an average of the three units and based on a rolling 30-boiler-operating-day average. Under ADEQ's 2011 Regional Haze SIP, the PM_{10} controls required each unit to use a fabric filter with an associated emission limit of 0.015 lb/MMBtu. In addition, the SO_2 controls required each unit to use wet Flue Gas Desulfurization (FGD) with an emission limit of 0.15 lb/MMBtu on a 30-day rolling average. The FIP later imposed an additional requirement of 95 percent SO_2 removal efficiency for the control equipment.

On January 15, 2015, APS and PacifiCorp submitted an "Application for Significant Permit Revision and Five-Factor BART Reassessment for Cholla" to ADEQ. APS and PacifiCorp committed to take specific actions in lieu of the FIP requirements for Cholla and requested that ADEQ conduct a revised BART

[19] Id.

[20] 77 FR 72512

analysis and determination ("BART Reassessment") and submit it to the EPA as a revision to the Arizona RH SIP.

Specifically, APS and PacifiCorp committed to

(1) permanently close Cholla Unit 2 by April 1, 2016,

(2) continue to operate low-NO_X burners with separated over-fire air (LNB+SOFA) on Units 3 and 4, and

(3) by April 30, 2025, permanently cease burning coal at both units with the option to convert both units to enable combustion of pipeline-quality natural gas by July 31, 2025, with an annual average capacity factor of less than or equal to 20 percent.

On October 22, 2015, ADEQ submitted to the EPA the Cholla SIP Revision that incorporated the Cholla BART Reassessment. The Cholla SIP Revision consisted of a revised BART analysis and determination for NO_x, an analysis under CAA section 110(l), and revisions to Cholla's operating permit to implement ADEQ's revised BART determination for NO_x and the commitments by APS and PacifiCorp related to the retirement and repowering of units.

On March 27, 2017, the EPA took final action to approve the Cholla SIP Revision and to withdraw the provisions of the FIP that applied to Cholla.[21]

Table 3 below lists the BART reassessment requirements and associated compliance dates contained in Cholla Generating Station's current air quality permit.[22]

Table 3: APS Cholla BART Reassessment Limits

Source	NO_x	PM_{10}	SO_2	Action
Cholla Unit 2	Shutdown in 2016			
Cholla Unit 3	0.22 lb/MMBtu	0.015 lb/MMBtu	0.15 lb/MMBtu and 95 percent removal efficiency	Permanently cease burning coal by April 20, 2025 with the option to convert to pipeline natural gas by July 31, 2025 with a ≤20 percent annual average capacity factor
	0.08 lb/MMBtu if converted to pipeline natural gas	0.01 lb/MMBtu if converted to pipeline natural gas	0.0006 lb/MMBtu if converted to pipeline natural gas	
Cholla Unit 4	0.22 lb/MMBtu	0.015 lb/MMBtu	0.15 lb/MMBtu and 95 percent removal efficiency	Permanently cease burning coal by April 20, 2025 with the option to convert to pipeline natural gas by July 31, 2025 with a ≤20 percent
	0.08 lb/MMBtu if converted to pipeline natural gas	0.01 lb/MMBtu if converted to pipeline natural gas	0.0006 lb/MMBtu if converted to	

[21] 82 FR 15139

[22] *APS – Cholla Generating Station*, Permit No. 53399; as amended by No. 60129 (Aug. 22, 2014).

			pipeline natural gas	annual average capacity factor

In addition to complying with emission limits on the BART-eligible units at Cholla Generating Station, APS took on voluntary emission limits for Unit 1. The voluntary provisions were incorporated into the facility's operating permit and submitted at the same time as the BART reassessment. The voluntary limits for Unit 1 in Significant Permit Revision No. 61713 to Operating Permit No. 53399 were approved by the EPA into the Arizona SIP on March 27, 2017.[23] The SIP approved emission limits that apply to Unit 1 are listed in Table 4 below.

Table 4: APS Cholla Voluntary Limits and Compliance Dates

Source	NO_x	PM_{10}	SO_2	Action
Cholla Unit 1	0.22 lb/MMBtu	0.015 lb/MMBtu	0.15 lb/MMBtu and 95 percent removal efficiency	Permanently cease burning coal by April 20, 2025 with the option to convert to pipeline natural gas by July 31, 2025 with a ≤20 percent annual average capacity factor
	0.08 lb/MMBtu if converted to pipeline natural gas	0.01 lb/MMBtu if converted to pipeline natural gas	0.0006 lb/MMBtu if converted to pipeline natural gas	

2.1.3 Salt River Project (SRP) Coronado Generating Station

There are two emission units at the Coronado Generating Station that were subject to BART requirements in the first round of regional haze, referred to herein as Coronado Units 1 and 2. Both Coronado Units are 456 MW coal-fired steam boilers and both are subject to emission limits for NO_x, PM_{10}, and SO_2.

2.1.3.1 Coronado Generating Station - Initial BART Limits

The 2015 Arizona RH FIP provided the initial BART emission limit requirements for NO_x controls, while the SIP provided the requirements for PM_{10} and SO_2 controls.[24] The initial NO_x control was an emission limit of 0.065 lb/MMBtu, which is determined as an average of the two units and based on a rolling 30-boiler-operating-day average.[25] No further emissions control technology was required for PM_{10}, but both units were required to comply with a 0.03lb/MMBtu emission limit.[26] In addition, the SO_2 BART controls required both units to implement Wet Flue Gas Desulfurization with an associated emission rate of 0.080 lb/MMBtu on a 30-day rolling average.[27]

[23] *Supra* note 21.
[24] 80 FR 17010 (March 31, 2015).
[25] *Id.*
[26] *Id.*
[27] *Id.*

On March 31, 2015, the EPA proposed to revise the NO_x BART requirements applicable to the Coronado Generating Station in the FIP.[28] The revision was finalized on April 13, 2016, requiring Unit 1 to meet a 0.065lb/MMBtu emission limit and requiring Unit 2 to meet the emission limit prescribed by consent decree of 0.080 lb/MMBtu based on a 30-boiler-operating-day basis.[29] SRP will move forward with SCR installation on Unit 1, splitting existing operations limitations between Unit 1 and Unit 2 until installation is complete no later than 12/31/2024.

2.1.3.2 Coronado Generating Station - Limit Revisions

Since the 2015 progress report, SRP Coronado Generating Station has also been the subject of further SIP actions. On October 10, 2017, the EPA took final action to approve a source-specific revision to the Arizona SIP that provided an alternative to the BART FIP previously promulgated by the EPA.[30] The Coronado SIP Revision and BART Alternative to replace the FIP consists of an interim operating strategy that took effect on December 5, 2017, and a final operating strategy that must take effect no later than December 31, 2025.

Coronado Generating Station's current air quality permit contains the BART reassessment requirements and emissions limits as listed in Table 5 and

Table 6.

Table 5: SRP Coronado Generating Station Interim Operating Strategies

Interim Strategies (IS)	Unit 1 (lb/MMBtu) (Highest 30-boiler-operating-day average)		Unit 2	Unit 1 Curtailment Period
	NO_x	SO_2		
IS 2	0.320	0.060	0.060	Oct. 21 to Jan. 31
IS 3	0.320	0.050	0.050	Nov. 21 to Jan. 20
IS 4	0.310	0.060	0.060	Nov. 21 to Jan. 20
IS 2, IS 3, and IS 4		1,970 tons of SO_2 per calendar year starting in 2018 (Unit 1 and Unit 2 combined)		

Table 6: SRP Coronado Generating Station Final BART Alternative Operating Strategy

Final BART Alternative Operating Strategies	Unit 1 (lb/MMBtu) (30-boiler-operating-day average)			Unit 2			Annual Combined Unit 1 and Unit 2 SO_2 Cap (Tons/year)
	NO_x	SO_2	PM_{10}	NO_x	SO_2	PM_{10}	
OS-1 SCR Installation[31]	0.065	0.060	0.033	0.080	0.060	0.030	1,970
OS-2 Unit 1 Shutdown[32]	0.00	0.00	0.00	0.080	0.060	0.030	1,080 (Unit 2 only)

[28] 80 FR 17010 (March 31, 2015).
[29] 81 FR 21735 (April 13, 2016).
[30] 82 FR 46,903 (Oct. 10, 2017).
[31] SCR installation and operation no later than December 31, 2025. Unit 1 will be subject to a 0.033 total PM10/2.5 BACT limit.
[32] Unit 1 shut down no later than December 31, 2025. Notification of selection of the Final BART Alternative Operating Strategy shall be sent by SRP to EPA and ADEQ by December 31, 2022.

2.1.4 Freeport-McMoRan Miami Smelter

The Miami Smelter Converters 2 through 5 and the Electric Furnace are the emission units that required BART controls under the EPA's 2014 Regional Haze FIP for Arizona.[33] These requirements apply either to all units collectively or are split into converter and electric furnace requirements depending on the pollutant. The regional haze FIP imposes NO_x and SO_2 control requirements for all of the emission units, while the SIP contains the control requirements for PM_{10}.[34] The requirements are currently codified at 40 CFR § 52.145(m). The NO_x and SO_2 compliance dates were September 2, 2016 and January 1, 2018 respectively.

The NO_x FIP determination requires that the facility as a whole comply with annual emission limit of 40 tons per year.[35] The PM_{10} SIP determination provides that compliance with the previously approved Maximum Achievable Control Technology (MACT) standard in the National Emission Standards for Hazardous Air Pollutants (NESHAPs) for Primary Copper Smelting is sufficient to satisfy BART and the FIP incorporates these requirements by reference to ensure their enforceability.[36]

The SO_2 FIP determination provided separate requirements for the converters and the electric furnace. The converters must achieve a SO_2 control efficiency of 99.7 percent on a 365-day rolling average applied to combined primary and secondary capture system on a cumulative mass basis.[37] Improvements were required for the primary control system (existing acid plant with tail stack scrubber) and the construction of a new capture and control system.[38] The FIP also imposed a work practice standard for the converters requiring the primary and secondary capture systems designed and operated in a way that maximizes SO_2 captured from the units.[39] The FIP determination for SO_2 requirements on the electric furnace are the continued use of the existing work practice standard and prohibition of active aeration.[40]

2.1.5 ASARCO Hayden Smelter

The converters and anode furnaces at the Hayden Smelter are the emission units that required BART controls under the EPA's 2014 Regional Haze FIP for Arizona.[41] The smelter is also subject to PM_{10} requirements under the regional haze SIP.[42] The requirements are currently codified at 40 CFR § 5 2.145(l).

[33] 79 FR 52420 (Sept. 3, 2014).
[34] 78 FR 46142 (July 30, 2013) (EPA disapproved the NO_x and SO_2 requirements in ADEQ's SIP submittal and approved the PM10 requirements.), 79 Fed. Reg. 52420 (Sept. 3, 2014) (EPA published the FIP detailing NO_x and SO_2 requirements).
[35] 79 Fed. Reg. 52420 (Sept. 3, 2014).
[36] 78 Fed. Reg. 46142 (July 30, 2013), 79 FR 52420 (Sept. 3, 2014).
[37] 79 FR 52420 (Sept. 3, 2014).
[38] *Id*.
[39] *Id*.
[40] *Id*.
[41] 79 FR 52,420 (Sept. 3, 2014).
[42] 78 Fed. Reg. 46142 (July 30, 2013) (EPA disapproved the NO_x and SO_2 requirements in ADEQ's SIP submittal and approved the PM_{10} requirements.), 79 Fed. Reg. 52420 (Sept. 3, 2014) (EPA issued the FIP detailing the NO_x and SO_2 requirements for the Hayden Smelter.).

Under the FIP, the Hayden Smelter must comply with an annual emission limit of 40 tons per year of NOx from the converters and anode furnaces.[43] To control PM_{10} the Asarco Smelter must continue to use the existing controls and meet specified provisions of the NESHAPs for Primary Copper Smelting.[44]

The smelter must reduce SO_2 at both the converters and anode furnaces.[45] The converters must comply with an emission limit of 99.8 percent control efficiency on a 365-day rolling average for the primary system and 98.7 percent efficiency on a 365-day rolling average for the secondary capture system. The smelter must impose a work practice standard requiring the anode furnaces to be charge only with blister copper or higher purity copper. The NO_x and SO_2 compliance dates have passed and were on September 4, 2017 and September 3, 2018, respectively.

As of the August 2024 draft of this progress report, the ASARCO Hayden Smelter has not been operating and actual emissions have been far below the permitted potential to emit (PTE), although the facility retains an active permit and has not permanently ceased operation.

2.1.6 Tucson Electric Power (TEP) Irvington (IGS) Generating Station

The Irvington Generating Station (IGS) (formerly referred to as Sundt Generating Station) has one emission unit that must comply with certain BART determinations, referred to here as “Sundt Unit 4.” The EPA disapproved ADEQ’s initial determination that Unit 4 was not BART-eligible and later promulgated requirements for NO_X, PM_{10} and SO_2 in the FIP.[46] The requirements are currently codified at 40 CFR § 52.145(j).

To control NO_x emissions, Unit 4 must comply with a of 0.36 lb/MMBtu emission limit, which is consistent with the use of SNCR paired with the existing Low-NOx Burners.[47] Sundt Unit 4 must also comply with a PM_{10} filterable emission limit of 0.030 lb/MMBtu and an SO_2 emission limit of 0.23 lb/MMBtu on a 30-boiler-operating-day average.[48] The compliance dates for these controls are listed below in Table 7.

Table 7: Sundt BART Compliance Dates

Source	BART Compliance Dates		
	NO_x	PM_{10}	SO_2
Sundt Unit 4	9/4/2017	4/16/2015	9/4/2017

Alternatively, TEP had the option to elect to switch Sundt Unit 4 to natural gas, in which case it would have to meet a NO_X emission limit of 0.25 lb/MMbtu and an SO_2 emission limit of 0.00064 lb/MMbtu (both on a 30-boiler-operating-day average).[49] The PM_{10} limit would be based on the results of initial performance test following the switch to gas. TEP was required to inform the EPA of its choice of

[43] 79 FR 52420 (Sept. 3, 2014).
[44] 78 FR 46142 (July 30, 2013), 79 FR 52420 (Sept. 3, 2014).
[45] *Id.*
[46] 78 FR 46142 (July 30, 2013). (Disapproving the regional haze SIP), 79 FR 52420 (Sept. 3, 2014). (issuing the FIP).
[47] 79 FR 52420 (Sept. 3, 2014).
[48] *Id*.
[49] *Id.*

compliance option by March 31, 2017. Under TEP's option to switch to gas, it was required to meet the alternative emission limits by December 31, 2017.

On March 14, 2016, TEP exercised this option and notified the US EPA Director of Enforcement Division (EPA Region 9) for Sundt Unit 4 at IGS that it would comply with the Regional Haze requirements by selecting the better than BART alternative (switching to firing natural gas and landfill gas exclusively). As of the August 2024 draft of this progress report, TEP has stopped burning coal and fuel oil in Sundt Unit 4 and suspended the use of equipment necessary to fire coal and fuel oil in Sundt Unit 4.

2.1.6.1 Voluntary Emission Reductions at Irvington Generation Station

In addition to having one emission unit that must comply with BART determinations in the FIP, Irvington Generating Station has set voluntary emissions limits on Unit 3. On January 18th, 2021 TEP submitted a permit application to the Pima Department of Environmental Quality for the following voluntary NOx emission limits for Unit 3:

1. 335 tons per 12-month rolling total;
2. 753 tons per 36-month rolling total; and
3. 1,285 cumulative tons for the remaining life of the unit. The unit must shut down permanently before the cumulative limit is exceeded.

ADEQ updated the four-factor analysis to include these new emission limits as the baseline emissions for control evaluation, as these limits will become enforceable upon finalization of the revised TEP IGS permit and approval of ADEQ's regional haze reasonable progress determination for IGS by the EPA. Considering the four statutory factors, ADEQ determined that with the emission reductions associated with the new Unit 3 emission caps, no additional controls were necessary to make reasonable progress towards natural visibility at Class I areas during this implementation period and that none of the controls evaluated were reasonable.

This source-specific revision to the Pima County portion of the Arizona SIP was included in the ADEQ's comprehensive regional haze SIP revision and supports the enforceability of ADEQ's long-term strategy pursuant to 40 CFR 51.308(f)(2) of the federal regional haze program. The permit revision becomes effective June 2, 2022, and will amend the Class 1 Prevention of Signification Deterioration permit for TEP IGS and pertains only to electric steam generation Unit 3, to reduce NOx emissions are identified in Section VI of the PDEQ Air Quality Permit, permit number 1052. These additional more stringent NOx limits become effective one year after the EPA approves ADEQ's Regional Haze NOx Reasonable Progress determination for Unit 3 and will then, therefore, adopt Section VI of the permit as part of the SIP for Arizona.

As of the August 2024 draft of this progress report, the EPA has not yet taken final action on Arizona's 2022 Regional Haze plan, so the additional permit conditions are not yet effective.

2.1.7 Nelson Lime Plant

The Nelson Lime Plant has two lime kilns that must comply with BART requirements, referred to here as Nelson Kilns 1 and 2. The EPA disapproved ADEQ's initial determination that the Kilns were not subject to BART control measures and promulgated requirements for NO_X, PM_{10} and SO_2 in the FIP.[50]

To control NO_x emissions, Nelson Kiln 1 is subject to a limit of 3.80 lbs/ton of lime on a 12-month rolling average and Nelson Kiln 2 is subject to a limit of 2.61 lbs/ton of lime on a 30-day rolling average.[51] Each of these NO_x emission limits is consistent with the use of LNB and SNCR.[52] To control PM_{10}, Nelson Kilns 1 and 2 are subject to an emission limit of 0.12 lbs/ton of stone feed, based on the use of the existing fabric filter baghouses.[53] To control SO_2, Nelson Kiln 1 is subject to an emission limit of 9.32 lbs/ton of lime on a 12-month rolling average.[54] Nelson Kiln 2 is subject to an emission limit of 9.73 lbs/ton of lime on a 12-month rolling average.[55]

These requirements are currently codified at 40 CFR § 52.145(i). The NO_x and SO_2 compliance dates were on September 4, 2017 and March, 2016 respectively.

2.2 Other Stationary Sources Subject to Control Requirements

As part of the reasonable progress analysis in its Regional Haze FIP, the EPA also conducted an independent source-specific analysis of potential NO_x controls for facilities ADEQ previous determined did not require BART controls. Based on that analysis, the EPA identified two non-BART sources that required control technology to meet reasonable progress requirements.[56]

2.2.1 Phoenix Cement Company (PCC) Clarkdale

Phoenix Cement Company (PCC) Clarkdale Kiln 4 is the emission unit that required "reasonable progress" controls under the EPA's 2014 Regional Haze FIP for Arizona.[57] The FIP was subsequently reconsidered and revised in 2016 to replace the control technology demonstration requirements for NO_x applicable to Kiln 4 with a series of revised recordkeeping and reporting requirements.[58] The NO_x compliance date was on December 31, 2018.

2.2.2 CalPortland Cement (CPC) Rillito

CalPortland Cement (CPC) Rillito Kiln 4 is the emission unit that required "reasonable progress" controls under the EPA's 2014 Regional Haze FIP for Arizona.[59] The FIP was subsequently reconsidered and revised in 2016 to replace the control technology demonstration requirements for NO_x applicable to Kiln

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[50] *Id*.
[51] *Id.*
[52] *Id.*
[53] *Id*.
[54] *Id*.
[55] *Id*.
[56] *Id*.
[57] Id.
[58] 81 FR 83,144 (Nov. 23, 2016).
[59] 79 FR 52,420 (Sept. 3, 2014).

4 with a series of revised recordkeeping and reporting requirements.[60] The NO_x compliance date was on December 31, 2018.

2.3 Stationary Sources with Voluntary Limits

As part of the reasonable progress analysis in the 2021 Regional Haze plan, ADEQ also included voluntary emissions limits from facilities that will contribute to reasonable further progress of Arizona's state visibility progress goals.

2.3.1 El Paso Natural Gas Williams Compressor Station

To achieve reasonable emission reductions at this facility, a compressor station located in Coconino County, ADEQ issued a Significant Permit Revision No. 93062 to operating Permit No. 77575 for Regional Haze provisions.

This revision establishes new voluntary emissions limits for NO_x for Reciprocating Engine B-1 and Reciprocating Engines B-2 and B-5, referred to herein as RECIP-1, RECIP-2, and RECIP-5 and will become effective eighteen months after the EPA approves ADEQ's Regional Haze NO_x Reasonable Progress determination and adopts Attachment "D" as part of the SIP for Arizona.

Voluntary Emissions Limits:

1. RECIP-1: The Permittee shall ensure that the NOx emissions from RECIP-1 shall not exceed 3.0 g/bhp-hr.
2. RECIP-2 and RECIP-5: The Permittee shall ensure that the NOx emissions from RECIP-2 and RECIP-5 shall not exceed 1.5 g/bhp-he each.

As of the August 2024 draft of this progress report, the EPA has not yet taken final action on Arizona's 2022 Regional Haze plan, so the additional permit conditions are not yet effective.

2.3.2 Tucson Electric Power Springerville Generating Station

Tucson Electric Power (TEP) Springerville Generating Station (SGS) located in Apache County, comprises four coal-fired electric generating units with a combined nominal net generating capacity of 1,620 MWe.

Units 1 and 2 at SGS are owned and operated by TEP. Unit 3 is owned by Tri-State Generation and Transmission Association, Inc., and Unit 4 is owned by the Salt River Project Agricultural Improvement and Power District. All units are operated by TEP.

Air Quality Permit Conditions were submitted by ADEQ to the EPA for inclusion in Arizona's SIP. If the SIP revision is approved by the EPA, TEP SGS will adopt Significant Permit Revision No. 91093 to Operating Permit No. 65614 for Regional Haze Provisions for Unit 1 and Unit 2 at SGS. TEP SGS will then have one year to adopt Attachment "E" of this permit revision to meet voluntary source-specific requirements for Unit 1 and Unit 2.

[60] 81 FR 83,144 (Nov. 23, 2016).

Additionally, Significant Permit Revision No. 91093 incorporates a 1.4 lb/MWh limit for Unit 3 based on a 30-boiler operating day (BOD) rolling average. The limit and associated monitoring, recordkeeping, and reporting requirement will become effective upon issuance of the permit revision.

This Significant Permit Revision No. 91093 also establishes new voluntary emission limits for sulfur dioxide under Attachment "E" Regional Haze Provisions: TEP SGS, including combined sulfur dioxide emission limits for SGS Unit 1 and Unit 2, as well as associated compliance demonstration requirements.

The new limits are as follows:

1. 16.1 tons of sulfur dioxide per day, based on daily rolling 30-calendar day average.
2. 3,729 tons sulfur dioxide per 12-month rolling total.

As of the August 2024 draft of this progress report, the EPA has not yet taken final action on Arizona's 2022 Regional Haze plan, so the additional permit conditions are not yet effective.

2.4 Compliance Data for Facilities Subject to Regional Haze Controls

Table 8 contains permit compliance records for point source facilities listed in Sections 2.1 through 2.3 of this report. Compliance data is representative of the whole facility and is not filtered for compliance with only Regional Haze related provisions. Case data includes information related to source inspections and performance test (PT) observations, as well as Notices of Opportunity to Correct Deficiencies (NOC) and Notices of Violation (NOV). All the facilities listed in Table 1 are currently in compliance with their air quality permits.

Table 8: Regional Haze Progress Report Facility Compliance Data from 2020 to present.

Place Name	No. of Site Inspections	No. of Cases	No. of Excess Emissions (EE) / Permit Deviations (PD) Submitted through myDEQ
AEPCO Apache	5 Source inspections; 13 PT Observations	None since 2015	0
APS Cholla	7 Source inspections; 4 PT Observations	None since 2018	EE – 2; PD - 16
SRP Coronado	3 Source inspections; 4 PT Observations	None since 2015	EE – 1; PD - 8
FMMI Miami	3 Source inspections; 4 PT Observations	5 NOVs	EE – 17; PD - 4
ASARCO Hayden	9 Source inspections; 2 PT Observations	1 NOC	EE – 1; PD - 11

Place Name	No. of Site Inspections	No. of Cases	No. of Excess Emissions (EE) / Permit Deviations (PD) Submitted through myDEQ
TEP Irvington Generating Station*	2 FCEs 9 Test observations	0	Seven (7) permit deviations, zero (0) excess emissions reports submitted to PDEQ
Nelson Lime Plant	6 Source inspections; 3 PT Observations	1 NOC; 3 NOVs	EE – 12; PD - 6
PCC Clarkdale	6 Source inspections; 6 PT Observations	None since 2015	EE – 1; PD - 0
CPC Rillito	7 Source inspections; 7 PT Observations	3 NOVs	EE – 10; PD - 5
EPNG Williams Compressor Station	6 Source inspections; 6 PT Observations	0	0
TEP Springerville Generating Station	6 Source inspections; 6 PT Observations	1 NOV	EE – 0; PD - 2

*PDEQ provided compliance data for TEP IGS.[61]

2.5 Controls for Nonpoint Sources

In Arizona's 2021 regional haze plan, ADEQ analyzed reasonable controls for nonpoint or area sources of visibility impairing pollutants. Following pollutant screening analysis to determine the pollutants most impacting visibility at Class I areas, ADEQ focused on evaluating PM_{10} controls on nonpoint sources in areas surrounding monitors with a relative coarse mass impact of ≥20% of total light extinction and ≥10% of anthropogenic light extinction.

For the period 2013-2017, MID coarse mass impacts were greatest at the following IMPROVE monitoring sites and corresponding Class I Federal areas.[62]

- Chiricahua NM and Wilderness Area (IMPROVE Site: Chiricahua NM, CHIR1)

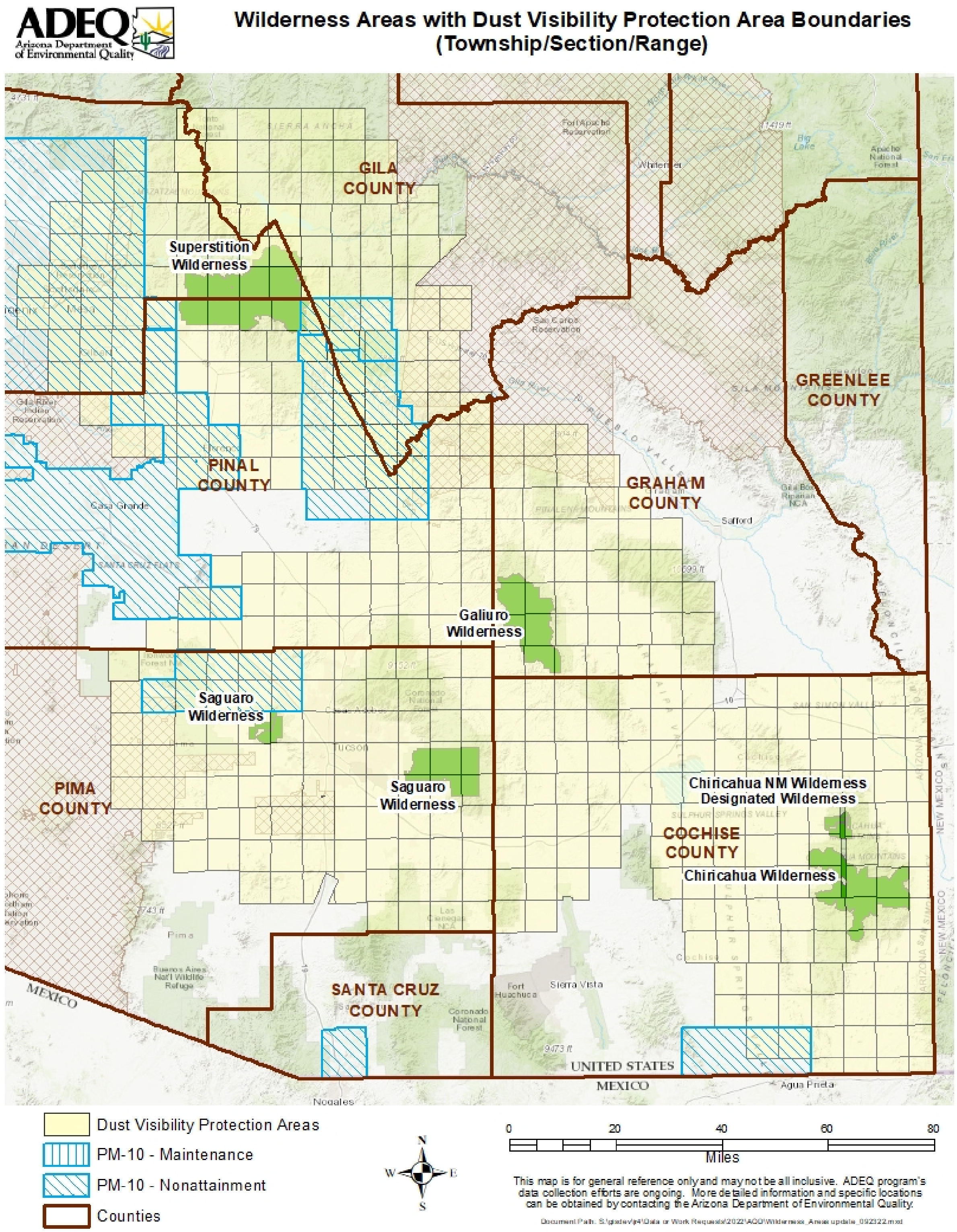
[61] Note from PDEQ records search: *Used K Custom Reports "Air Inspections" for inspections; K Standard Report "Cases V4" for cases; Aircc Manager for EE/PD. (JZ)*

[62] See Appendix C of Arizona's *State Implementation Plan Revision: Regional Haze Program (2018-2028)*. Each of these sites exhibited coarse mass impacts on the most impaired days of > 10% of the total anthropogenic extinction (Mm-1) during the 2013-2017 period.

- Galiuro Wilderness Area (IMPROVE Site: Chiricahua NM, CHIR1)
- Saguaro NP (IMPROVE Site: Saguaro NP – East Unit, SAGU1)
- Superstition Wilderness Area (IMPROVE Site: Tonto NM, TONT1)

ADEQ then evaluated which sectors most contributed to emissions of visibility impairing pollutants near these selected Class I areas. Since PM_{10} does not generally experience high transport distances, evaluation of emissions reduction strategies for paved and unpaved roads, mining and quarrying, and non-residential construction was limited to nonpoint sources within 50 km of these Class I Federal areas. Figure 2 shows the regions for which nonpoint controls were evaluated.

Figure 2: Map of Arizona "Dust Visibility Protection Areas" under Regional Haze Nonpoint Rules



2.5.1 New Control Measures for Industrial, Commercial, Institutional Construction (ICI)

ADEQ evaluated control strategies to mitigate PM_{10} emissions from industrial, commercial, and institutional (ICI) construction sources located within 50 kilometers (km) of the Chiricahua National Monument and Wilderness Area, Galiuro Wilderness Area, Saguaro National Park, and Superstition Wilderness Area. By identifying coarse mass as a significantly contributing PM species at certain Arizona Class I Federal areas and choosing to evaluate PM_{10} emissions from ICI Construction, Arizona sought to further its obligations pursuant to 40 CFR § 51.308(f)(2)(iv)(B). Furthermore, Arizona proposed additional measures for ICI construction as being reasonable and for inclusion in the state's LTS.

ADEQ determined that the control options presented in Table 9 were reasonable based on the four-factor analysis. All controls evaluated were considered technically feasible; however, those controls with costs in excess of $5,000/ton were considered to be cost-excessive and unreasonable. No controls were considered unreasonable based on time necessary for compliance, energy and non-air quality environmental impacts, or remaining useful life.

Table 9: Enacted Control Measures for ICI Construction

Control Measure Description and Applicability
Pave unpaved parking and staging areas
Apply chemical stabilizer to unpaved parking and staging areas
Apply gravel to unpaved parking and staging areas
Limit vehicle speed at work site to 15 mph with signage

On July 28, 2023, ADEQ completed a rulemaking to codify these controls at certain ICI construction sites as A.A.C. R18-2-D1302 (Fugitive Dust Emissions from Nonresidential Construction).[63] ADEQ submitted the enacted rules as a supplemental SIP revision for the EPA review and approval on August 21, 2023.

In the 2021 regional haze plan, Arizona requested conditional approval of its nonpoint four factor analysis control determinations to allow ADEQ time to promulgate the proposed rule; however, the rule revisions were complete and submitted as a supplemental SIP revision before the EPA issued its approval determination for the 2021 regional haze plan.

2.5.2 Measures to Mitigate Paved Road Dust

ADEQ also evaluated control strategies to mitigate PM_{10} emissions from paved roads that are located within 50 km of the Chiricahua National Monument and Wilderness Area, Galiuro Wilderness Area, Saguaro National Park, and Superstition Wilderness Area.

Based on a review of available controls and consideration of stakeholder input on the required four statutory factors, ADEQ found that the controls options presented in Table 10 for paved roads are reasonable based on the four-factor analysis.

Table 10: Enacted Control Measures for Paved Roads

Measure Description and Applicability
Pave access points where unpaved traffic surfaces adjoin paved roads

[63] 29 A.A.R. 1658, July 28, 2023. This rulemaking also included a definition rule for the new control rules, A.A.C. R18-2-D1301 (Definitions for R18-2-D1302 and R18-2-D1303).

Provide for traffic rerouting or rapid cleanup of temporary (and not readily preventable) sources of dust on paved roads (trackout, spills, water erosion, runoff, and skid control sand)

On July 28, 2023, ADEQ completed a rulemaking to codify these controls for certain paved roads as A.A.C. R18-2- D1303 (Fugitive Dust Emissions from Paved Roads).[64] ADEQ submitted the enacted rules as a supplemental SIP revision for the EPA review and approval on August 21, 2023.

In the 2021 regional haze plan, Arizona requested conditional approval of its nonpoint four factor analysis control determinations to allow ADEQ time to promulgate the proposed rule; however, the rule revisions were complete and submitted as a supplemental SIP revision before the EPA issued its approval determination for the 2021 regional haze plan.

2.6 Emissions Reductions as a Result of Facility Closures

In 2012, the Catalyst Paper facility shut down production and closed permanently resulting in a decrease in emissions equal to that of its total emissions.[65] The Catalyst Paper facility housed a boiler unit, referred to as Power Boiler #2, which was previously determined to be subject to BART requirements. Power Boiler #2 emitted more than 250 tons per year of NO_x and SO_2.[66] According to CALPUFF modeling, it had a visibility extinction of 0.739 deciviews on the Sierra Ancha Wilderness area and 0.523 deciviews on the Superstition Wilderness area.[67] Emissions reductions due to the closure of the Catalyst Paper facility were significant and the resulting visibility improvement assisted Arizona in achieving its 2018 RPGs. If the Catalyst Paper facility ever sought to resume business operations, it would constitute a new source subject to New Source Review regulation.

2.7 Federal Regulations

To support the development of second round regional haze plans, the Western Regional Air Partnership (WRAP) identified all existing (adopted) federal rules and upcoming rules and limits, and incorporated the data into the calculations of expected reductions and improvements in visibility in 2028 (WRAP 2028 modeling). The WRAP modeling used the following emission inventories for the 2028OTBa2 scenario.

Source Sector	2028OTBa2
California All Sectors 12WUS2	**CARB-2028**
WRAP Fossil EGU w/ CEM	**WRAP-2028-EGU** [1]
WRAP Fossil EGU w/o CEM	**WRAP-2028-EGU** [1]
WRAP Non-Fossil EGU	**EPA-2028v1**
Non-WRAP EGU	**EPA-2028v1**
O&G WRAP O&G States	**WRAP-2028-O&G** [2]

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[64] *Id.*

[65] *See generally* http://www.catalystpaper.com/media/news/community/catalyst-permanently-close-snowflake-recycle-paper-mill.

[66] ADEQ, *Arizona State Implementation Plan: Regional haze Under Section 308 of the Federal Regional Haze Rule*, January 2011, Appendix D, section IX.

[67] *Id*.

O&G WRAP Other States	**EPA-2016v1 [3]**
O&G non-WRAP States	**EPA-2016v1 [3]**
WRAP Non-EGU Point	**WRAP-2014v2 [4]**
Non-WRAP non-EGU Point	**EPA-2016v1**
On-Road Mobile 12WUS2	**WRAP-2028-Mobile [5]**
On-Road Mobile 36US	**EPA-2028v1**
Non-Road 12WUS2	**WRAP-2028-Mobile [5]**
Non-Road non-WRAP 36US	**EPA-2028v1 [6]**
Other (Non-Point) 12WUS2	**EPA-2014v2 [7]**
Other (Non-Point) 36US	**EPA-2016v1**
Can/Mex/Offshore 12WUS2	**EPA-2016v1**
Fires (WF, Rx, Ag)	**WRAP-RB-Fires [8]**
Natural (Bio, etc.)	**WRAP-2014v2**
Boundary Conditions (BCs)	**WRAP-2014-GEOS**

1. WRAP-2028OTBa2-EGU includes changes/corrections/updates from WESTAR-WRAP states
2. WRAP-2028OTBa2-O&G both include corrections for WESTAR-WRAP states.
3. O&G for other WRAP states and Non-WRAP states use EPA-2016v1 assumptions for 2028OTBa2 and unit-level changes provided by WESTAR-WRAP states.
4. WRAP-2014v2 Non-EGU Point is used for 2028OTBa2 scenario, with source specific updates provided by WESTAR-WRAP states.
5. WRAP-2028-MOBILE is used for On-Road and Non-Road sources for the 12WUS2 domain.
6. EPA-2016v1 and EPA-2028v1 are used for On-Road and Non-Road Mobile for the 36km US domain.
7. Non-Point emissions use 2014v2 emissions for 2028OTBa2 scenario, including state-provided corrections.
8. RepBase fires are used for 2028OTBa2

Some of the federal regulations that were included in these emission inventory projections that contribute to visibility improvement as part of Arizona's LTS include:

- Mobile source controls
    - Heavy Duty Diesel Engine Standard[68]
    - Tier 3 Tailpipe Standards[69]
    - Large Spark Ignition and Recreational Engines and Vehicle Rule[70]
    - Tier 4 Nonroad Diesel Engines and Fuel Rule[71]

[68] 40 CFR § 86.007-11.
[69] 79 FR 23,414 (Apr. 28, 2014).
[70] 67 FR 68,242 (Nov. 8, 2002).
[71] 40 CFR Part 1039.

  - Low sulfur fuel requirements for gasoline engines, on-road diesel engines, nonroad diesel engines, and locomotives[72]
  - Ultra-low sulfur diesel fuel for highway, nonroad, locomotive, and marine diesel necessary for new advanced emission control technologies[73]
- Maximum Achievable Control Technology (MACT) emission standards (40 CFR Part 63): Combustion Turbines (Subpart YYYY), Industrial Boilers and Process Heaters (Subpart DDDDD), and Reciprocating Internal Combustion Engines (RICE) (Subpart ZZZZ).
- Stationary Spark Ignition Internal Combustion Engine Rules[74]
- Locomotive and Marine Diesel Emission Standards[75]

2.8 State Regulations

In addition to the federal regulatory programs listed above, state regulations also contribute to Arizona's success in reaching the 2028 RPGs. The most relevant state regulations for reducing emissions of visibility impairing pollutants are discussed below, including mobile source programs, updates to the preconstruction permitting program, and requirements to manage pollution resulting from prescribed/controlled burns.

2.8.1 Arizona State Vehicle Emissions Inspection Program

The Arizona Department of Environmental Quality (ADEQ) administers a mandatory vehicle emissions testing and repair program known as the Vehicle Emissions Inspection Program (VEIP) in the Phoenix and Tucson metro areas.[76] VEIP emphasizes the importance of proper vehicle maintenance to ensure better performance, lower emissions, and a longer life of vehicles.

VEIP improves the air quality by reducing vehicle emissions through effective testing to ensure continued function of emission control systems and customer service measures to make it easier for participants to comply with emissions requirements. The VEIP has resulted in significant reductions in air pollutant such as NO_x and VOCs by identifying the vehicles emitting high levels of pollutants, requiring repairs and maintenance for registration purposes when appropriate, and providing financial assistance to those who need vehicle repairs.

The Voluntary Vehicle Repair Program (VVRP) pays up to $900 toward the cost of emissions-related vehicle repairs after a failed emissions test. Participants must meet program requirements and pay a $100 co-pay toward repairs. ADEQ accepts applications to the VVRP on a first-come, first-served basis during two separate funding cycles each month.[77]

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[72] 40 CFR Part 80, Subpart I.
[73] 40 CFR § 80.500.
[74] 40 CFR Part 60, Subpart JJJJ.
[75] 73 FR 37,096 (June 30, 2008).
[76] ADEQ, *Air Quality Division: Vehicle Emissions Control (VEC) Section*, https://www.azdeq.gov/EmissionsTest (Accessed March 15, 2023).
[77] ADEQ, *Air Quality Division: Vehicle Emissions Control (VEC) Section*, *Voluntary Vehicle Repair Program (VVRP) Overview*, https://www.azdeq.gov/carhelp (Accessed March 15, 2023).

2.8.2 Arizona Smoke Management Practices

ADEQ's Air Quality Division implements a smoke management program that meets all the criteria for an Enhanced Smoke Management Program (ESMP). ADEQ's smoke management program works toward a reduction in smoke impacts due to prescribed/controlled burning of nonagricultural fuels with particular regard to heavy forest fuels. All state lands, parks and forests, as well as any federally managed lands in Arizona, are under the jurisdiction of ADEQ in matters relating to air pollution from prescribed burning. The EPA has approved the state and local rules that comprise the Enhanced Smoke Management Program into the Arizona SIP.[78] See 6.4.1, The Role of Fire in Arizona Emission Trends for more information on smoke from prescribed fires and emission trends from fires in Arizona.

[78] *See* 71 FR 28,270 (May 16, 2006); *see also* 72 FR 25,973 (May 8, 2007).

3 Emissions Reductions from Regional Haze SIP Strategies

The RHR requires that each state's regional haze progress report provide a summary of the emission reductions achieved through the implementation of the regional haze control measures included in the state's long-term strategy.[79]

This section discusses the significant and continued reductions in emissions of anthropogenic visibility-impairing pollutants resulting from implementation of the various control strategies included in Arizona's regional haze plans, as well as the emissions reductions from other state and federal air pollution reduction programs. These regional haze control strategies are discussed in more detail in Section 2, Status of Control Strategies in the Regional Haze SIP.

Although it is not possible to quantify every reduction, ADEQ has compiled emission data for electric generating units (EGUs) and other major point sources for the period of 2002 to 2023. Separate emission trends are provided for sources subject to BART requirements from earlier rounds of regional haze planning.

3.1 NO_x & SO_2 from All Arizona EGUs

Figure 3 below presents the NO_x emissions, SO_2 emissions, and heat input for all Arizona EGUs that are published in the EPA's Clean Air Markets Program Division (CAMPD) database.[80]

Compared to the 2002 baseline, 2023 emission totals from these EGUs for NO_x and SO_2 have decreased by 85 percent and 90 percent, respectively. During this same period, total heat input at these facilities has only decreased by 6 percent. Similar trends are observed when focusing on the last five years: since 2019, NOx and SO_2 emissions have decreased by 52 percent and 42 percent, respectively, while total heat input has only decreased by 14 percent. This trend is consistent with the effective implementation of control measures for NO_x and SO_2 and other upgrades that improve efficiency, fuel switching from coal to natural gas, as well as reduced operation or retirement of the least efficient units over time as discussed in Section 2.

Figure 3: Emission Trend for Arizona EGUs (2002 - 2023)

[79] 40 CFR §51.308(g)(2)
[80] https://campd.epa.gov/

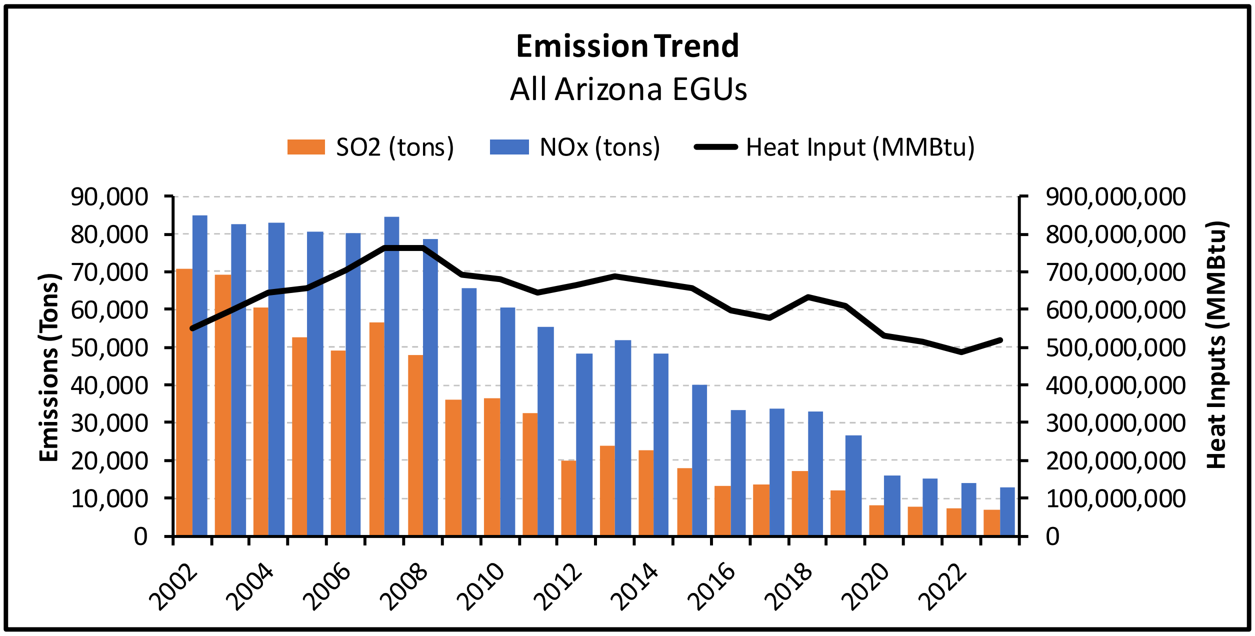


Table 11: CAMPD - EGU Emission Data

Year	SO_2 (tons)	NOx (tons)	Heat Input (MMBtu)
2002	70,693	84,938	550,435,918
2003	69,396	82,607	596,941,073
2004	60,372	83,083	643,404,347
2005	52,762	80,790	657,183,740
2006	49,161	80,197	703,627,113
2007	56,486	84,431	764,895,852
2008	48,116	78,525	762,442,943
2009	35,978	65,608	693,798,486
2010	36,445	60,524	681,330,967
2011	32,428	55,453	643,162,935
2012	20,023	48,137	663,704,899
2013	23,689	51,753	686,904,693
2014	22,802	48,441	670,874,220
2015	17,817	39,908	656,460,098
2016	13,173	33,202	597,497,372
2017	13,591	33,742	577,110,149
2018	17,063	32,879	633,714,775
2019	12,094	26,771	607,465,324
2020	8,222	16,194	532,287,595
2021	7,549	15,315	514,576,793
2022	7,387	13,994	486,804,161
2023	6,984	12,972	519,818,455

Year	SO_2 (tons)	NOx (tons)	Heat Input (MMBtu)
Change % (2002-2023)	**-90%**	**-85%**	**-6%**
Change % (2019-2023)	**-42%**	**-52%**	**-14%**

The Arizona EGUs that report CAMPD data and whether each EGU was subject to BART controls under regional haze are listed below in Table 12.

Table 12: List of CAMPD EGUs in Arizona and BART requirements

Facility Name	Facility ID	BART
Agua Fria Generating Station	141	N
Apache Station*	**160**	**Y**
APS Saguaro Power Plant	118	N
APS West Phoenix Power Plant	117	N
Arlington Valley Energy Facility	55282	N
Black Mountain Generating Station	56482	N
Cholla Station	**113**	**Y**
Coolidge Generating Station	56948	N
Coronado Generating Station	**6177**	**Y**
De Moss Petrie Generating Station	124	N
Desert Basin Generating Station	55129	N
Gila River Power Station	55306	N
Griffith Energy Project	55124	N
Irvington Generating Station	**126**	**Y**
Kyrene Generating Station	147	N
Mesquite Generating Station	55481	N
Navajo Generating Station	4941	N
New Harquahala Generating Company	55372	N
Ocotillo Power Plant	116	N
Redhawk Generating Facility	55455	N
Santan	8068	N
South Point Energy Center, LLC	55177	N
Springerville Generating Station	8223	N
Sundance Power Plant	55522	N
Yucca Power Plant	120	N
Yuma Cogeneration Associates	54694	N

*Note: EGUs that have implemented BART requirements are bolded.

3.2 NO_x & SO_2 from Arizona EGUs Subject to BART

Since Figure 3 includes emissions data from EGU sources that are not subject to BART controls under the regional haze program, ADEQ provides Figure 4 and

Table 13 to demonstrate the emission reductions resulting specifically from BART control measures.

The four Arizona EGU sources subject to BART controls that report to CAMPD are:

1) Apache Generating Station,
2) Cholla Generating Station,
3) Coronado Generating Station, and
4) Irvington (formerly Sundt) Generating Station.

Since 2002, these four facilities have decreased their NO_x and SO_2 emissions by 78 percent and 97 percent, respectively. At the same time, the total heat input for these facilities has decreased by 46 percent. Similarly, since 2019, NOx and SO_2 emissions have decreased by 13 percent and 30 percent, respectively, with a 10 percent reduction in total heat input. These contemporaneous trends demonstrate that the emission reductions are the result of the proper implementation of BART controls, as well as retirement of certain units, fuel switching to natural gas, and facility upgrades unrelated to BART requirements.

2020 saw a small increase in emissions from these facilities, likely due to changes in residential energy consumption during the Covid-19 pandemic and an especially hot summer in Arizona's desert areas. However, emissions continued to trend downward in the following years.

Figure 4: BART-Only Emission Trend (2002 - 2023)

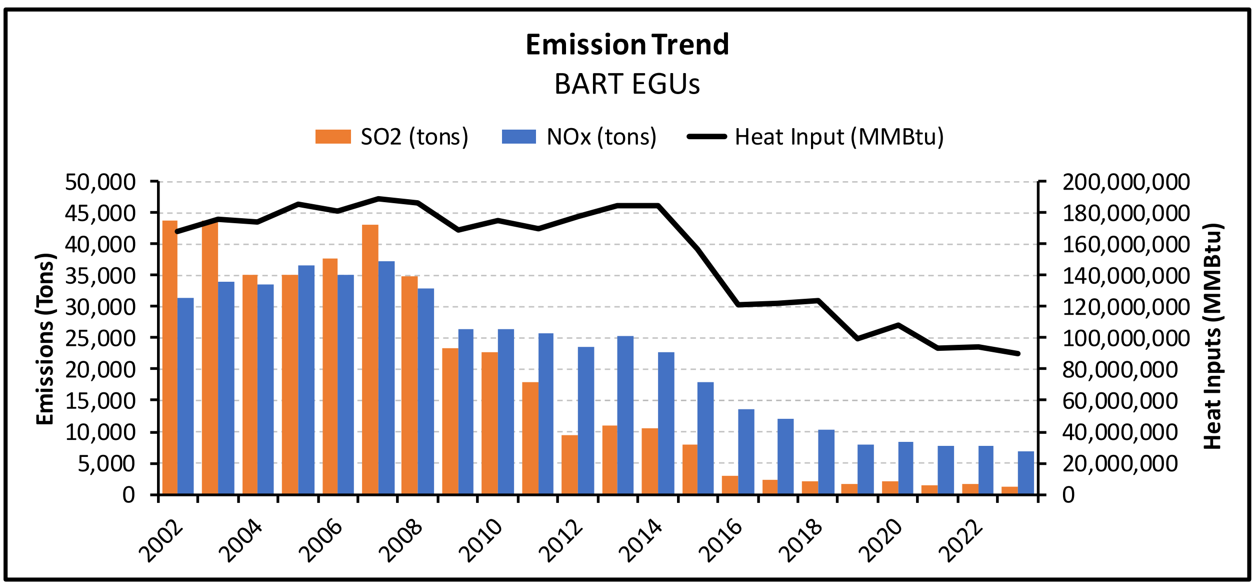


Table 13: EGU BART Emission Trend Data

Year	SO_2 (tons)	NOx (tons)	Heat Input (MMBtu)
2002	43,664	31,342	168,318,107
2003	43,821	34,051	176,053,334
2004	35,107	33,560	174,244,795

Year	SO_2 (tons)	NOx (tons)	Heat Input (MMBtu)
2005	35,160	36,639	185,687,840
2006	37,682	35,082	181,146,200
2007	43,065	37,206	189,322,174
2008	34,773	32,926	186,072,803
2009	23,389	26,318	168,592,229
2010	22,805	26,382	174,970,171
2011	18,002	25,820	169,776,936
2012	9,398	23,466	177,908,801
2013	11,025	25,386	184,192,383
2014	10,618	22,735	184,671,870
2015	7,978	17,826	156,595,175
2016	2,901	13,489	121,448,803
2017	2,304	12,060	122,261,715
2018	2,121	10,303	123,941,891
2019	1,719	7,844	99,829,078
2020	2,035	8,476	108,478,966
2021	1,435	7,770	93,805,692
2022	1,620	7,696	94,228,903
2023	1,199	6,803	90,064,234
Change % (2002-2023)	**-97%**	**-78%**	**-46%**
Change % (2019-2023)	**-42%**	**-52%**	**-14%**

3.3 NO_x, SO_2, & PM_{10} from Other Non-EGU BART Sources

Three of the seven sources in Arizona subject to BART controls are not EGUs and therefore do not report emission data to the CAMPD database provided for EGUs in the preceding sections. However, their emission data for 2023 will not be available until the emission reporting cycle (Q4, 2024), which comes after finalization of this report. Therefore, ADEQ presents the emission data through 2022 below.

Figure 5 and Table 14 below provide the emission totals for the three non-EGU BART sources to provide a more complete characterization of emissions reductions from emission control implementation. ADEQ obtained the emission data for the non-EGU facilities from ADEQ's internal point source emission database.

The three Arizona point sources subject to BART controls that do not report to CAMPD are:

1) Asarco Hayden Smelter (Facility ID: 2435),
2) Nelson Lime Plant (Facility ID: 5992), and
3) Freeport-McMoRan Miami Smelter (Facility ID: 5129).

From 2002 to 2022, SO_2 and NOx emissions from these facilities have decreased by 90 percent and 13 percent, respectively, demonstrating the effective implementation of BART controls. A similar trend has been observed in recent years since 2019, with SO_2 emissions decreasing by 46 percent and NOx emissions by 1 percent.

Figure 5: Non-EGU BART Emission Trend Graph

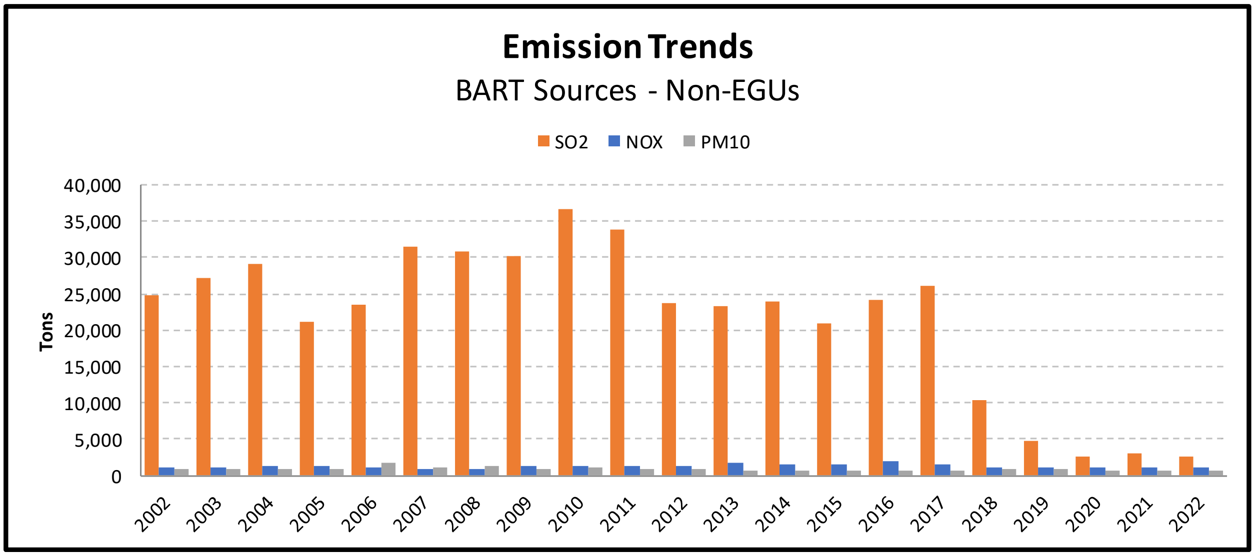


Table 14: Non-EGU BART Emission Trend Data (2002-2022)

Year	SO_2 (tons)	NOx (tons)	PM_{10} (tons)
2002	24811.79	1222.91	949.86
2003	27161.87	1141.07	911.77
2004	28999.00	1262.49	933.60
2005	21113.98	1245.00	916.44
2006	23518.90	1151.89	1840.03
2007	31429.30	919.37	1133.47
2008	30787.53	1017.15	1246.36
2009	30079.15	1366.32	976.91
2010	36521.66	1392.14	1049.68
2011	33861.28	1438.43	845.18
2012	23750.65	1416.76	811.64
2013	23363.64	1825.78	738.03
2014	23934.69	1640.60	714.18
2015	20854.81	1622.14	761.69
2016	24183.29	2023.92	687.17
2017	26107.01	1586.23	724.27
2018	10328.96	1161.72	896.16
2019	4761.96	1079.54	831.85
2020	2737.31	1067.24	694.04
2021	2997.95	1029.01	605.88
2022	2553.36	1066.43	682.51
Change % (2002-2022)	**-90%**	**-13%**	**-28%**

Year	SO_2 (tons)	NOx (tons)	PM_{10} (tons)
Change % (2019-2022)	**-46%**	**-1%**	**-18%**

3.4 NO_x, SO_2, & PM_{10} from Other Non-BART, Non-EGU Sources

Two non-EGU point sources in Arizona were required to implement "reasonable progress" controls, although they were not subject to BART requirements:

1) Phoenix Cement Company (PCC) Clarkdale (Facility ID: 2393), and
2) CalPortland Cement (CPC) Rillito (Facility ID: 2869)

Figure 6 and

Table 15 present the SO_2, NO_x, and PM_{10} emission data from these non-BART, non-EGU facilities from 2002 to 2022, the latest year with available data. These data show that from 2002 to 2022 SO_2 emissions have decreased by 99 percent and NO_x has decreased by 71 percent, demonstrating effective implementation of the reasonable progress controls at these facilities. However, in recent years, SO_2 emissions have decreased by 74 percent, while NOx emissions have increased by 7 percent since 2019. Both facilities have shown some increase in NOx and PM_{10} emissions in recent years, due to yearly variability in facility throughput while remaining at or below permitted emission limits.

Figure 6: Non-EGU Non-BART Emission Trend Graph

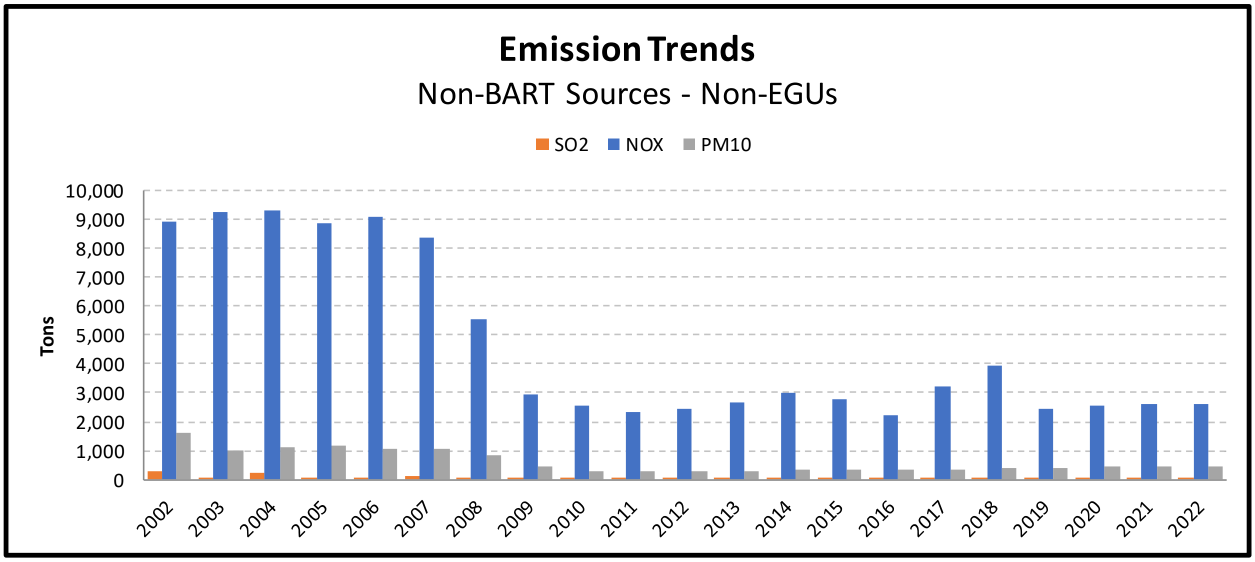


Table 15: Non-EGU Non-BART Emission Trend Data (2002-2022)

Year	SO_2 (tons)	NOx (tons)	PM_{10} (tons)
2002	291.58	8894.53	1600.16
2003	30.97	9215.68	1004.81
2004	220.97	9285.76	1094.75
2005	19.33	8851.11	1157.94
2006	21.60	9077.13	1081.03
2007	103.79	8367.40	1046.82

Year	SO_2 (tons)	NOx (tons)	PM_{10} (tons)
2008	21.39	5543.42	859.78
2009	10.71	2937.34	464.27
2010	14.84	2559.71	312.56
2011	10.41	2350.05	290.54
2012	10.89	2465.56	287.24
2013	9.94	2648.60	301.89
2014	10.92	2986.10	353.86
2015	14.27	2776.99	347.07
2016	10.15	2243.89	354.96
2017	6.81	3201.21	340.86
2018	7.31	3947.50	385.86
2019	6.75	2436.01	383.32
2020	6.24	2565.83	441.29
2021	1.58	2600.23	441.16
2022	1.76	2601.41	458.08
Change % (2002-2022)	**-99%**	**-71%**	**-71%**
Change % (2019-2022)	**-74%**	**7%**	**20%**

4 Assessment of Baseline, Natural, and Current Visibility Conditions

4.1 Visibility Requirements

The Federal RHR, codified at 40 CFR § 51.300 through § 51.309, requires states to make reasonable progress toward achieving the national goal of reaching natural visibility conditions in Class I Federal areas. 40 CFR § 51.301 defines natural conditions as:

> **Natural conditions** reflect naturally occurring phenomena that reduce visibility as measured in terms of light extinction, visual range, contrast, or coloration, and may refer to the conditions on a single day or a set of days. These phenomena include, but are not limited to, humidity, fire events, dust storms, volcanic activity, and biogenic emissions from soils and trees. These phenomena may be near or far from a Class I area and may be outside the United States.[81]

40 CFR § 51.308(d)(1) requires states to establish goals that provide for reasonable progress towards achieving natural visibility conditions. These reasonable progress goals reflect the visibility conditions that are projected to be achieved by the end of the implementation period as a result of a state's long-term strategy (LTS), other states' long-term strategies, as well as the implementation of other CAA requirements. 40 CFR § 51.308(f)(1)(i)-(vi) contains four metrics that are used to track progress in reducing visibility impairment in Class I Federal areas:

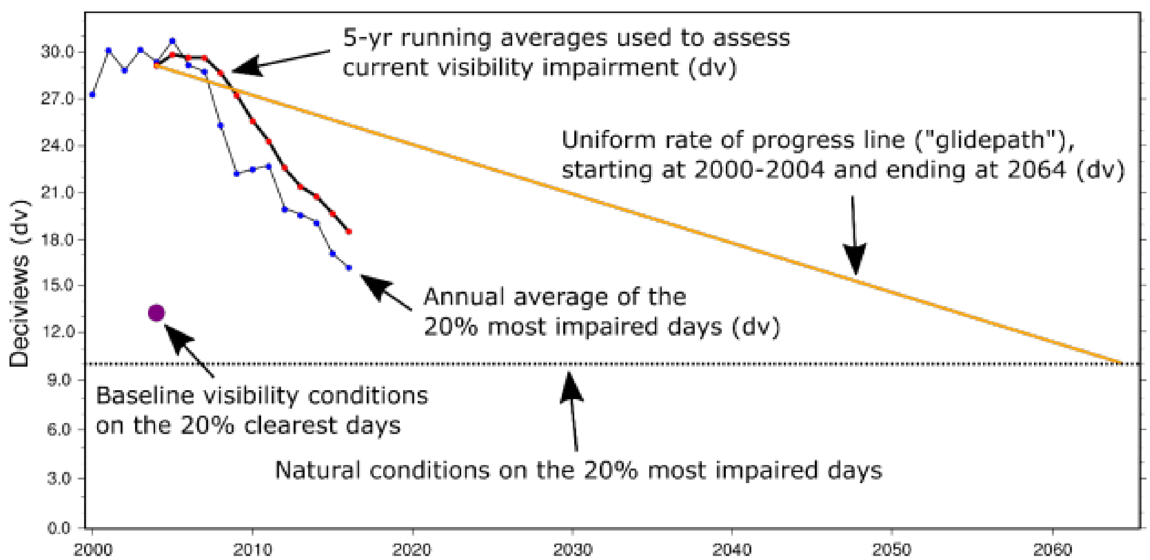
1. Baseline conditions - 40 CFR § 51.308(f)(1)(i)
    - The average of the five annual averages of the individual values of daily visibility for the period 2000 through 2004 unique to each Class I area for either the most anthropogenically impaired days (most impaired days) or the clearest days.
2. Natural conditions - 40 CFR § 51.308(f)(1)(ii)
    - The average of individual values of daily natural visibility unique to each Class I area for either the most impaired days or the clearest days.
3. Current conditions - 40 CFR § 51.308(f)(1)(iii)
    - The average of the five annual averages of individual values of daily visibility for the most recent period for which data are available unique to each Class I area for either the most impaired days or the clearest days.
4. Progress to date for the most impaired and clearest days - 40 CFR § 51.308(f)(1)(iv)
    - Actual progress made towards the natural visibility condition since the baseline period, and actual progress made during the previous implementation period up to and including the period for calculating current visibility conditions, for the most impaired and for the clearest days.

[81] 40 CFR § 51.301 (emphasis in original).

5. Differences between current visibility condition and natural visibility condition - 40 CFR § 51.308(f)(1)(v)
   - The number of deciviews by which the current visibility condition exceeds the natural visibility condition, for the most impaired and for the clearest days.
6. Uniform rate of progress (URP) - 40 CFR § 51.308(f)(1)(vi)
   - The rate of improvement in visibility that would need to be maintained during each implementation period in order to reach natural conditions by 2064 for the 20 percent most impaired days, given the starting point of the 2000-2004 baseline visibility condition. The "glidepath," or URP, is the amount of visibility improvement that would be needed to stay on a linear path from the baseline period to natural conditions.

To calculate these metrics, the concentrations of visibility-impairing pollutants from the different time periods are entered into a commonly accepted algorithm which estimates light extinction.[82] These estimates are then logarithmically transformed to the deciview index scale (deciviews) which was established as the principal metric for expressing visibility under the Federal RHR. 40 CFR § 51.301 defines a deciview as "the unit of measurement on the deciview index scale for quantifying in a standard manner human perception of visibility." Figure 7 is an example diagram showing the important parameters used to calculate the visibility metrics for the RHR.[83]

Figure 7: Example diagram showing the important parameters used to calculate the visibility



For this progress report, baseline visibility data was obtained from IMPROVE monitoring data for 2000 through 2004 and represents visibility conditions for the baseline period. Similarly, visibility data was obtained from IMPROVE monitoring data for 2005-2022. The five-year average of 2018-2022 represents

[82] Pitchford, M. et al., 2007. Revised algorithm for estimating light extinction from IMPROVE particle speciation data. J. Air & Waste Manage. Assoc., 57(11), pp. 1326-1336.

[83] EPA, *Technical Guidance on Tracking Visibility Progress for the Second Implementation Period of the Regional Haze Program* (Dec. 20, 2018), *available at* https://www.epa.gov/sites/production/files/2018-12/documents/technical_guidance_tracking_visibility_progress.pdf (last accessed July 25, 2024).

current visibility conditions for the purposes of this report. Natural visibility was determined by estimating the natural concentrations of visibility-impairing pollutants and then calculating total light extinction with the IMPROVE algorithm. Comparison of baseline conditions to natural visibility conditions shows the improvement necessary to attain natural visibility by 2064 measured in deciviews of improvement per year (i.e. uniform rate of progress).

4.2 Uniform Rate of Progress

The revisions to the 2017 Regional Haze Rule (RHR) require a revised approach to tracking visibility improvements over time within the Uniform Rate of Progress (URP) framework.[84] Following these revisions, ADEQ determined the rate of improvement in visibility that would need to be maintained in order to reach natural conditions by 2064 for the 20 percent most impaired days, given the starting point of the 2000 - 2004 baseline visibility condition. This "glidepath," or URP, is the amount of visibility improvement that would be needed to stay on a linear path from the baseline period to natural conditions.

The URP is calculated according to the following formula:

URP = [(2000-2004 visibility)20% most impaired - (natural visibility)20% most impaired]/60

4.3 Baseline, Natural, and Current Visibility Conditions in Arizona, and Uniform Rate of Progress

Per 40 CFR § 51.308(f)(1)(i) through (v), ADEQ calculated the following visibility metrics for each in-state Class I Federal area:

a. baseline on the 20% most impaired days and the 20% clearest days and URP;
b. natural for the most impaired and clearest days;
c. current visibility for the most impaired and clearest days;
d. progress to date for the most impaired and clearest days; and
e. differences between current and natural visibility conditions.

This information is provided in the three tables located Section 4.3.1: Table 16;Table 17; and Table 18.

A summary of the results is presented below in Sections 4.3.1 through 4.4.2. The Class I Federal areas that utilize the same IMPROVE monitor are presented together.

[84] "'URP framework' refers to the interrelated Regional Haze Rule requirements regarding the quantification of historical and projected visibility conditions using specific metrics, the quantification of natural conditions, the quantification of the uniform progress that would achieve natural visibility conditions for the 20 percent most anthropogenically impaired days in 2064, the URP glidepath, the setting of reasonable progress goals (RPGs) for the end of the implementation period, and the comparison of the RPG for the 20 percent most anthropogenically impaired days to the URP glidepath".

4.4 URP Glidepath Adjustments

The RHR allows adjustments to be made to the URP Glidepath to account for contributions from international anthropogenic emissions ("international emissions") and wildland prescribed fires ("Rx fire").[85] Estimates of the contributions of international emissions and/or Rx fire are added to the 2064 natural conditions end-point to create adjusted glidepaths. A state can select the default glidepath slope or propose to use endpoint adjustment options for international sources and prescribed fire contributions to visibility at each Class I Federal area.[86] Arizona uses the International Emissions + Wildland Rx Fire[87] glidepath endpoint adjustment option.

[85] 40 CFR § 51.308(f)(1)(vi)(B)

[86] 40 CFR § 51.308(f)(1)(vi).

[87] 40 CFR § 51.308(f)(1)(vi)(B) allows states to propose adjustments to the URP to account for impacts from wildland prescribed fires that were conducted with the objective to establish, restore, and/or maintain sustainable and resilient wildland ecosystems, to reduce the risk of catastrophic wildfires, and/or to preserve endangered or threatened species during which appropriate basic smoke management practices were applied. The WRAP/WAQS Regional Haze modeling platform leveraged scaled 2014 NEI wildland prescribed fire data for purposes of calculating the URP adjustments. ADEQ submits activity data related to wildland prescribed fires approved under its SIP approved Enhanced Smoke Management Program to EPA for use in the development of the NEI. Use of these emissions in the model meets the requirements outlined in this section for glidepath endpoint adjustments.

4.4.1 Calculations of baseline, current, and natural visibility conditions; progress to date; and the uniform rate of progress

Table 16: Baseline, current, and natural visibility conditions for the most impaired days (in dv)

Class I Federal Area	Baseline Visibility Conditions (2000-2004)	Current Conditions (2018-2022)	Estimated Unadjusted Natural Conditions 2064	Progress to Date (Baseline - Current)	Remaining Progress to Natural Conditions (Current – Natural)
Chiricahua NM WA	10.5	9.3	4.9	-1.2	4.4
Chiricahua WA	10.5	9.3	4.9	-1.2	4.4
Galiuro WA	10.5	9.3	4.9	-1.2	4.4
Grand Canyon NP	8.0	7.0	4.2	-1	2.8
Mazatzal WA[88]	11.2	9.5	5.2	-1.7	4.3
Mount Baldy WA	8.8	7.3	4.2	-1.5	3.1
Petrified Forest NP	9.8	7.9	4.2	-1.9	3.7
Pine Mountain WA[89]	11.2	9.5	5.2	-1.7	4.3
Saguaro NP	12.6	10.3	5.1	-2.3	5.2
Sierra Ancha WA[90]	10.8	9.7	5.1	-1.1	4.6
Superstition WA	11.7	10.2	5.1	-1.5	5.1
Sycamore Canyon WA	12.2	11.6	4.7	-0.6	6.9

NP: National Park.
WA: Wilderness Area.
NM: National Monument.

[88] Data is not available for 2018-2022 for IKBA1.Progress period represented is 2014-2018.

[89] Data is not available for 2018-2022 for IKBA1.Progress period represented is 2014-2018.

[90] Data is not available for 2016-2022 for SIAN1.Progress period represented is 2011-2015.

Table 17: Baseline, current, and natural visibility conditions for the clearest days (in dv)

Class I Federal Area	Baseline Visibility Conditions (2000-2004)	Current Conditions (2018-2022)	Estimated Unadjusted Natural Conditions 2064	Progress to Date (Baseline - Current)	Remaining Progress to Natural Conditions (Current – Natural)
Chiricahua NM WA	4.9	3.9	1.8	-1.0	2.1
Chiricahua WA	4.9	3.9	1.8	-1.0	2.1
Galiuro WA	4.9	3.9	1.8	-1.0	2.1
Grand Canyon NP	2.2	1.5	0.3	-0.7	1.2
Mazatzal WA[91]	5.4	4.2	1.9	-1.2	2.3
Mount Baldy WA	3.0	1.7	0.5	-1.3	1.2
Petrified Forest NP	5.0	3.4	1.1	-1.6	2.3
Pine Mountain WA[92]	5.4	4.2	1.9	-1.2	2.3
Saguaro NP	6.9	5.5	2.2	-1.4	3.3
Sierra Ancha WA[93]	6.2	4.6	2.0	-1.6	2.6
Superstition WA	6.5	4.8	2.0	-1.7	2.8
Sycamore Canyon WA	5.6	4.2	1.0	-1.4	3.2

[91] Data is not available for 2018-2022 for IKBA1.Progress period represented is 2014-2018.

[92] Data is not available for 2018-2022 for IKBA1.Progress period represented is 2014-2018.

[93] Data is not available for 2016-2022 for SIAN1.Progress period represented is 2011-2015.

Table 18: Uniform Rate of Progress for Arizona Class I Federal Areas

Class I Federal Area	Uniform Rate of Progress (dv/year)	Visibility Improvement Needed to Maintain URP (Baseline to 2022)	Visibility Improvement Needed to Maintain URP (Baseline to 2028)
Chiricahua NM WA	0.09	1.7	2.2
Chiricahua WA	0.09	1.7	2.2
Galiuro WA	0.09	1.7	2.2
Grand Canyon NP	0.06	1.1	1.5
Mazatzal WA	0.10	1.9	2.4
Mount Baldy WA	0.08	1.5	1.8
Petrified Forest NP	0.09	1.7	2.2
Pine Mountain WA	0.10	1.9	2.4
Saguaro NP	0.12	2.3	3.0
Sierra Ancha WA	0.09	1.7	2.3
Superstition WA	0.11	2.1	2.6
Sycamore Canyon WA	0.12	2.3	3.0

4.4.2 Discussion of Visibility Trends at Arizona IMPROVE Monitors that Meet or Exceed the URP Glidepath

For the 2018-2028 planning period covered by the Arizona 2022 regional haze plan, all but one Arizona IMPROVE monitor [Sycamore Canyon WA, AZ (SYCA_RHTS)] are projected to have met RPGs for the most impaired days that provide for a greater rate of visibility improvement than the adjusted URP. In fact, several sites saw visibility improvement greater than even the unadjusted URP, demonstrating progress that exceeds expectations under the adjusted URP. Further discussion of visibility trends at Sycamore Canyon is provided in Section 4.4.11.1.

The data in Table 16: Baseline, current, and natural visibility conditions for the most impaired days (in dv) shows that the IMPROVE monitor site with the most visibility progress-to-date is Saguaro NP with a dv of -2.3 and the monitor with the least progress-to-date is Sycamore Canyon WA with a dv of -0.6.

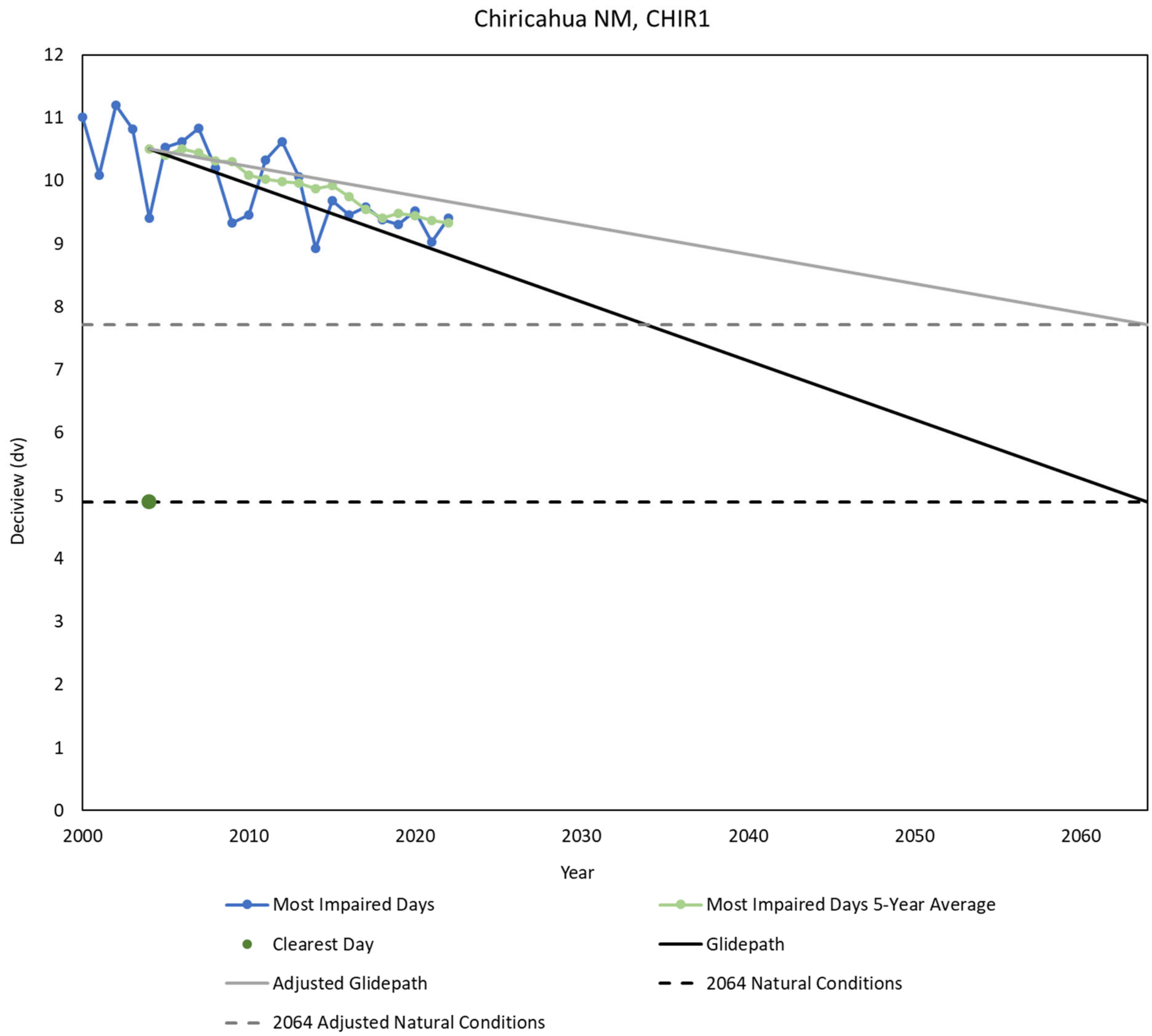
The data in Table 17: Baseline, current, and natural visibility conditions for the clearest days (in dv) the IMPROVE monitor with the most visibility progress to date is Superstition WA with a dv of -1.7 and the monitor with the least progress to date is Grand Canyon NP with a dv of -0.7. The table demonstrates that Grand Canyon saw the lowest rate of progress on clearest days because baseline visibility impairment at the Grand Canyon monitor during the 2000-2004 analysis period (2.2dv) was already significantly lower than other Arizona Class I areas, which had baseline impairment ranging from 3-6.9 dv. This improved baseline visibility at Grand Canyon likely resulted from efforts to protect visibility at this National Park even before creation of the Regional Haze program, via the Grand Canyon Visibility Transport Commission (GCVTC) throughout the 1990s.

Visibility progress that meets or exceeds the URP at nearly all Arizona IMPROVE monitors demonstrates the statewide reduction in emissions of visibility impairing pollutants as discussed in Section 3, Emissions Reductions from Regional Haze SIP Strategies, due in part specifically to continued implementation of BART controls at the facilities subject to BART requirements in the first regional haze planning period as discussed in Section 2, Status of Control Strategies in the Regional Haze SIP. Additionally, visibility progress at these sites can be attributed to general declines in emissions from EGUs and industrial facilities as a result of fuel switching, decreased or ceased operation of the oldest and most polluting units, and additional emission control measures implemented to meet non-regional haze SIP requirements, such as the SO_2 SIP revisions for the Miami and Hayden copper smelters.

4.4.3 Chiricahua NM, Chiricahua WA, and the Galiuro WA, AZ (CHIR1)

Figure 8 depicts the annual and five-year average of the 20% most impaired days, the baseline visibility conditions on the 20% clearest days, the natural conditions on the 20% most impaired days, and the unadjusted and adjusted uniform rate of progress lines for the CHIR1 site.

Figure 8: Chiricahua NM (CHIR1) 2000-2022 Visibility Impairment Trends



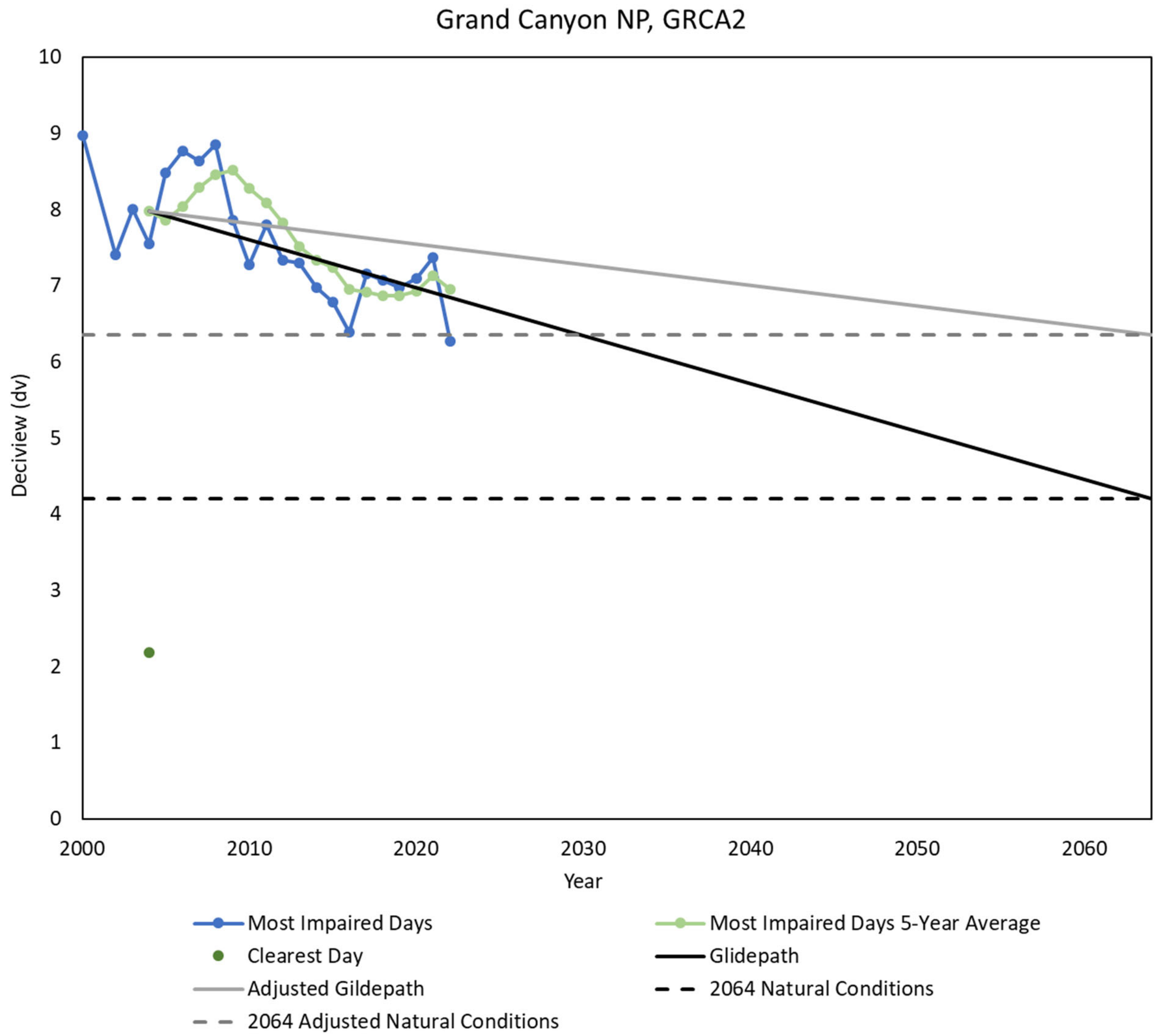
In Arizona, there are nine IMPROVE monitors which serve twelve Class I Federal areas. The CHIR1 and IKBA1 IMPROVE monitors serve multiple Class I Federal areas.

The baseline visibility conditions on the 20% clearest days for Chiricahua NM, Chiricahua WA, and the Galiuro WA is 4.9 dv. The uniform rate of progress line, or glidepath, starts at 10.5 dv and ends at the natural conditions on the 20% most impaired days of 4.9 dv at a rate of 0.09 dv per year, 5.6 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions in the areas by 2064. The adjusted uniform rate of progress line, or adjusted glidepath, starts at 10.5 dv and ends at the adjusted natural conditions on the 20% most impaired days of 7.7 dv at a rate of 0.04 dv per year, 2.8 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions in the areas by 2064. The annual average of the 20% most impaired days has an overall downward trend, beginning at 11.0 dv in 2000 and ending with the most recent value of 9.4 dv in 2022. The five-year annual average of the 20% most impaired days diminishes the effects of the year to year fluctuations, and as a result, more clearly illustrates the downward trend in visibility impairment. Starting with the 2000 - 2004 average of 10.5 dv and ending with the most recent average of 9.3 dv for 2018 - 2022. The annual and five-year annual average of the 20% most impaired days for 2022 and 2018 – 2022, respectively, are currently below the adjusted glidepath.

4.4.4 Grand Canyon NP, AZ (GRCA2)

Figure 9 depicts the annual and five-year average of the 20% most impaired days, the baseline visibility conditions on the 20% clearest days, the natural conditions on the 20% most impaired days, and the unadjusted and adjusted uniform rate of progress lines for the GRCA2 site.

Figure 9: Grand Canyon NP, AZ (GRCA2) 2000-2022 Visibility Impairment Trends

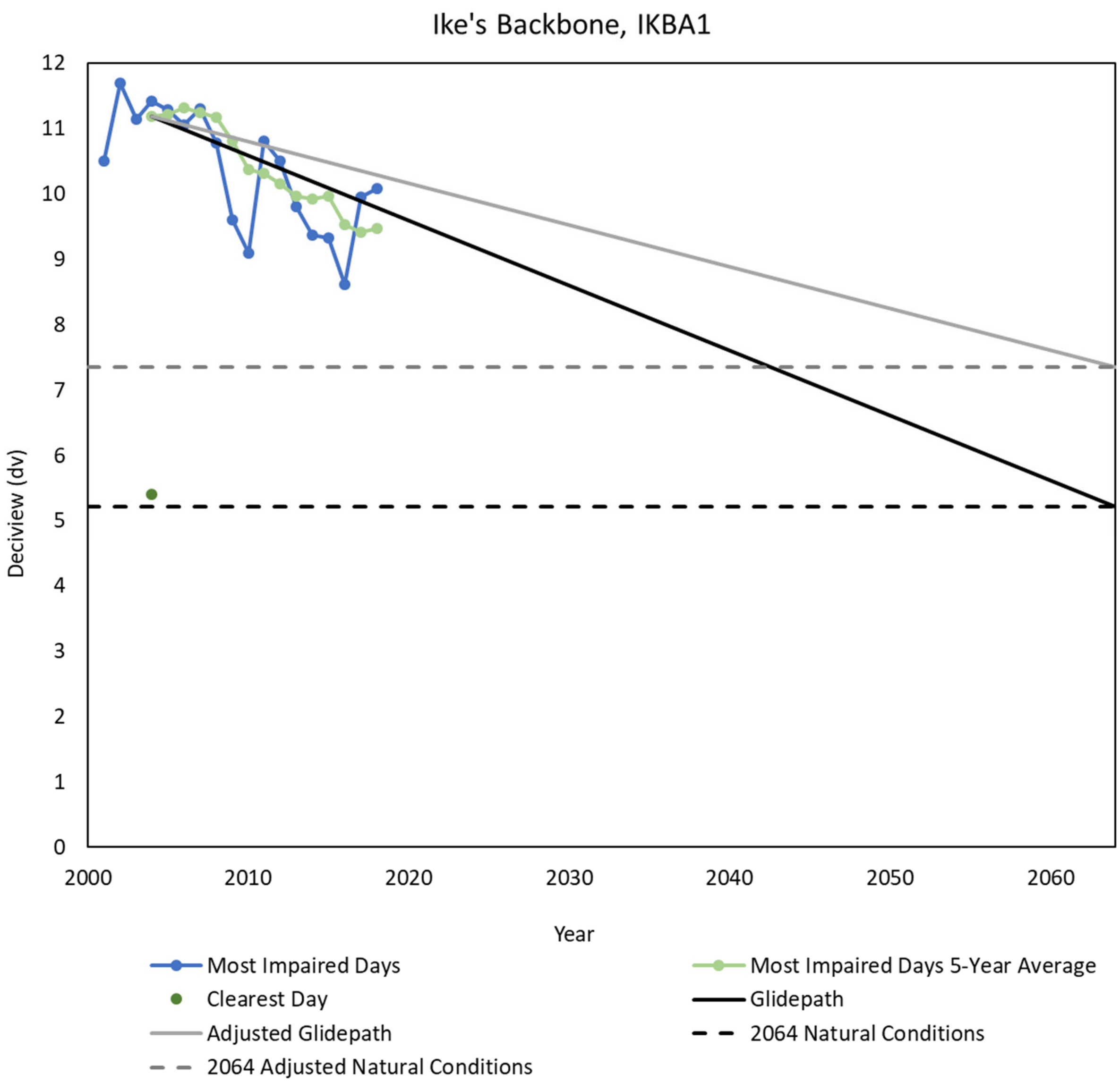


The baseline visibility conditions on the 20% clearest days for Grand Canyon NP is 2.2 dv. The uniform rate of progress line, or glidepath, starts at 8.0 dv and ends at the natural conditions on the 20% most impaired days of 4.2 dv at a rate of 0.06 dv per year, 3.8 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions in the areas by 2064. The adjusted uniform rate of progress line, or adjusted glidepath, starts at 8.0 dv and ends at the adjusted natural conditions on the 20% most impaired days of 6.4 dv at a rate of 0.03 dv per year, 1.6 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions in the areas by 2064. The annual average of the 20% most impaired days has an overall downward trend, beginning at 9.0 dv in 2000 and ending with the most recent value of 6.3 dv in 2022. The five-year annual average of the 20% most impaired days diminishes the effects of the year to year fluctuations, and as a result, more clearly illustrates the downward trend in visibility impairment. Starting with the 2000 - 2004 average of 8.0 dv and ending with the most recent average of 7.0 dv for 2018 - 2022. The annual and five-year annual average of the 20% most impaired days for 2022 and 2018 – 2022, respectively, are currently below the adjusted glidepath; however, only the annual average of the 20% most impaired days for 2022 is below the unadjusted glidepath.

4.4.5 Mazatzal WA and Pine Mountain WA, AZ (IKBA1)

Figure 10 depicts the annual and five-year average of the 20% most impaired days, the baseline visibility conditions on the 20% clearest days, the natural conditions on the 20% most impaired days, and the unadjusted and adjusted uniform rate of progress lines for the IKBA1 site.

Figure 10: Mazatzal WA and Pine Mountain WA, AZ (IKBA1) 2001-2018 Visibility Impairment Trends



The baseline visibility conditions on the 20% clearest days for Mazatzal WA and Pine Mountain WA is 5.4 dv. The uniform rate of progress line, or glidepath, starts at 11.2 dv and ends at the natural conditions on the 20% most impaired days of 5.2 dv at a rate of 0.1 dv per year, 6.0 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions in the areas by 2064. The adjusted uniform rate of progress line, or adjusted glidepath, starts at 11.2 dv and ends at the adjusted natural conditions on the 20% most impaired days of 7.4 dv at a rate of 0.06 dv per year, 3.8 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions in the areas by 2064. The annual average of the 20% most impaired days has an overall downward trend, beginning at 10.5 dv in 2001[94] and ending with a value of 10.1 dv in 2018. The five-year annual average of the 20% most impaired days diminishes the effects of the year to year fluctuations, and as a result, more clearly illustrates the downward trend in visibility impairment. Starting with the 2001 - 2004 average of 11.2 dv and ending with an average of 9.5 dv for 2014 - 2018[95]. The annual and five-year annual average of the 20% most impaired days for 2018 and 2014 – 2018, respectively, are currently below the adjusted glidepath; however, only the five-year annual average of the 20% most impaired days for 2022 is below the unadjusted glidepath.

There has not been any new data for the IKBA1 site since 2018 due to various controller related issues and part replacements.

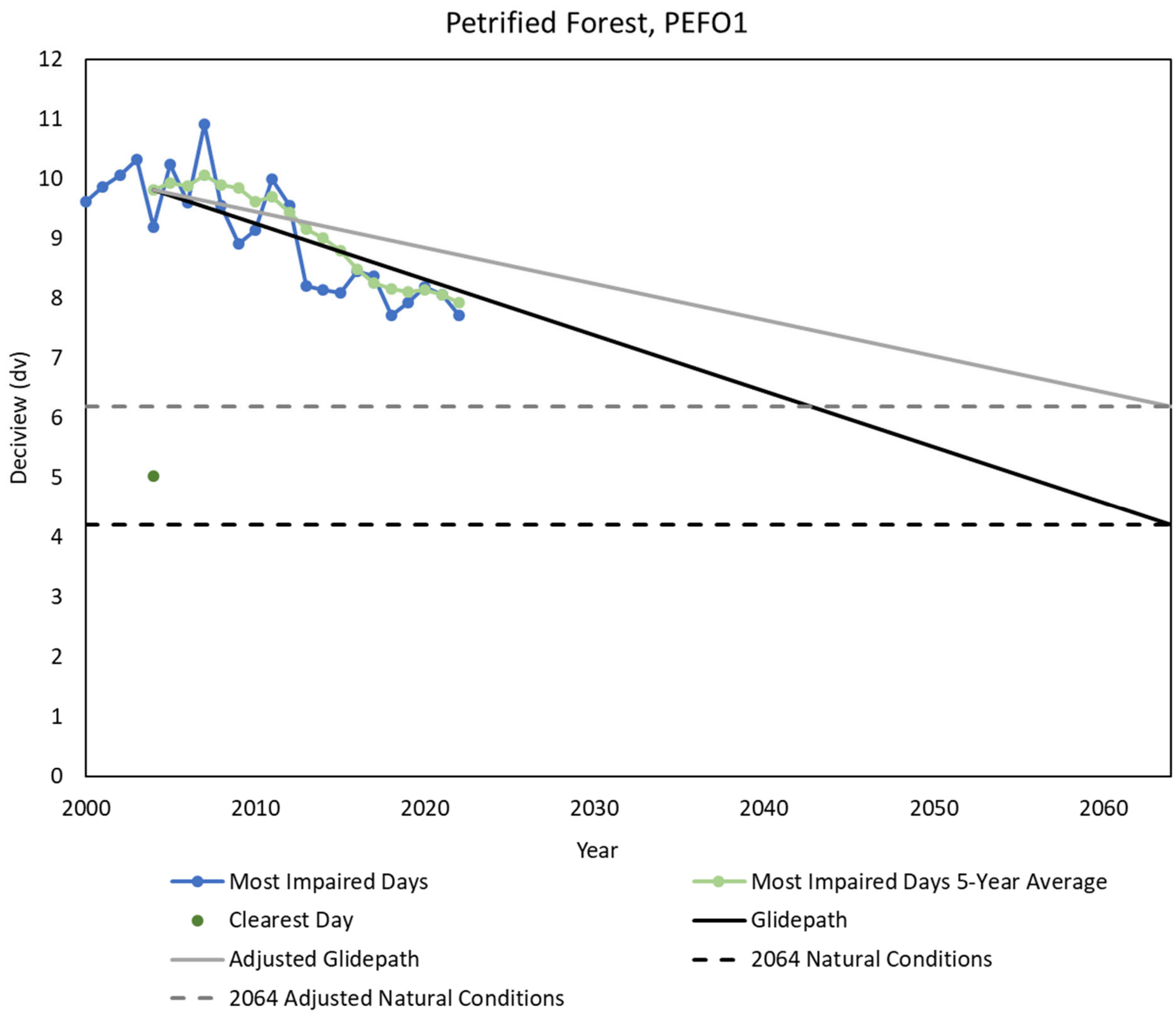
4.4.6 Petrified Forest NP, AZ (PEFO1)

Figure 11 depicts the annual and five-year average of the 20% most impaired days, the baseline visibility conditions on the 20% clearest days, the natural conditions on the 20% most impaired days, and the unadjusted and adjusted uniform rate of progress lines for the PEFO1 site.

Figure 11: Petrified Forest NP, AZ (PEFO1) 2000-2022 Visibility Impairment Trends

[94] Although the monitor was operational in 2000, module flow calibrations were performed throughout the year. Additionally, the site was not operational until March of 2000, thus making 2001 the first full year of operation and data.

[95] For further discussion of the rationale behind certain years and data being utilized for this analysis, refer to section 4.5 Unavailable Visibility Data.

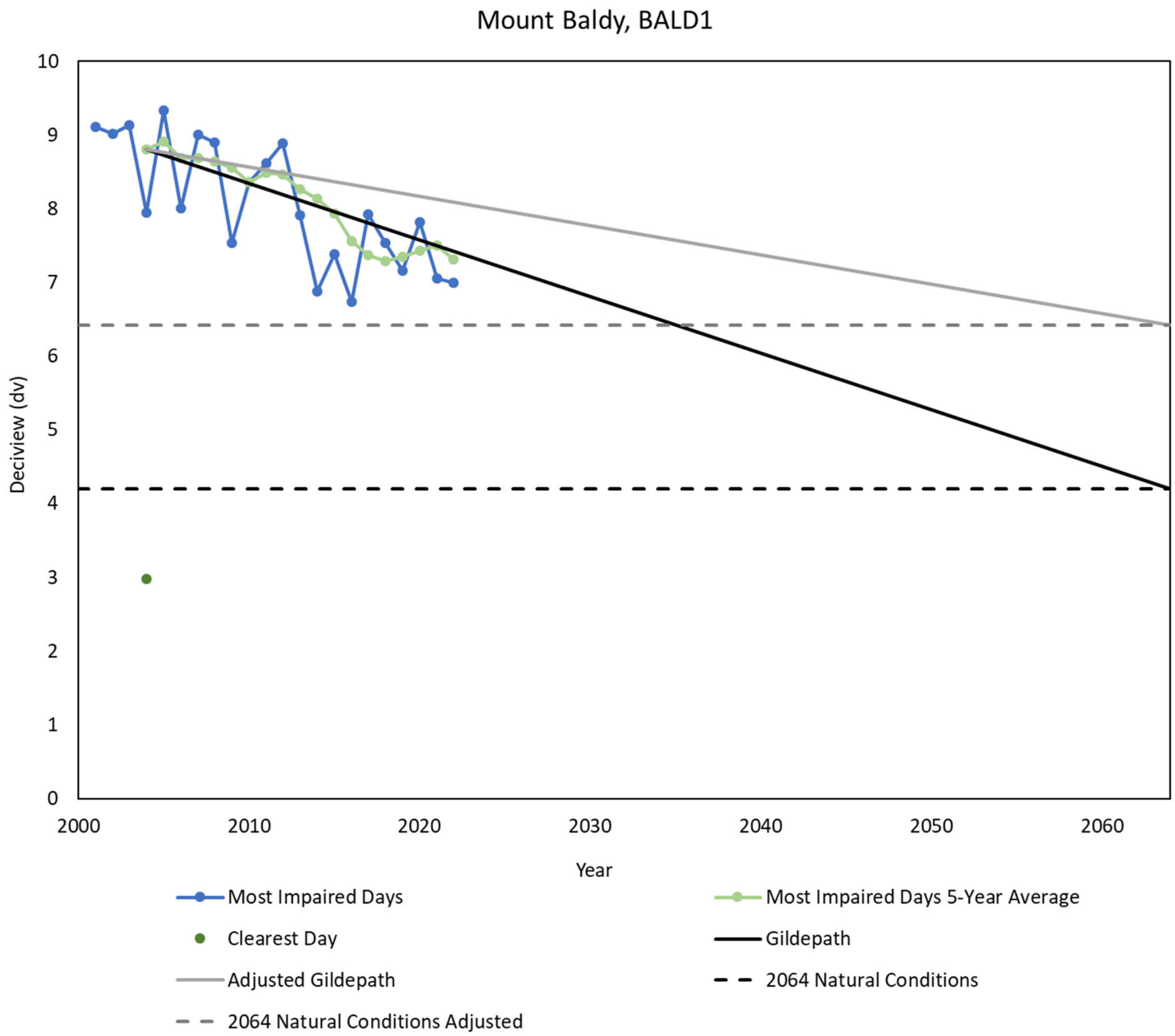


The baseline visibility conditions on the 20% clearest days for Petrified Forest NP is 5.0 dv. The uniform rate of progress line, or glidepath, starts at 9.8 dv and ends at the natural conditions on the 20% most impaired days of 4.2 dv at a rate of 0.09 dv per year, 5.6 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions in the areas by 2064. The adjusted uniform rate of progress line, or adjusted glidepath, starts at 9.8 dv and ends at the adjusted natural conditions on the 20% most impaired days of 6.2 dv at a rate of 0.06 dv per year, 3.6 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions in the areas by 2064. The annual average of the 20% most impaired days has an overall downward trend, beginning at 9.6 dv in 2000 and ending with a value of 7.7 dv in 2022. The five-year annual average of the 20% most impaired days diminishes the effects of the year to year fluctuations, and as a result, more clearly illustrates the downward trend in visibility impairment. Starting with the 2000 - 2004 average of 9.8 dv and ending with the most recent average of 7.9 dv for 2018 - 2022. The annual and five-year annual average of the 20% most impaired days for 2022 and 2018 – 2022, respectively, are currently below the adjusted and unadjusted glidepaths.

4.4.7 Mount Baldy, AZ (BALD1)

Figure 12 depicts the annual and five-year average of the 20% most impaired days, the baseline visibility conditions on the 20% clearest days, the natural conditions on the 20% most impaired days, and the unadjusted and adjusted uniform rate of progress lines for the BALD1 site.

Figure 12: Mount Baldy, AZ (BALD1) 2001-2022 Visibility Impairment Trends



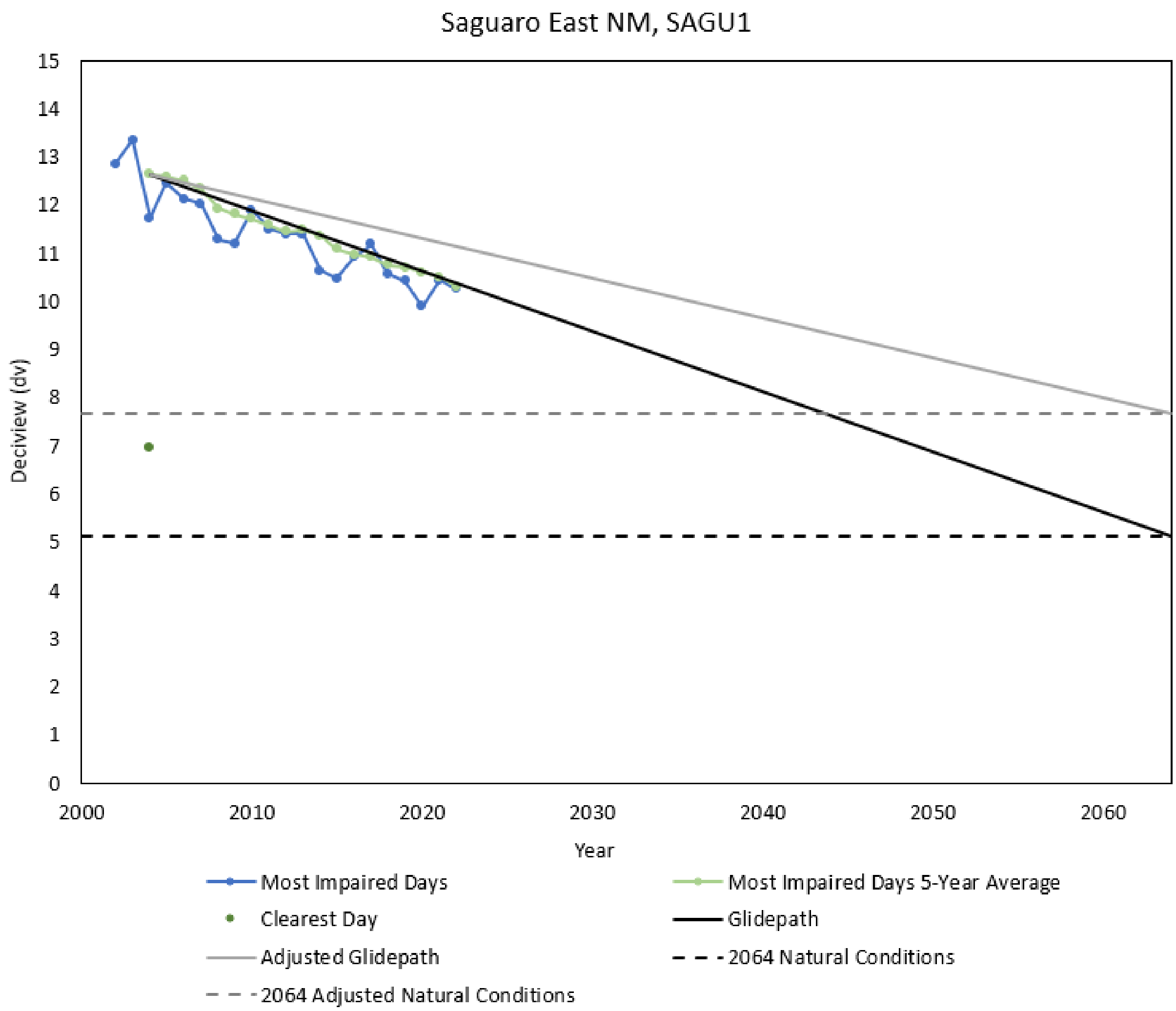
The baseline visibility conditions on the 20% clearest days for Mount Baldy, AZ is 3.0 dv. The uniform rate of progress line, or glidepath, starts at 8.8 dv and ends at the natural conditions on the 20% most impaired days of 4.2 dv at a rate of 0.08 dv per year, 4.60 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions for the area by 2064. The adjusted uniform rate of progress line, or adjusted glidepath, starts at 8.8 dv and ends at the adjusted natural conditions on the 20% most impaired days of 6.4 dv at a rate of 0.04 dv per year, 2.38 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions for the area by 2064. The annual average of the 20% most impaired days has a downward trend, beginning at

9.1 dv in 2001[96] and ending with the most recent value of 7.0 dv in 2022. The five-year annual average of the 20% most impaired days diminishes the effects of the year to year fluctuations, and as a result, more clearly illustrates the trend in visibility impairment. Starting with the 2002 - 2004 average of 8.8 dv and ending with the most recent average of 7.3 dv for 2018 - 2022. The annual and five-year annual average of the 20% most impaired days for 2022 and 2018 – 2022, respectively, are currently below the unadjusted and the adjusted glidepaths.

4.4.8 Saguaro NP, AZ (SAGU1)

Figure 13 depicts the annual and five-year average of the 20% most impaired days, the baseline visibility conditions on the 20% clearest days, the natural conditions on the 20% most impaired days, and the unadjusted and adjusted uniform rate of progress lines for the SAGU1 site.

Figure 13: Saguaro NP East, AZ (SAGU1) 2002-2022 Visibility Impairment Trends



[96] Although the monitor was operational in 2000, module flow calibrations were performed throughout the year. Additionally, the site was not operational until February of 2000, thus making 2001 the first full year of operation and data.

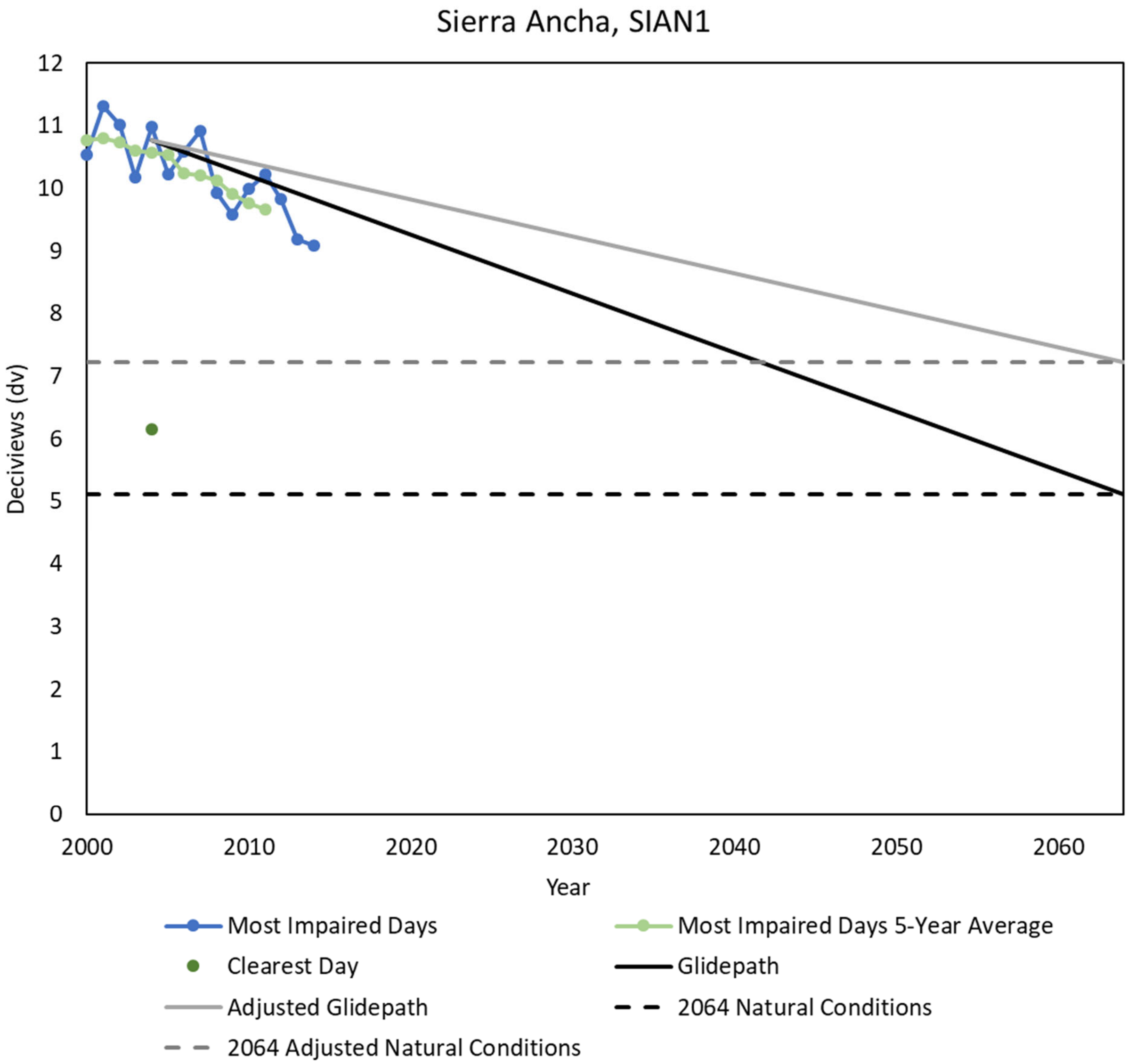
The baseline visibility conditions on the 20% clearest days for Saguaro NP East, AZ is 6.9 dv. The uniform rate of progress line, or glidepath, starts at 12.6 dv and ends at the natural conditions on the 20% most impaired days of 5.1 dv at a rate of 0.12 dv per year, 7.50 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions for the area by 2064. The adjusted uniform rate of progress line, or adjusted glidepath, starts at 12.6 dv and ends at the adjusted natural conditions on the 20% most impaired days of 7.7 dv at a rate of 0.08 dv per year, 4.98 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions for the area by 2064. The annual average of the 20% most impaired days has a downward trend, beginning at 12.8 dv in 2001[97] and ending with the most recent value of 10.2 dv in 2022. The five-year annual average of the 20% most impaired days diminishes the effects of the year to year fluctuations, and as a result, more clearly illustrates the trend in visibility impairment. Starting with the 2002 - 2004 average of 12.6 dv and ending with the most recent average of 10.3 dv for 2018 - 2022. The annual and five-year annual average of the 20% most impaired days for 2022 and 2018 – 2022, respectively, are currently below the unadjusted and the adjusted glidepaths.

4.4.9 Sierra Ancha WA, AZ (SIAN1)

Figure 14 depicts the annual and five-year average of the 20% most impaired days, the baseline visibility conditions on the 20% clearest days, the natural conditions on the 20% most impaired days, and the unadjusted and adjusted uniform rate of progress lines for the SIAN1 site.

Figure 14: Sierra Ancha WA, AZ (SIAN1) 2001-2015 Visibility Impairment Trends

[97] Starting in August of 2000 the site was offline until April of 2021.



The baseline visibility conditions on the 20% clearest days for Sierra Ancha WA, AZ is 6.2 dv. The uniform rate of progress line, or glidepath, starts at 10.8 dv and ends at the natural conditions on the 20% most impaired days of 5.1 dv at a rate of 0.09 dv per year, 5.65 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions for the area by 2064. The adjusted uniform rate of progress line, or adjusted glidepath, starts at 10.8 dv and ends at the adjusted natural conditions on the 20% most impaired days of 7.2 dv at a rate of 0.06 dv per year, 3.53 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions for the area by 2064. The annual average of the 20% most impaired days has a downward trend, beginning at 10.5 dv in 2001 and ending with the most recent value of 9.1 dv in 2015[98]. The five-year annual average of the 20% most impaired days diminishes the effects of the year to year fluctuations, and as a result, more clearly illustrates the trend in visibility impairment. Starting with the 2001 - 2004 average of 9.7 dv and ending with the most recent average of 8.0 dv for 2011 - 2015. The annual and five-year annual

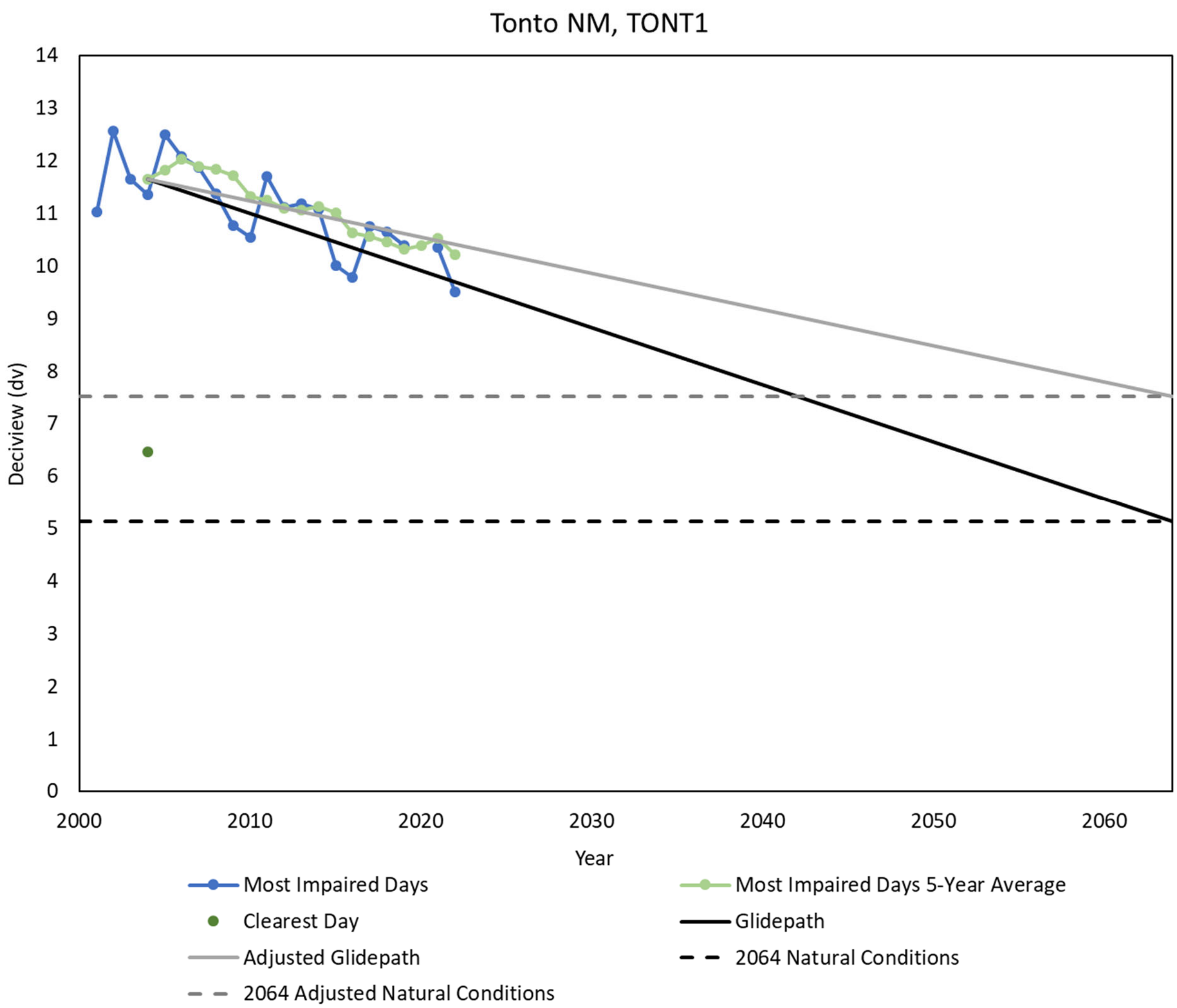
[98] For further discussion of the rationale behind certain years and data being utilized for this analysis, refer to section 4.5 Unavailable Visibility Data.

average of the 20% most impaired days for 2015 and 2011 – 2015, respectively, are currently below the unadjusted and the adjusted glidepaths.

4.4.10 Superstition WA, AZ (TONT1)

Figure 15 depicts the annual and five-year average of the 20% most impaired days, the baseline visibility conditions on the 20% clearest days, the natural conditions on the 20% most impaired days, and the unadjusted and adjusted uniform rate of progress lines for the TONT1 site.

Figure 15: Superstition WA, AZ (TONT1) 2001-2022 Visibility Impairment Trends



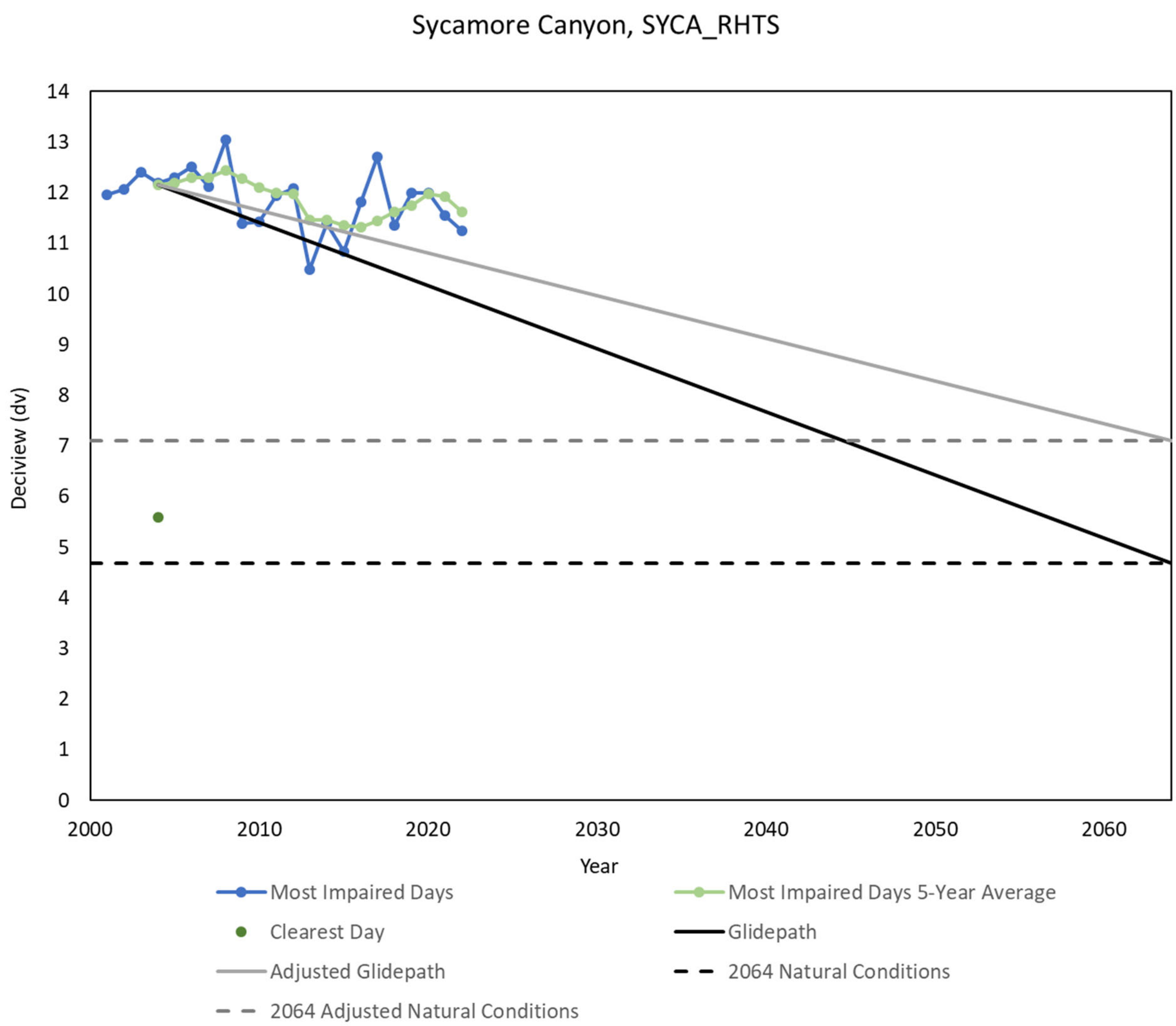
The baseline visibility conditions on the 20% clearest days for Superstition WA, AZ is 6.5 dv. The uniform rate of progress line, or glidepath, starts at 11.7 dv and ends at the natural conditions on the 20% most impaired days of 5.1 dv at a rate of 0.11 dv per year, 6.51 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions for the area by 2064. The adjusted uniform rate of progress line, or adjusted glidepath, starts at 11.7 dv and ends at the adjusted natural conditions on the 20% most impaired days of 7.5 dv at a rate of 0.07 dv per year, 4.13 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions for the area by 2064. The annual average of the 20% most impaired days has a downward trend, beginning at

11.0 dv in 2001 and ending with the most recent value of 9.5 dv in 2022. The five-year annual average of the 20% most impaired days diminishes the effects of the year to year fluctuations, and as a result, more clearly illustrates the trend in visibility impairment. Starting with the 2001 - 2004 average of 11.7 dv and ending with the most recent average of 10.2 dv for 2018 - 2022. The annual and five-year annual average of the 20% most impaired days for 2022 and 2018 – 2022, respectively, are currently below the adjusted glidepath; however, only the annual average of the 20% most impaired days for 2022 is below the unadjusted glidepath.

4.4.11 Sycamore Canyon WA, AZ (SYCA_RHTS)

Figure 16 depicts the annual and five-year average of the 20% most impaired days, the baseline visibility conditions on the 20% clearest days, the natural conditions on the 20% most impaired days, and the unadjusted and adjusted uniform rate of progress lines for the SYCA_RHTS site.

Figure 16: Sycamore Canyon WA, AZ (SYCA_RHTS) 2001-2022 Visibility Impairment Trends



The baseline visibility conditions on the 20% clearest days for Sycamore Canyon WA, AZ is 5.6 dv. The uniform rate of progress line, or glidepath, starts at 12.2 dv and ends at the natural conditions on the

20% most impaired days of 4.7 dv at a rate of 0.12 dv per year, 7.48 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions for the area by 2064. The adjusted uniform rate of progress line, or adjusted glidepath, starts at 12.2 dv and ends at the adjusted natural conditions on the 20% most impaired days of 7.1 dv at a rate of 0.08 dv per year, 5.06 dv divided by 60 years, which is the rate that would need to be maintained to reach natural visibility conditions for the area by 2064. The annual average of the 20% most impaired days has a slight downward trend, beginning at 12.0 dv in 2001 and ending with the most recent value of 11.2 dv in 2022. The five-year annual average of the 20% most impaired days diminishes the effects of the year to year fluctuations, and as a result, more clearly illustrates the trend in visibility impairment. Starting with the 2001 - 2004 average of 12.2 dv and ending with the most recent average of 11.6 dv for 2018 - 2022. The annual and five-year annual average of the 20% most impaired days for 2022 and 2018 – 2022, respectively, are currently above the unadjusted and the adjusted glidepaths.

4.4.11.1 Discussion of Visibility Trends at Sycamore Canyon WA, AZ (SYCA_RHTS)

As discussed in the 2022 Arizona regional haze SIP revision, 40 CFR § 51.308(f)(3)(ii)(A) requires that if a state adopts a reasonable progress goal (RPG) for the most impaired days that results in a slower rate of visibility improvement than the uniform rate of progress (URP), meaning the RPG for a given Class I area is above the URP glidepath, the state must:

> Demonstrate, based on the [Long Term Strategy (LTS)] analysis, . . . that there are no additional emission reduction measures for anthropogenic sources or groups of sources in the State that may reasonably be anticipated to contribute to visibility impairment in the Class I area *that would be reasonable* to include in the long-term strategy.[99] [emphasis added]

For the 2018-2028 planning period covered by the Arizona 2022 regional haze plan, all but one Arizona IMPROVE monitor are projected to have RPGs for the most impaired days that provide for a greater rate of visibility improvement than the adjusted URP. The only site with a lower rate of visibility progress than the adjusted URP is the SYCA_RHTS monitor, which serves as the IMPROVE visibility monitor for the Sycamore Canyon Wilderness Class I area.

With its analysis in Section 10.1 of the 2022 plan, ADEQ has provided the "robust demonstration" required under the regional haze rule that no additional emission reduction measures would be reasonable to include in the LTS due to the "slower-than-URP" rate of visibility improvement at the Sycamore Canyon monitor.[100]

ADEQ conducted a detailed analysis of visibility data at the Sycamore site to demonstrate that its slower rate of progress results from significant increases in light extinction from coarse mass and soil emissions, which did not occur at any other Arizona Class I area monitoring site over the analysis period. ADEQ then discusses local factors that demonstrate why recent trends at the site are unrepresentative of long-term emission and visibility trends in the area and why it is therefore unreasonable to require additional controls in order to control emissions impacting this site.

[99] 40 CFR § 51.308(f)(3)(ii)(A).
[100] ADEQ, State Implementation Plan Revision: Regional Haze Program (2018-2028), page 101-106.

There was a substantial increase in coarse mass and soil impairment at this site following the relocation of the Sycamore monitor in 2015, with the new monitor located outside of the boundaries of the Sycamore Canyon Class I area and closer to residential development and rural unpaved roads.

Between 2016 and 2019, coarse mass extinction trended downward at the Sycamore site, while soil total extinction trended upwards over the same period. Since 2020, the site has seen a return to declining visibility impairment. These mixed trends in particulate matter impairment, as well as significant decreases in impairment from all other pollutants analyzed for the Sycamore site, suggest that the spike in particulate impairment seen at the site after monitor relocation is not representative of longer-term emission and visibility trends in the area.

As discussed in the 2022 regional haze plan, “Arizona wishes to further investigate the large coarse mass impact at this Class I Federal area following its relocation,” and notes that the soil and coarse mass impact at Sycamore is far out of line with the trends for these pollutants at other areas, further suggesting that the irregular data is not yet cause for further control investigation. ADEQ will continue to monitor and investigate the source of coarse mass impacts at the new Sycamore Canyon monitor site during subsequent progress reports and periodic comprehensive Regional Haze SIP revisions.

4.5 Unavailable Visibility Data

Note that complete visibility data is not available for the Ike's Backbone (IKBA1) and Sierra Ancha (SIAN1) monitors from 2018 to 2022. The reasons for this missing data are described below.

4.5.1 Missing Data from the Ike's Backbone (IKBA1) Monitor

This monitoring site, located in Yavapai County near the Mazatzal Wilderness and Pine Mountain Wilderness Class I areas, did not have enough valid samples from 2018 through 2022 to generate complete data statistics for those years.

In 2018, the site was inaccessible for several months because of fires in the area. In 2019, 20 samples were lost during and following the government shutdown. Then, the site was not serviced at all from early 2020 through the end of 2022 due to Covid-19 restrictions. As of December 2022, the IKBA1 site is back up and running.

4.5.2 Missing Data from the Sierra Ancha (SIAN1) monitor

This monitoring site, located in Gila County near the Sierra Ancha Wilderness Class I area, did not have enough valid samples from 2018 through 2022 to generate complete data statistics for those years.

5 Statewide Emission Trends in Arizona

Under the regional haze progress report requirements, 40 CFR § 51.308(g)(4) requires an analysis of the change in emissions of pollutants contributing to visibility impairment in each state.[101]

5.1 Analysis of Change in Emissions of Visibility-Impairing Pollutants

This progress report provides detailed emission inventories of visibility impairing pollutants in Arizona from all relevant sources and activities.

In these inventories, ADEQ provides estimates for NOx, SO_2, PM_{10}, $PM_{2.5}$, NH_3, and VOCs from both National Emission Inventory (NEI) sources and CAMPD sources. Each of these pollutants has the potential to contribute to visibility impairment at Arizona Class I areas.

This section provides a high-level summary of the trends in emissions of each pollutant, grouped based on the EPA NEI source categories. The groups ADEQ used for this analysis are presented in Table 19 below.

Table 19: NEI Emission Sources Grouped by Category

Group	Section
Agriculture	Agriculture - Crops & Livestock Dust
	Agriculture - Fertilizer Application
	Agriculture - Livestock Waste
Biogenic	Biogenics - Vegetation and Soil
Bulk Gasoline Terminals	Bulk Gasoline Terminals
Commercial Cooking	Commercial Cooking
Dust	Dust - Construction Dust
	Dust - Paved Road Dust
	Dust - Unpaved Road Dust
Fires	Fires - Agricultural Field Burning
	Fires - Prescribed Fires
	Fires - Wildfires
Fuel Combustion	Fuel Comb - Comm/Institutional - Biomass
	Fuel Comb - Comm/Institutional - Coal
	Fuel Comb - Comm/Institutional - Natural Gas
	Fuel Comb - Comm/Institutional - Oil
	Fuel Comb - Comm/Institutional - Other
	Fuel Comb - Electric Generation - Biomass
	Fuel Comb - Electric Generation - Coal
	Fuel Comb - Electric Generation - Natural Gas
	Fuel Comb - Electric Generation - Oil

[101] 40 CFR § 51.308(g)(4).

Group	Section
	Fuel Comb - Electric Generation - Other
	Fuel Comb - Industrial Boilers, ICEs - Biomass
	Fuel Comb - Industrial Boilers, ICEs - Coal
	Fuel Comb - Industrial Boilers, ICEs - Natural Gas
	Fuel Comb - Industrial Boilers, ICEs - Oil
	Fuel Comb - Industrial Boilers, ICEs - Other
	Fuel Comb - Residential - Natural Gas
	Fuel Comb - Residential - Oil
	Fuel Comb - Residential - Other
	Fuel Comb - Residential - Wood
Gas Stations	Gas Stations
Industrial Processes	Industrial Processes - Cement Manufacturing
	Industrial Processes - Chemical Manufacturing
	Industrial Processes - Ferrous Metals
	Industrial Processes - Mining
	Industrial Processes - NEC
	Industrial Processes - Non-ferrous Metals
	Industrial Processes - Oil & Gas Production
	Industrial Processes - Petroleum Refineries
	Industrial Processes - Pulp & Paper
	Industrial Processes - Storage and Transfer
Miscellaneous Non-Industrial NEC	Miscellaneous Non-Industrial NEC
Mobile	Mobile - Aircraft
	Mobile - Locomotives
	Mobile - Non-Road Equipment - Diesel
	Mobile - Non-Road Equipment - Gasoline
	Mobile - Non-Road Equipment - Other
	Mobile - On-Road Diesel Heavy Duty Vehicles
	Mobile - On-Road Diesel Light Duty Vehicles
	Mobile - On-Road non-Diesel Heavy Duty Vehicles
	Mobile - On-Road non-Diesel Light Duty Vehicles
Solvent	Solvent - Consumer & Commercial Solvent Use
	Solvent - Degreasing
	Solvent - Dry Cleaning
	Solvent - Graphic Arts
	Solvent - Industrial Surface Coating & Solvent Use
	Solvent - Non-Industrial Surface Coating
Waste Disposal	Waste Disposal

Section 6 will provide further policy discussion of the causes of major changes in emissions, including an assessment of whether these changes were expected and whether the change will impact Arizona's ability to achieve its reasonable progress goals.

5.2 Statewide Emission Trends

Overall, emissions of visibility impairing pollutants in Arizona have decreased by 57% between 2014 and 2020. Analysis of the data presented in

Figure 17,

Figure 18, and Table 20 reveals several trends in statewide emission totals over this period, namely:

1) VOC emissions, including both anthropogenic and biogenic emissions, represent the largest contributor to total emissions of visibility impairing pollutants,
2) Total VOC emissions have decreased by 67%,
3) NO_x emissions have decreased by 37%
4) SO_2 emissions have decreased by 62%,
5) PM_{10} emissions have decreased by 41%,
6) $PM_{2.5}$ emissions increased by 2% overall while anthropogenic emissions decreased by 41%, and
7) NH_3 emissions have increased by 127%.

Further analysis of these trends is presented in the pollutant-specific subsections below, as well as the policy discussion in Section 6.

Figure 17: Statewide Emission Trends by Pollutant

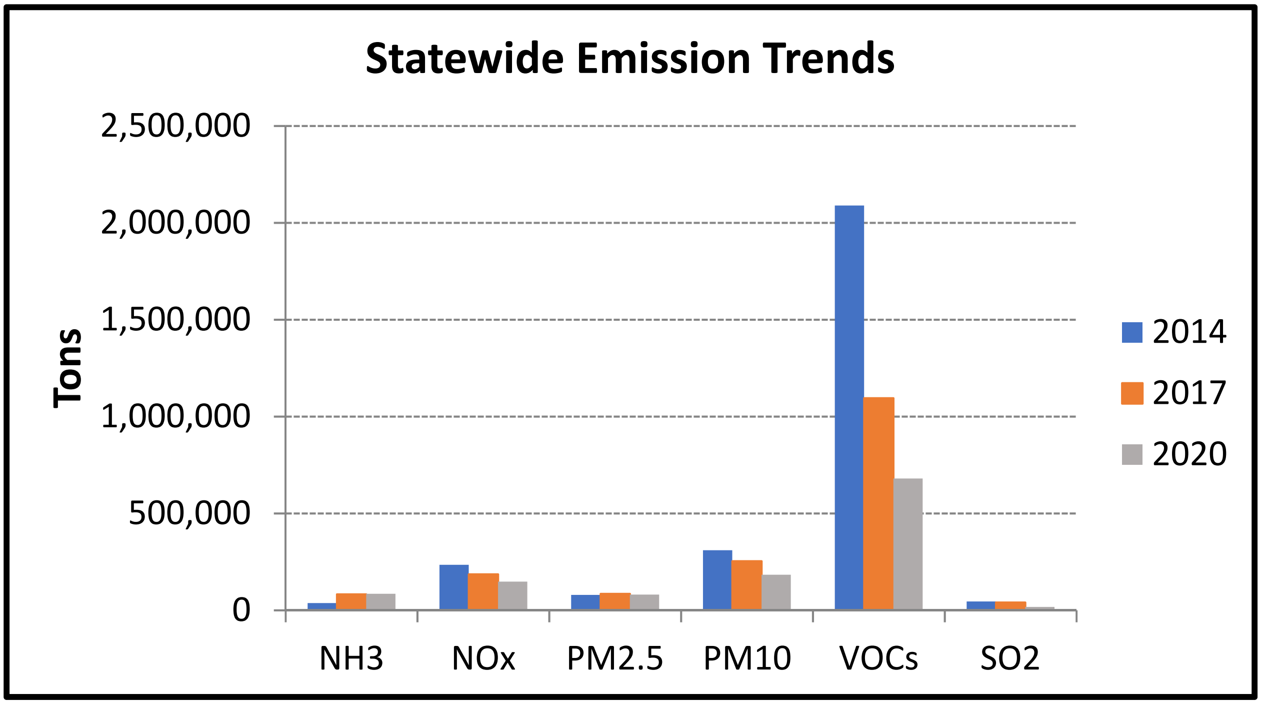


Figure 18: Statewide Emission Trends by Year

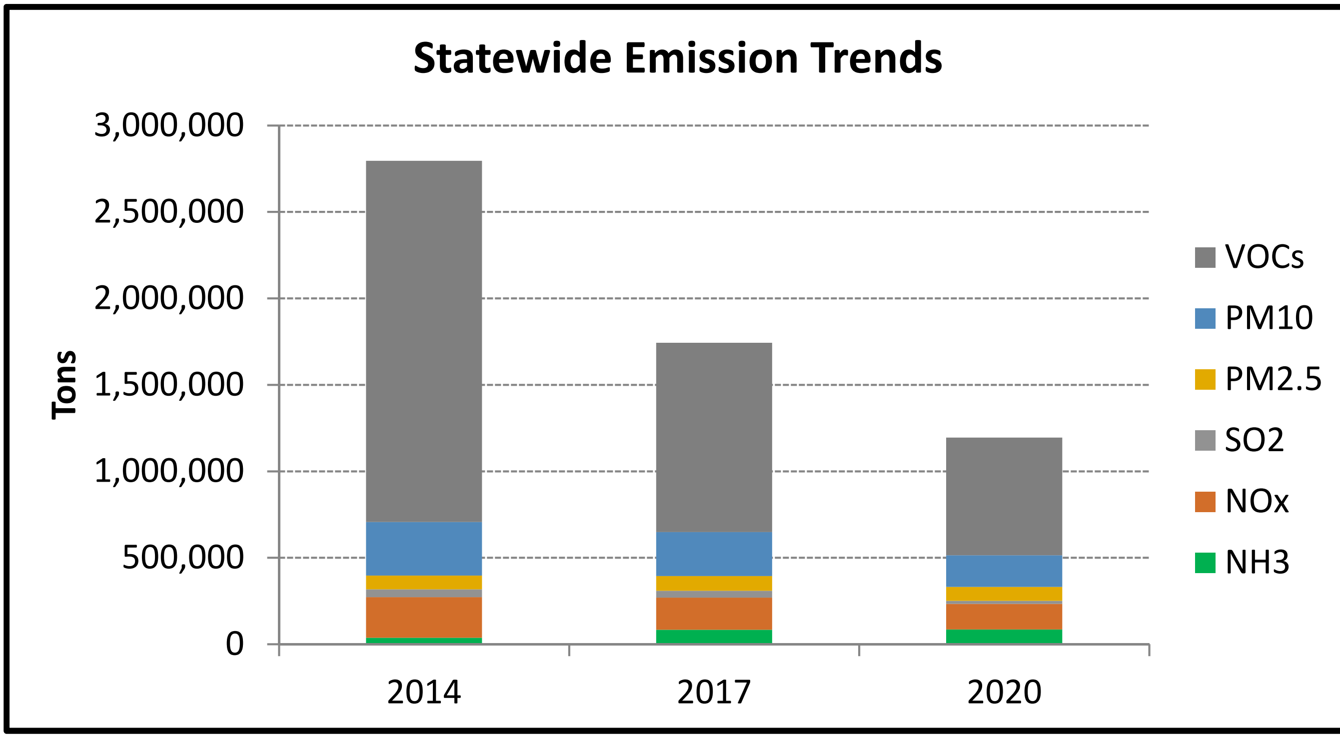


Table 20: Statewide Emission Trend Data

(Unit: Ton)	NH_3	NOx	$PM_{2.5}$	PM_{10}	VOCs	SO_2
2014	37,419	234,388	78,969	310,175	2,089,362	45,590
2017	82,961	185,732	84,885	253,695	1,095,420	40,578
2020	85,107	147,990	80,611	183,742	680,519	17,102
% Change 2014 to 2020	**127%**	**-37%**	**2%**	**-41%**	**-67%**	**-62%**

5.3 Analysis of Change in Emissions of NO_x

Figure 19 below displays the trend in NOx emissions in Arizona from 2014-2020, based on NEI source categories. Table 21 provides the change in emissions for each sector category, by tons and percent change.

Figure 19: NOx Emission Trends in Arizona from NEI, 2014-2020

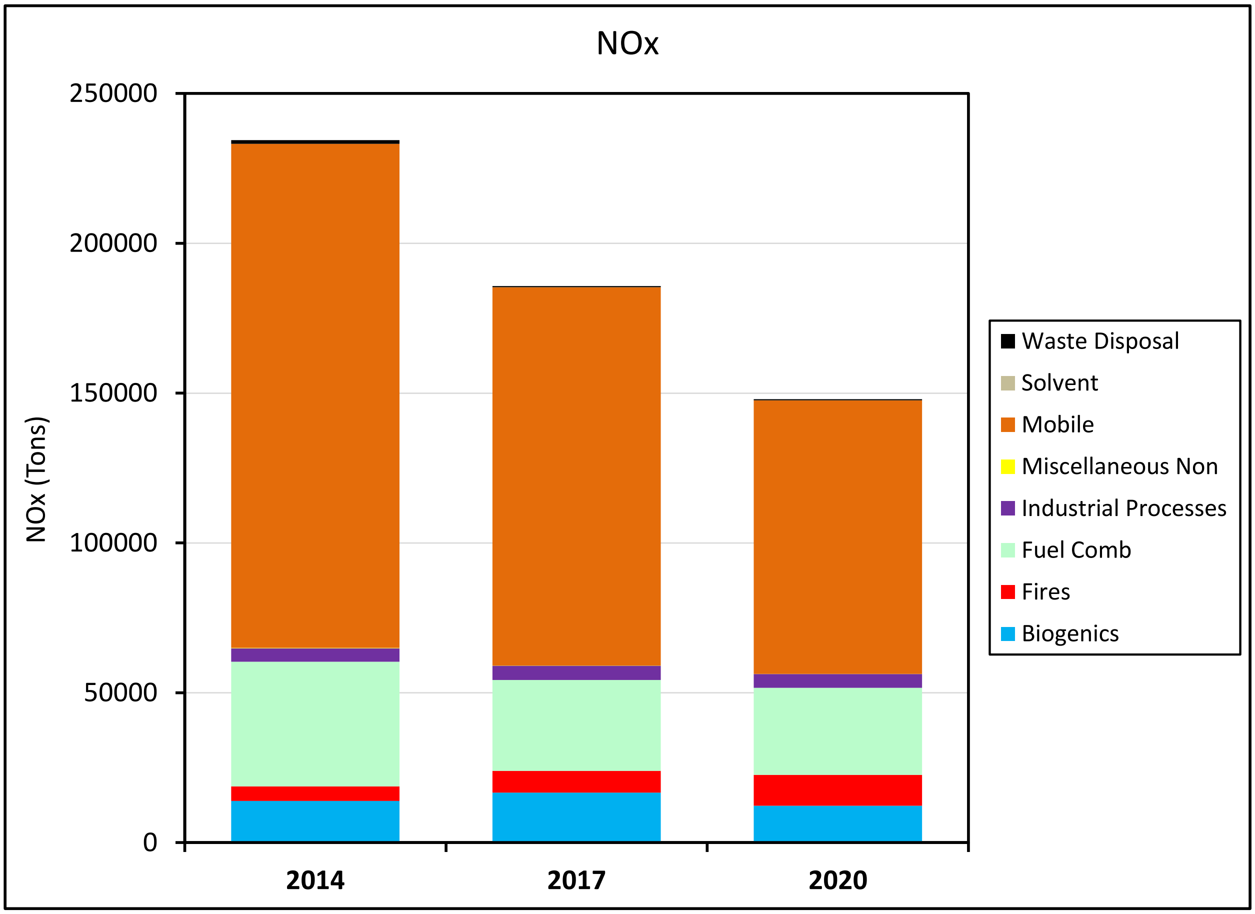


Table 21: NOx Emissions in Arizona from all NEI Categories, 2014-2020 (Tons)

Source	2014	2017	2020	NOx Change (2014-2020)	Percent NOx Change (2014-2020)
Biogenic*	13912	16680	12292	-1620	-12%
Fires*	4853	7211	10327	5474	113%
Fuel Comb**	41560	30415	29022	-12538	-30%
Industrial Processes	4557	4748	4638	81	2%
Miscellaneous Non-Industrial NEC	125	63	67	-58	-46%
Mobile	168150	126270	91272	-76878	-46%
Solvent	4	8	5	1	25%
Waste Disposal	1227	337	367	-860	-70%
Anthropogenic Emissions	**215623**	**161841**	**125371**	**-90252**	**-42%**
Total	**234388**	**185732**	**147990**	**-86398**	**-37%**

Note: *Emissions from "Biogenic" and "Fires" are considered natural emissions. Emissions from the other groups are considered anthropogenic emissions

** "Fuel Combustion" emissions include the emission data from Electrical Generating Units (EGUs) that report data to the CAMPD and are discussed in more detail in Section 3.1, NOx & SO2 from All Arizona EGUs.

From 2014 to 2020, NOx emissions in Arizona exhibited a decline of 37%. Notably, there were especially large percent reductions in emissions from the mobile source, fuel combustion, and waste disposal sectors. Among these, the mobile and fuel combustion sectors emerged as the primary contributors to total tons of NOx emission reductions. Further discussion of these trends is provided in Section 6.

5.4 Analysis of Change in Emissions of SO_2

Figure 20 below displays the trend in SO_2 emissions in Arizona from 2014-2020, based on NEI source categories. Table 23 provides the change in emissions for each sector category, by tons and percent change.

Figure 20: SO_2 Emission Trends in Arizona from NEI, 2014-2020

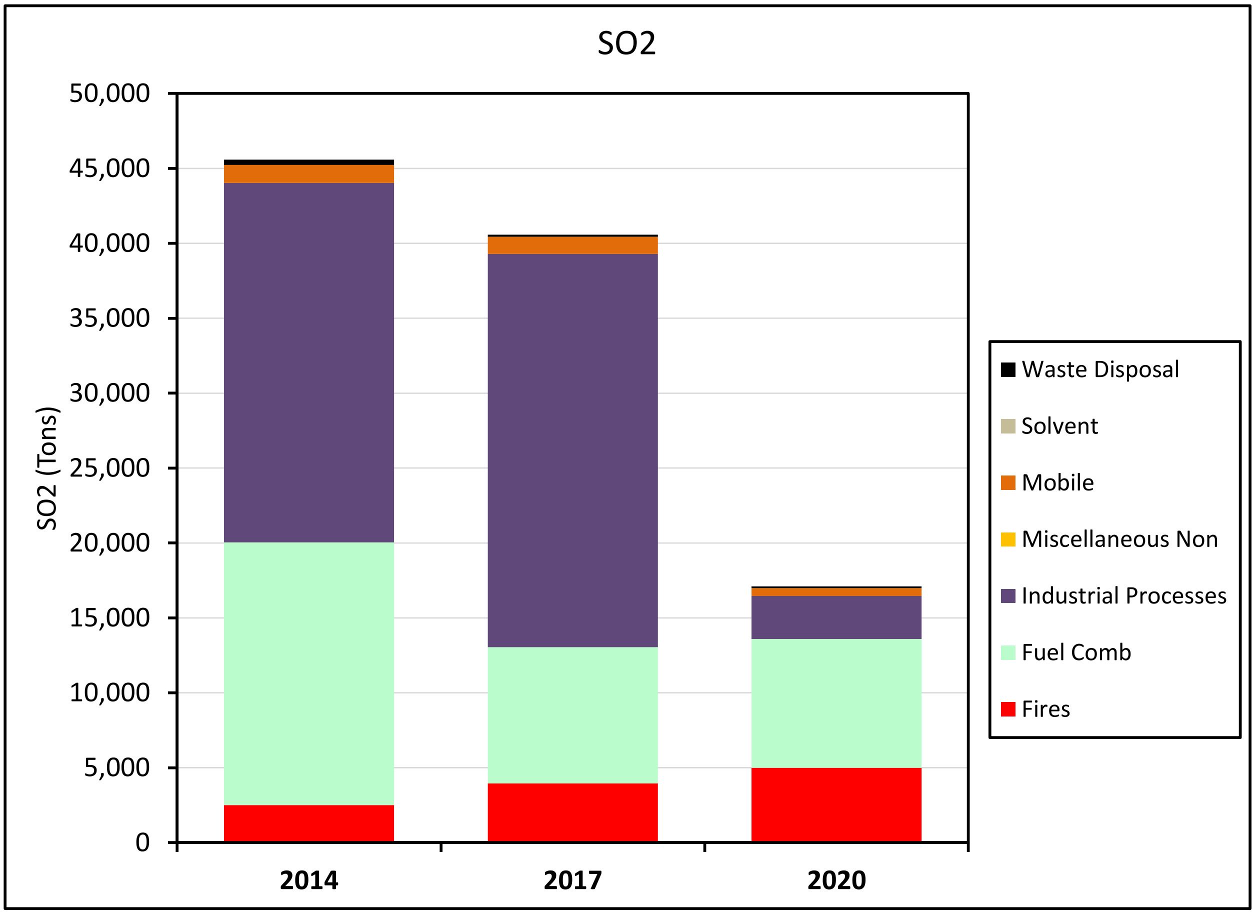


Table 22: SO_2 Emissions in Arizona from all NEI Categories, 2014-2020 (Tons)

Source	2014	2017	2020	SO_2 Change (2014-2020)	Percent SO_2 Change (2014-2020)
Fires*	2508	3958	4987	2479	99%
Fuel Comb	17537	9094	8594	-8943	-51%
Industrial Processes	23996	26241	2881	-21115	-88%
Miscellaneous Non-Industrial NEC	3	2	4	1	33%
Mobile	1189	1140	523	-666	-56%
Solvent	0	0	0	0	
Waste Disposal	357	143	113	-244	-68%
Anthropogenic Emissions	**43082**	**36620**	**12115**	**-30967**	**-72%**
Total	**45590**	**40578**	**17102**	**-28488**	**-62%**

Note: *Emissions from "Fires" are considered natural emissions. Emissions from the other groups are considered anthropogenic emissions

** "Fuel Combustion" emissions include the emission data from Electrical Generating Units (EGUs) that report data to the CAMPD and are discussed in more detail in Section 3.1, NOx & SO2 from All Arizona EGUs.

SO_2 emissions in Arizona decreased by 62% over the period from 2014-2020 based on NEI data. The largest emission reductions were from point sources in the industrial processes and fuel combustion sectors. Further discussion of these trends is provided in Section 6.

5.5 Analysis of Change in Emissions of PM_{10}

Figure 21 below displays the trend in PM_{10} emissions in Arizona from 2014-2020, based on NEI source categories.

Table 23 provides the change in emissions for each sector category, by tons and percent change.

Figure 21: PM_{10} Emission Trends in Arizona from NEI, 2014-2020

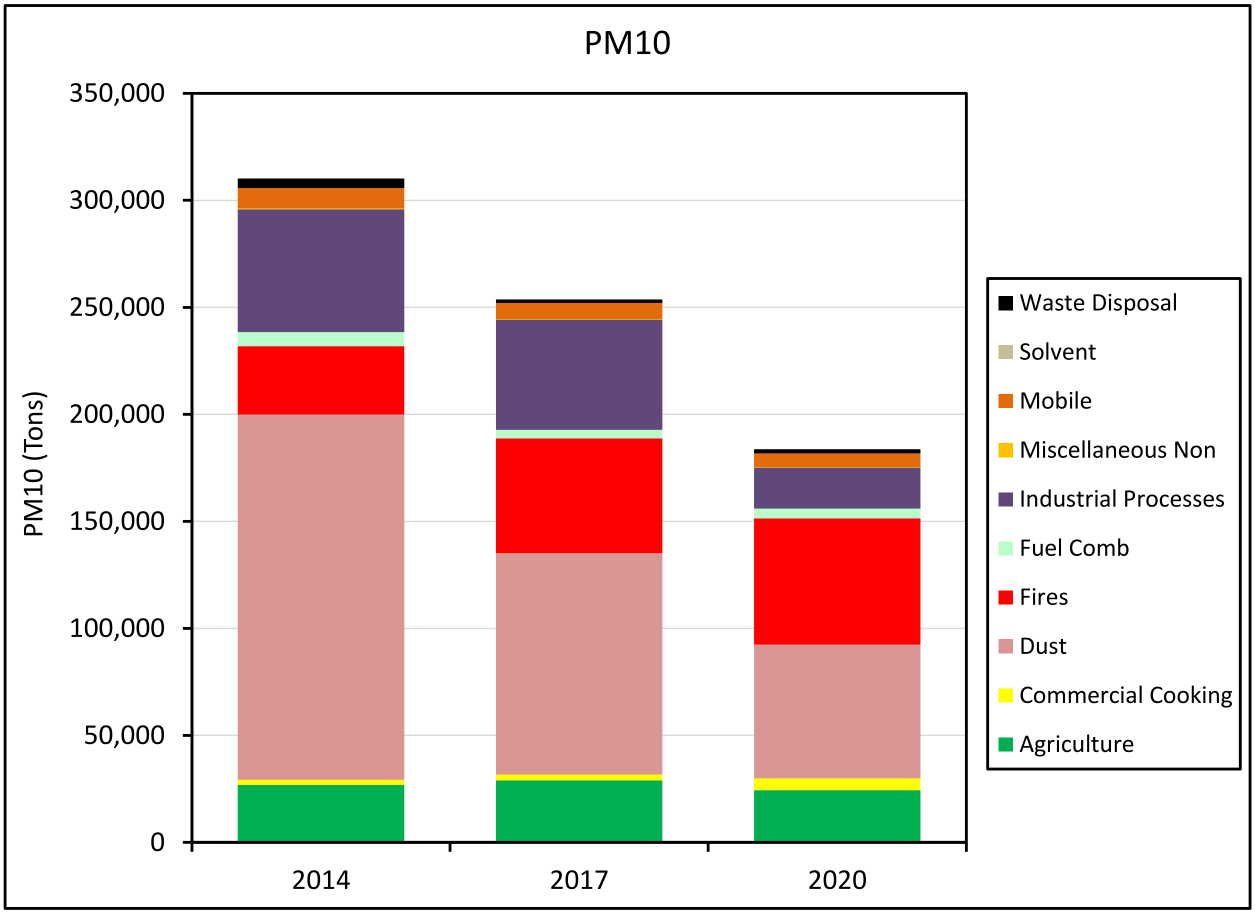


Table 23: PM_{10} Emissions in Arizona from all NEI Categories, 2014-2020 (Tons)

Source	2014	2017	2020	PM_{10} Change (2014-2020)	Percent PM_{10} Change (2014-2020)
Fires*	31880	53569	58972	27092	85%
Agriculture	26838	28994	24377	-2461	-9%
Commercial Cooking	2459	2765	5535	3076	125%
Dust	170698	103433	62495	-108203	-63%
Fuel Comb	6560	4017	4646	-1914	-29%
Industrial Processes	57382	51496	19084	-38298	-67%
Miscellaneous Non-Industrial NEC	334	352	310	-24	-7%

Source	2014	2017	2020	PM_{10} Change (2014-2020)	Percent PM_{10} Change (2014-2020)
Mobile	9601	7431	6363	-3238	-34%
Solvent	0	1	4	4	-
Waste Disposal	4423	1637	1956	-2467	-56%
Anthropogenic Emissions	**278295**	**200126**	**124770**	**-153525**	**-55%**
Total	**310175**	**253695**	**183742**	**-126433**	**-41%**

Note: *Emissions from "Fires" are considered natural emissions. Emissions from the other groups are considered anthropogenic emissions

Anthropogenic PM_{10} emissions in Arizona decreased by 55% over the period from 2014-2020 based on NEI data, while overall emissions declined by 41%. The largest decreases were in the dust, industrial process, waste disposal, and mobile source sectors. Further discussion of these trends is provided in Section 6.

5.6 Analysis of Change in Emissions of $PM_{2.5}$

Figure 22 below displays the trend in $PM_{2.5}$ emissions in Arizona from 2014-2020, based on NEI source categories.

Table 24 provides the change in emissions for each sector category, by tons and percent change.

Figure 22: $PM_{2.5}$ Emission Trends in Arizona from NEI, 2014-2020

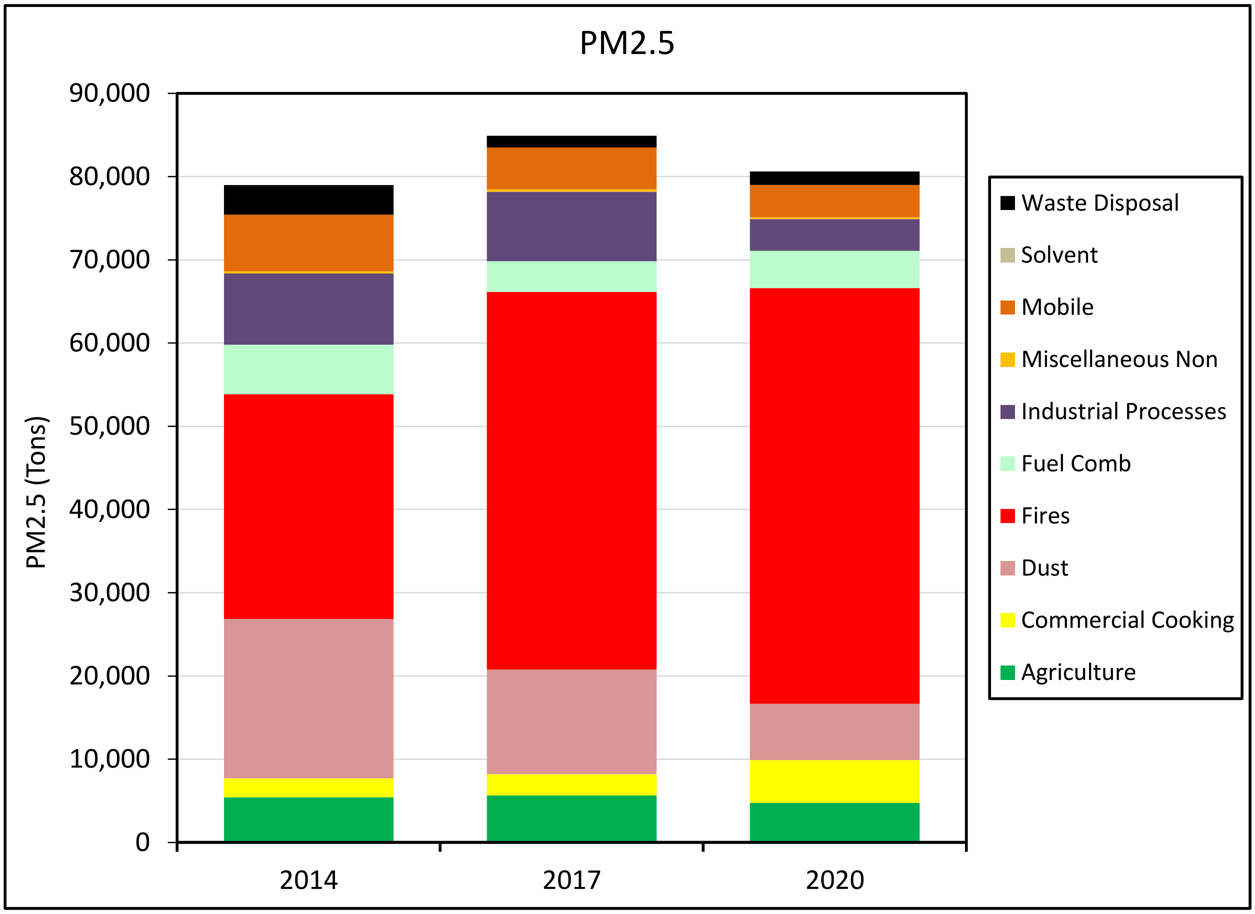


Table 24: $PM_{2.5}$ Emissions in Arizona from all NEI Data Categories, 2014-2020 (Tons)

Source	2014	2017	2020	$PM_{2.5}$ Change (2014-2020)	Percent $PM_{2.5}$ Change (2014-2020)
Fires*	27009	45362	49958	22949	85%
Agriculture	5420	5630	4748	-672	-12%
Commercial Cooking	2276	2563	5142	2866	126%
Dust	19145	12571	6759	-12386	-65%
Fuel Comb	5941	3706	4470	-1471	-25%
Industrial Processes	8564	8324	3804	-4760	-56%

Miscellaneous Non- Industrial NEC	265	286	246	-19	-7%
Mobile	6812	5047	3875	-2937	-43%
Solvent	0	1	4	4	
Waste Disposal	3537	1395	1605	-1932	-55%
Anthropogenic Emissions	**51960**	**39523**	**30653**	**-21307**	**-41%**
Total	**78969**	**84885**	**80611**	**1642**	**2%**

Note: *Emissions from "Fires" are considered natural emissions. Emissions from the other groups are considered anthropogenic emissions

From 2014 to 2020, total $PM_{2.5}$ emissions in Arizona showed a slight overall increase of 2%. This net increase of total emissions is overwhelmingly due to increased $PM_{2.5}$ from wildfires, with tonnage of wildfire emissions outweighing significant reductions from other sectors.

Over the same period, anthropogenic $PM_{2.5}$ emissions in Arizona showed an overall decrease of 41%. The largest reductions in $PM_{2.5}$ emissions were from the fugitive dust sector, particularly unpaved road and construction dust; the industrial processes sector; and mobile sources, especially onroad heavy duty (HD) diesel vehicles.

These reductions in manmade emissions nearly outweigh the overall increase in $PM_{2.5}$ emissions and fully outweigh the anthropogenic increases in emissions, when wildfire is excluded. Further discussion of these trends is provided in Section 6.

5.7 Analysis of Change in Emissions of Ammonia (NH_3)

Figure 23 below displays the trend in NH_3 emissions in Arizona from 2014-2020, based on NEI source categories.

Table 25 provides the change in emissions for each sector category, by tons and percent change.

Figure 23: NH_3 Emission Trends in Arizona from NEI, 2014-2020

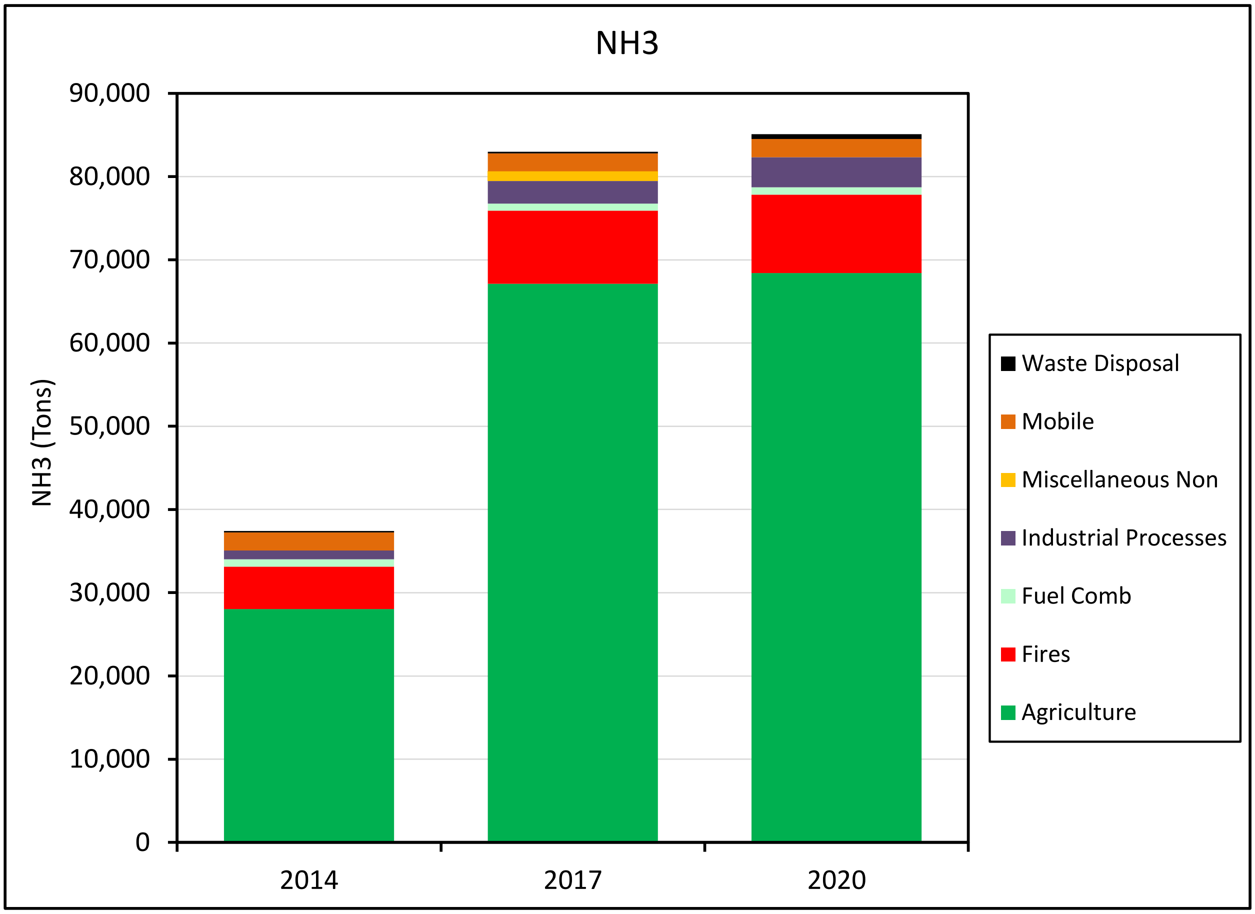


Table 25: NH_3 Emissions in Arizona from all NEI Categories, 2014-2020 (Tons)

Source	2014	2017	2020	NH_3 Change (2014-2020)	Percent NH_3 Change (2014-2020)
Fires*	5083	8779	9418	4335	85%
Agriculture	28031	67117	68406	40375	144%
Fuel Comb	896	837	888	-8	-1%
Industrial Processes	1062	2728	3601	2539	239%
Miscellaneous Non- Industrial NEC	0	1184		0	-

Source	2014	2017	2020	NH_3 Change (2014-2020)	Percent NH_3 Change (2014-2020)
Mobile	2186	2134	2217	31	1%
Waste Disposal	161	182	577	416	258%
Anthropogenic Emissions	**32336**	**74182**	**75689**	**43353**	**134%**
Total	**37419**	**82961**	**85107**	**47688**	**127%**

Note: *Emissions from "Fires" are considered natural emissions. Emissions from the other groups are considered anthropogenic emissions

NH_3 emissions in Arizona increased by 127% over the period from 2014-2020 based on NEI data. The largest increases were in the agriculture, fire, and industrial process sectors. Further discussion of these trends is provided in Section 6.

5.8 Analysis of Change in Emissions of VOCs

Figure 24 below displays the trend in VOC emissions in Arizona from 2014-2020, based on NEI source categories.

Table 26 provides the change in emissions for each sector category, by tons and percent change.

Figure 24: VOC Emission Trends in Arizona from NEI, 2014-2020

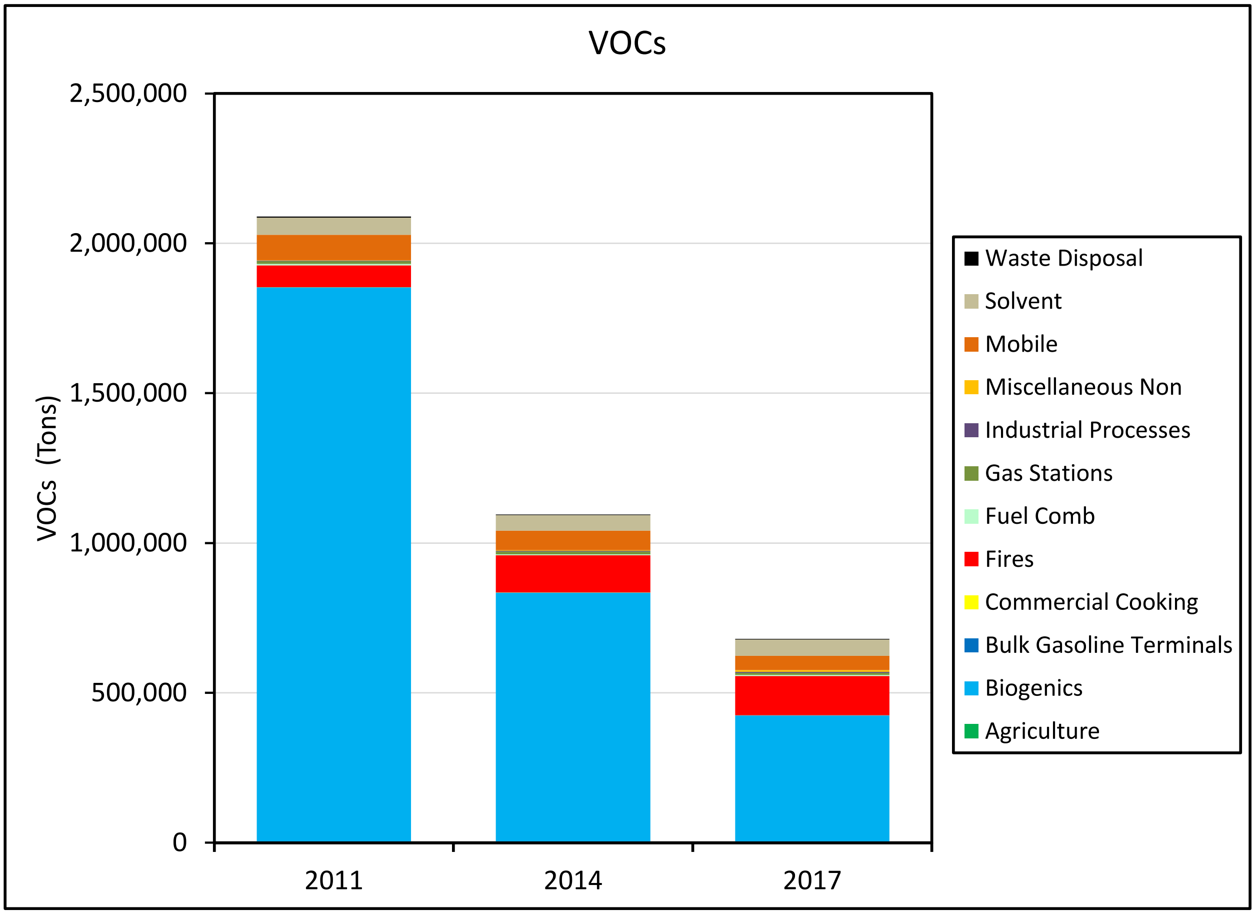


Table 26: VOC Emissions in Arizona from all NEI Categories, 2014-2020 (Tons)

Source	2014	2017	2020	VOCs Change (2014-2020)	Percent VOCs Change (2014-2020)
Fires*	72573	123783	130975	-1429663	-77%
Biogenic*	1850671	831263	421008	58402	80%
Agriculture	1772	2886	3090	1318	74%
Bulk Gasoline Terminals	732	827	479	-253	-35%
Commercial Cooking	330	406	756	426	129%
Fuel Comb	4977	3106	3725	-1252	-25%

Source	2014	2017	2020	VOCs Change (2014-2020)	Percent VOCs Change (2014-2020)
Gas Stations	9777	9394	7290	-2487	-25%
Industrial Processes	1342	2660	2857	1515	113%
Miscellaneous Non-Industrial NEC	1484	1754	6133	4649	313%
Mobile	84811	65067	47482	-37329	-44%
Solvent	57261	52324	54803	-2458	-4%
Waste Disposal	3632	1950	1921	-1711	-47%
Anthropogenic Emissions	**166118**	**140374**	**128536**	**-37582**	**-23%**
Total	**2089362**	**1095420**	**680519**	**-1408843**	**-67%**

Note: *Emissions from “Biogenics” and “Fires” are considered natural emissions. Emissions from the other groups are considered anthropogenic emissions

Anthropogenic VOC emissions in Arizona decreased by 23% over the period from 2014-2020 based on NEI data, while large reductions in emissions from fire led to an overall emission decline of 67%. The largest anthropogenic decreases were in the mobile source, solvent, gas station, and fuel combustion sectors. Further discussion of these trends is provided in Section 6.

6 Assessment of Significant Changes in Anthropogenic Emissions

Under the regional haze progress report requirements, 40 CFR § 51.308 (g)(5) requires an assessment of significant changes in anthropogenic emissions since the last regional haze plan, "including whether or not these changes in anthropogenic emissions were anticipated in that most recent plan and whether they have limited or impeded progress in reducing pollutant emissions and improving visibility."[102]

The subsections below asses the changes in emissions identified in the high-level and detailed emission summaries in Sections 3, 5, and 1. This section also includes discussion of whether these changes were anticipated in the previous regional haze plan and whether they have impeded visibility progress.

6.1 Assessment of Change in Emissions of NO_x

From 2014 to 2020, anthropogenic NO_x emissions in Arizona had a decline of 42%, while overall NO_x emissions fell by 37%. The largest reductions in NO_x emissions were from the mobile source, fuel combustion, and waste disposal sectors.

Mobile source NO_x reductions have resulted from more stringent federal emissions requirements for vehicles and fuels such as the Tier 2 and Tier 3 standards and GHG/fuel economy standards, with some of the sharpest reductions in the onroad diesel heavy duty (HD) and onroad non-diesel light duty (LD) sectors.[103, 104] ADEQ expects NOx emissions for these sectors and other mobile sources to continue declining as vehicle fleets turn over, replacing old vehicles and equipment that produce more pollution with more efficient and less polluting new vehicles, and as federal emission standards are revised.

Reductions in nonroad equipment emissions are due to new engine standards for nonroad vehicles and equipment, resulting from several strengthened federal emission standards for nonroad vehicles and equipment. ADEQ also expects these reductions to continue with fleet turnover.

Reductions in NOx emissions from fuel combustion are overwhelmingly due to reduced emissions from coal combustion for electrical generation. According to federal Energy Information Agency (EIA) data, the Arizona electric power sector consumed 8,274,361 short tons of coal in 2022, down from 22,911,006 short tons in 2014.[105] This decrease resulted from fuel switching to a greater share of natural gas generation, retirement of certain coal-fired units, and increases in renewable power generation.

While this fuel switching also resulted in increased NO_x emissions from combustion of natural gas for electrical generation and industrial boilers, this increase was offset many times by the much larger decrease in coal NOx emissions.[106]

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[102] 40 CFR § 51.308 (g)(5).
[103] Control of Air Pollution From New Motor Vehicles: Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements, 65 FR 6698 (Feb. 10, 2000).
[104] Control of Air Pollution From Motor Vehicles: Tier 3 Motor Vehicle Emission and Fuel Standards, 79 FR 23414 (Apr. 28, 2014).
[105] Energy Information Agency, Fossil Fuel Consumption for Electricity Generation by Year, Industry Type and State, , available at https://www.eia.gov/electricity/data/state/
[106] Appendix A-1

As discussed further in Section 3.1, NO_x & SO_2 from All Arizona EGUs, overall NO_x from Arizona EGUs that report to the CAMPD database declined 62% from 2017-2023. This decline was also significant among Arizona EGU sources subject to BART controls. The four Arizona EGUs subject to BART saw NO_x emissions decrease by 44% over that same period.

Further, several coal-fired EGUs in Arizona have retired, announced retirement dates, or seen reduced capacity factors and emissions since the 2020 NEI was developed, suggesting the large reductions in NO_x emissions from the coal fired EGU sector will continue over future NEIs.

As demonstrated in the overall decline in NO_x emissions statewide, the other minor increases in emissions from the biogenic, fires (prescribed fire, agricultural burning, and wildfire), and industrial process source sectors (mostly in fluctuations from the cement manufacturing sector) were greatly offset by reductions in other sectors.

The sectors that saw an increase in NO_x emissions are unlikely to hinder continual progress toward visibility improvement in Arizona, given they are largely uncontrollable, like wildfire and biogenic; desirable for ecosystem health and air quality, like prescribed fire; or represent a very small portion of statewide NO_x, like industrial processes.

NO_x emissions in Arizona have met or exceeded the downward trend predicted in the most recent estimates from the second-round regional haze plan, submitted in 2022.[107] Increased emissions in certain subsectors have not limited or impeded visibility progress in the state, as evidenced by the overall decline in NO_x emissions across sectors, as well as continued visibility progress relative to the baseline at each Arizona Class I area.[108]

6.2 Assessment of Change in Emissions of SO_2

From 2014 to 2020, SO_2 emissions in Arizona declined overall by 62%, with an especially significant 72% decrease in anthropogenic emissions. The two largest single sources of these reductions were the non-ferrous metals industrial processes and coal-fired electricity generation sectors, which cut emissions by 98% (21,545 tons) and in half by 8,737 tons of SO_2, respectively. These substantial emission reductions more than offset the minor increases in SO_2 seen in certain other sectors.

SO_2 emissions increased from the wildfire and prescribed burning sectors, but as discussed further in Section 6.4 Assessment of Change in Emissions of $PM_{2.5}$, these fire emissions are generally uncontrollable or desirable for air quality on balance, respectively.

The non-ferrous metals sector saw a 98% decrease in SO_2 emissions over this period, or a total of 21,545 tons. ADEQ attributes this trend of sharply decreased emissions from the non-ferrous metals sector to improved SO_2 controls at Arizona's two primary copper smelters in Miami and Hayden. Additional controls were implemented at the Miami smelter to comply with the 2017 Miami SO_2 SIP (approved by the EPA on March 12, 2019). Reductions at the Hayden smelter resulted from limited operations and requirements included in the Hayden SO_2 SIP submitted October 3, 2023.[109]

[107] Arizona State Implementation Plan Revision: Regional Haze Program (2018-2028), August 15, 2022.
[108] Id.
[109] 84 FR 8813 (Mar. 12, 2019).

Further, several coal-fired EGUs in Arizona have retired, announced retirement dates, or seen reduced capacity factors and emissions since the 2020 NEI was developed, suggesting the large reductions in SO_2 emissions from the coal fired EGU sector will continue over future NEIs.

As discussed further in Section 3.1, NO_x & SO_2 from All Arizona EGUs, overall SO_2 from EGUs that report to the CAMPD database declined 49% from 2017-2023. This decline was similarly significant among Arizona EGU sources subject to BART controls. The four Arizona EGUs subject to BART saw SO_2 emissions decrease by 48% over that same period.

Other sectors with small decreases in SO_2 emissions over this period are the waste disposal, prescribed fire, industrial boiler, and mobile source sectors.

SO_2 emissions in Arizona have met or exceeded the downward trend predicted in the most recent estimates from the second-round regional haze plan, submitted in 2022.[110] Increased emissions in certain subsectors have not limited or impeded visibility progress in the state, as evidenced by the overall decline in SO_2 emissions across sectors, as well as continued visibility progress relative to the baseline at each Arizona Class I area.[111]

6.3 Assessment of Change in Emissions of PM_{10}

As discussed in Sections 2 and 4, from 2014 to 2020, PM_{10} emissions in Arizona showed an overall decline of 41%, with a more significant decline in anthropogenic emissions of 55%. The largest reductions in PM_{10} emissions were from the fugitive dust sector, particularly unpaved road and construction dust; industrial processes, especially mining; and mobile sources, especially onroad HD diesel vehicles.

Reductions in PM_{10} emissions from fugitive dust are largely due to increased control requirements for unpaved roads and construction activities. These controls are contained in such state PM_{10} plans and rules as the Phoenix PM_{10} Serious plan, approved by the EPA in 2014,[112] and the continued implementation of dust control requirements in Arizona's Article 6 rules for fugitive dust outside of nonattainment areas.[113]

It is also important to acknowledge that reductions in on-road emissions are partially influenced by differences in emission inventory calculation methodologies. In the 2017 NEI calculation, the EPA introduced changes in the method employed to determine vehicle miles traveled (VMT) on paved and unpaved roads within each county. These methodological changes are discussed in further detail in Section 4.11.3.6 of the 2017 NEI TSD.[114]

PM_{10} emissions reductions in the industrial sector resulted from improved dust management practices at mines and quarries in Arizona.[115] Small increases in PM_{10} emissions from the non-ferrous metals and

[110] Arizona State Implementation Plan Revision: Regional Haze Program (2018-2028), August 15, 2022.
[111] Id.
[112] Approval and Promulgation of Implementation Plans-Maricopa County PM-10 Nonattainment Area; Five Percent Plan for Attainment of the 24-Hour PM-10 Standard, 79 FR 33107 (June 10, 2014).
[113] A.A.C. R18-2-601 to R18-2-614.
[114] 2017 National Emissions Inventory: January 2021 Updated Release, Technical Support Document. Accessed at: www.epa.gov/sites/default/files/2021-02/documents/nei2017_tsd_full_jan2021.pdf
[115] A.A.C. R18-2-601 to R18-2-614.

storage/transfer industrial subsectors were greatly offset by decreased emissions in other industrial subsectors.

Mobile source PM_{10} reductions have resulted from more stringent federal emissions requirements for vehicles and fuels such as the Tier 2 and Tier 3 standards and GHG/fuel economy standards, with some of the sharpest reductions in the onroad diesel HD and onroad non-diesel LD sectors.[116, 117] ADEQ expects PM_{10} emissions for these sectors and other mobile sources to continue declining as vehicle fleets turn over, replacing old vehicles and equipment that produce more pollution with more efficient and less polluting new vehicles, and as federal emission standards are revised.

Additional PM_{10} emissions reductions occurred in the residential wood burning sector, likely related to improving emission standards for wood and pellet stoves and air quality “no burn” days in certain areas.

The percentage increase in PM_{10} emissions from agricultural field burning was large (790%), but this is largely due to the low base year emissions for this sector in 2014. The raw tonnage of increased agricultural burning emissions (735 tons) was greatly offset by reductions in other sectors, for an overall decline of 41%.

PM_{10} emissions in Arizona have met or exceeded the downward trend predicted in the most recent estimates from the second-round regional haze plan, submitted in 2022.[118] Increased emissions in certain subsectors have not limited or impeded visibility progress in the state, as evidenced by the overall decline in PM_{10} emissions across sectors, as well as continued visibility progress relative to the baseline at each Arizona Class I area.[119]

6.4 Assessment of Change in Emissions of $PM_{2.5}$

From 2014 to 2020, $PM_{2.5}$ emissions in Arizona showed a slight overall increase of 2%, with a 41% decrease in anthropogenic emissions. This net increase is overwhelmingly due to increased $PM_{2.5}$ emissions from wildfires and prescribed fire, with wildfire emissions increasing nearly twice as much as those from prescribed fire. The increase in fire emissions is discussed further in

The largest reductions in $PM_{2.5}$ emissions were from the fugitive dust sector, particularly unpaved road and construction dust; the waste disposal sector, including open burns; and mobile sources, especially onroad HD diesel vehicles. These reductions nearly matched the overall increase in $PM_{2.5}$ emissions and fully outweigh the increases in anthropogenic emissions.

While wildfire emissions are essentially uncontrollable, the increased emissions from prescribed fires also do not pose concern for the trajectory of Arizona's visibility goals. Emissions from prescribed fires should be understood as a preventative measure to reduce future emissions from more catastrophic wildfires, as prescribed burns are conducted under optimal smoke dispersion conditions to minimize the impact on air quality, even when there are overall increases in the raw emission totals.[120]

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[116] Tier 2 Motor Vehicle Emissions Standards and Gasoline Sulfur Control Requirements, Final Rule (gpo.gov/fdsys/pkg/FR-2000-02-10/pdf/00-19.pdf)
[117] Tier 3 Motor Vehicle Emission and Fuel Standards, Final Rule (https://www.gpo.gov/fdsys/pkg/FR-2014-04-28/pdf/2014-06954.pdf)
[118] Arizona State Implementation Plan Revision: Regional Haze Program (2018-2028), August 15, 2022.
[119] Arizona State Implementation Plan Revision: Regional Haze Program (2018-2028), August 15, 2022.
[120] Article 15 Smoke Management Rules, A.A.C. R18-2-1501 to R18-2-1515.

ADEQ expects mobile source emissions of $PM_{2.5}$ to continue decreasing with fleet turnover and improved LD, HD, and off-road vehicle and equipment standards. Similarly, $PM_{2.5}$ decreased from the residential wood burning sector, likely related to improving emission standards for wood and pellet stoves.

Additional $PM_{2.5}$ reductions occurred in the electrical generation sector, due mainly to the statewide decrease in coal-fired generation as described in Section 6.1, Assessment of Change in Emissions of NO_x.

Anthropogenic $PM_{2.5}$ emissions in Arizona have met or exceeded the downward trend predicted in the most recent estimates from the second-round regional haze plan, submitted in 2022.[121] Increased emissions in certain subsectors have not limited or impeded visibility progress in the state, as evidenced by the overall decline in $PM_{2.5}$ emissions across sectors, as well as continued visibility progress relative to the baseline at each Arizona Class I area.[122]

6.4.1 The Role of Fire in Arizona Emission Trends

As discussed in Section 6.4 Assessment of Change in Emissions of $PM_{2.5}$ fires, including wildfires, prescribed fires, and agricultural burning, are responsible for significant increased emissions of certain pollutants.

Fire especially impacts Arizona's $PM_{2.5}$ inventory and caused an overall net increase in $PM_{2.5}$ emissions between 2014 and 2020, despite significant $PM_{2.5}$ reductions in anthropogenic sectors such as dust and fuel combustion. PM_{10} and $PM_{2.5}$ from fires each saw a 64% decrease for prescribed fires, but a 378% increase for wildfires. The significant decrease in prescribed fire is attributable to significantly reduced burning activity during COVID-19 restrictions in 2020.

Therefore, further discussion of fire in Arizona provides crucial context for evaluating the emission trends in the state.

Table 27 below show the significant increases in acres burned by wildfires between 2014 and 2020 in Arizona. The data in this table demonstrate a roughly 273% increase in the acreage burned this source sector. The large increases in wildfire emissions discussed above are attributed to this substantial increase in fires.

Table 27: Arizona Fires and Acreage Data, 2014, 2017, and 2020

[121] Arizona State Implementation Plan Revision: Regional Haze Program (2018-2028), August 15, 2022.
[122] Arizona State Implementation Plan Revision: Regional Haze Program (2018-2028), August 15, 2022.

Source	2014 acres burned[123]	2017 acres burned[124]	2020 acres burned[125]	Change in acres burned, 2014-2020	Percent change in acres burned, 2014-2020
Wildfire	205,074	422,667	980,308	775,234	378%
Prescribed Fire[126]	63,579	133,878	23,103	-40,476	-64%
Total	**268,653**	**556,545**	**1,003,411**	**734,758**	**273%**

6.5 Assessment of Change in Emissions of VOCs

From 2014 to 2020, VOC emissions in Arizona showed a large overall decrease of 67%. This reduction is overwhelmingly from reductions in biogenic emissions from vegetation and soil, but anthropogenic emissions of VOCs also fell over this period by 23%. VOC emissions from the mobile source, solvent use, fuel combustion (other than natural gas, from fuel switching), and waste disposal sectors also decreased.

Mobile source VOC reductions are largely due to reduced emissions from gasoline-powered nonroad equipment, as well as LD vehicles. Reductions in both these sectors resulted mainly from improved federal emission standards for different mobile sources, described in further detail in Section 3.1 (NOx). Mobile source VOC emissions are particularly impacted from the proliferation of more vehicles with onboard vapor recovery systems into the fleet.

Falling emissions in the solvent sector were concentrated in the graphic arts, non-industrial surface coating, and industrial surface coating and solvent use subsectors, with a moderate increase in VOCs from consumer and commercial solvent use. These decreases resulted largely from rules that regulate solvent use as part of ozone nonattainment plans, such as Maricopa Rules 337 (Graphic Arts) and 336 (Surface Coating Operations).[127]

VOC emissions from the Miscellaneous Non-Industrial Not Elsewhere Classified (NEC) and Industrial Processes – NEC sectors saw large percent increases between 2014 and 2020, but in terms of actual tonnage of emissions these increases are vastly outweighed by substantial reductions in other sectors.

[123] National Interagency Fire Center, 2014 Southwest Area Year-To-Date Fires & Acres, available at https://gacc.nifc.gov/swcc/predictive/intelligence/Historical/Fire_and_Resource_Data/Fires_Acres/Annual/2014_Fire_Acres_By_State.pdf (last accessed April 23, 2024).
[124] National Interagency Fire Center, 2017 Southwest Area Year-To-Date Fires & Acres, available at https://gacc.nifc.gov/swcc/predictive/intelligence/Historical/Fire_and_Resource_Data/Fires_Acres/Annual/2017_Fires_Acres_By_State_EOY.pdf (last accessed April 23, 2024).
[125] National Interagency Fire Center, 2020 Southwest Area Year-To-Date Fires & Acres, available at https://gacc.nifc.gov/swcc/predictive/intelligence/Historical/Fire_and_Resource_Data/Fires_Acres/Annual/2020_EOY_ByState-Agency.pdf (last accessed April 23, 2024).
[126] Prescribed fire data obtained from ADEQ's internal Enhanced Smoke Management database. More information regarding Arizona's smoke management program is available here: https://smoke.azdeq.gov.
[127] Maricopa County Air Pollution Control Regulations Regulation III – Control of Air Contaminants; Rule 337 Graphic Arts and Rule 336 Surface Coating Operations and Industrial Adhesive Application Processes

VOC emissions in Arizona have met or exceeded the downward trend predicted in the most recent estimates from the second-round regional haze plan, submitted in 2022.[128] Increased emissions in certain subsectors have not limited or impeded visibility progress in the state, as evidenced by the overall decline in VOC emissions across sectors, as well as continued visibility progress relative to the baseline at each Arizona Class I area.[129]

6.6 Assessment of Change in Emissions of NH_3

Ammonia emissions showed a significant upward trend in Arizona from 2014-2020, with a 127% increase, or 47,688 tons. 40,375 tons of this increase resulted from increased estimated NH_3 emissions from the agriculture sector, mainly fertilizer application and livestock waste. Specifically, estimated emissions of NH_3 from fertilizer application increased by 25,526 tons or 607%. Livestock waste emissions increased by 14,849 tons or 62%.

However, much of this significant increase in estimated NH_3 emissions from agriculture resulted from the use of a different methodology to calculate these emissions between the 2014 and 2017 NEI periods. Further discussion of these estimation changes is below in Sections 6.6.1 and 6.6.2.

Notably, estimated NH_3 from the fertilizer application sector decreased 1,311 tons between 2017 and 2020, showing a decrease in emissions between years with comparable inventory methodology. Over this same period, livestock waste emissions saw a moderate increase of 2,600 tons.

Other sectors saw smaller increases in NH_3, including wildfire and agricultural burning, miscellaneous industrial processes, waste disposal, and natural gas combustion for residential and electric generation. These increased emissions outweighed small decreases in NH_3 from the chemical manufacturing, coal-fired electric generation, mobile sources, and residential wood burning.

Increases in estimated emissions of NH_3 have not limited or impeded visibility progress in the state, as evidenced by the continued visibility progress relative to the baseline at each Arizona Class I area.[130]

6.6.1 Methodology Changes Affecting Estimated NH_3 from the Fertilizer Application Sector

Increases of estimated ammonia emissions from the fertilizer application sector largely result from methodological and data source changes between the 2014 and 2017 NEI.

As discussed in Section 4.4.3.3 of the 2017 NEI TSD:

> "the 2017 fertilizer estimates are based on the CMAQ FEST-C “bidirectional” approach that couples meteorological inputs, CMAQ and the EPIC modeling system through the FEST-C interface. This approach used for deriving ammonia emissions for the 2017 NEI is substantially the same as the approach used for the 2014 NEI fertilizer estimates, section 4.4; however, newer model versions for CMAQ and FEST-C were used.

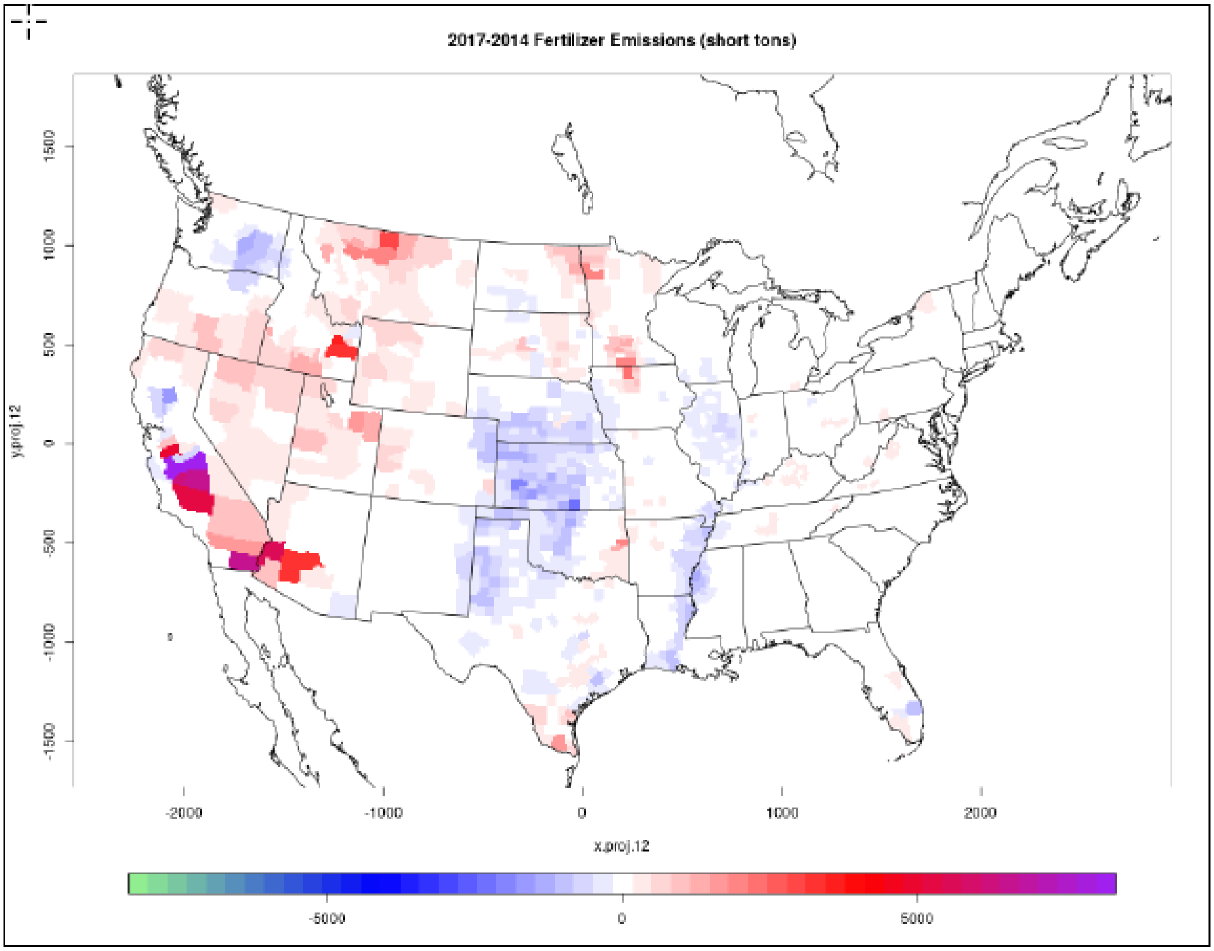
[128] Arizona State Implementation Plan Revision: Regional Haze Program (2018-2028), August 15, 2022.
[129] Id.
[130] *Id.*

> [Further,] the previous version of CMAQ used for the 2014 NEI fertilizer [estimated] emissions only from vegetated land. This has been corrected in CMAQ 5.3 with the STAGE deposition option and results in higher NH_3 emission rates in agricultural areas before crop germination and in areas with *sparse vegetation coverage*.
>
> Emission reduction [from a corrected error in nitrogen budgets] was largely offset when annual state and USDA fertilizer data was used at adjusted FEST-C rates. The adjusted FEST-C fertilizer rates were increased by approximately 20%, with the exceptions of *wheat (50% increase) and cotton (60% increase)* to better match USDA and data submitted by the states. Crops without state or USDA fertilizer data were adjusted by the mean adjustment factor from all the crops with state or USDA submitted data, approximately a 20% increase.
>
> *Large increases in fertilizer rates for cotton and wheat* resulted in a large increase in NH_3 emissions from fertilizer due to the typically alkali soils and *warm climate* where these crops are grown."[131] (Emphasis added.)

The figure below, 4-6 from the 2017 NEI TSD, shows the net change in NH_3 emissions from fertilizer application between the 2014 and 2017 NEIs in different areas. The significant estimated increase in emissions from this sector is visible in the agriculture-heavy counties of central and southwest Arizona.

[131] 2017 National Emissions Inventory: January 2021 Updated Release, Technical Support Document. Accessed at: www.epa.gov/sites/default/files/2021-02/documents/nei2017_tsd_full_jan2021.pdf

Figure 4-6: 2017 -2014 NEI "bidi" Fertilizer Application Emissions in tons NH3



The table below, 4-31 from the 2017 NEI TSD, shows the higher emission factor and increased estimated emissions from fertilizer application for the entire contiguous US resulting from these methodology changes.

Table 4-31: Contiguous US fertilizer totals and emissions for the 2017 NEI and 2014 NEI

	2017 FINAL	2017 DRAFT	2014 V2	2014 V1
EPIC FERTILIZER APPLICATION (TONS N)	13,604,640	11,451,713	18,851,866	20,314,303
CMAQ EMISSIONS (TONS N)	986,509	592,218	883,526	948,616
MEAN ANNUAL EMISSIONS FACTOR*	7.3% total, 12.5% of urea/NH_4	4.8% total, 8.9% of urea/NH_4	4.7% total, 9.8% of urea/NH_4	4.7% total, 9.1% of urea/NH_4
FERTILIZER USE** (TONS N)	Not Available	Not Available	13,295,000	12,814,000

* Defined as the annual emissions divided by the annual fertilizer application

** USDA Economic Research Service, Fertilizer Use and Price

In 2017, cotton and wheat were the second and fourth most cultivated crops in Arizona by acreage, with 182,175 and 104,650 acres, respectively.[132] Given the significant role of cotton and wheat in the overall Arizona fertilized acreage category, along with the generally warm climate and sparse vegetation of agricultural land in the sunny, arid state, the estimation differences between the 2014-2020 NEI discussed above likely explain the majority of the increased estimated emissions for this sector over the period. Absent substantial future methodological changes, ADEQ does not expect the significant increase between these two inventories to continue.

6.6.2 Methodology Changes Affecting Estimated NH_3 from the Livestock Waste Sector

Increases in the livestock waste sector also result from methodological and data source changes between the 2014 and 2017 NEI. As discussed in Section 4.5.3.2 of the 2017 NEI TSD:

> "the activity data for this source category is based on livestock counts and population information by state and county. These counts are derived from multiple data sets from the United States Department of Agriculture (USDA), particularly the National Agricultural Statistics Service (NASS) survey and census. A new and more robust method was introduced into the 2017 NEI for this category for estimating population counts." [133]

As a result, population estimates for each livestock category increased, sometimes significantly. The table below, 4-35 from the 2017 NEI TSD, shows the increased population estimates for each category between the 2014 and 2017 NEI.

Table 4-35: National-level animal population data trend from 2014 NEI to draft 2017 NEI

Livestock Category	2014 NEIv2	2017 Draft NEI	% Increase in 2017 Draft NEI
Beef	79,367,367	81,559,685	3%
Dairy	9,035,195	18,893,022	109%
Swine	67,766,007	72,151,500	6%
Poultry - Layers	362,319,588	497,677,000	37%
Poultry - Broilers	1,506,271,264	1,621,052,369	8%

According to the 2017 NEI TSD, "the significant change in the dairy and poultry-layers categories are due to the inclusion of new sub-categories within those livestock groups that were not previously included in the 2014 NEI populations. For the dairy cattle category, heifers and calves are now included in population totals in addition to mature dairy cows. For poultry-layers, pullets (young hens) are now included in the population total for this category."[134]

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[132] USDA 2017 Census of Agriculture, State Profile: Arizona. nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Arizona/cp99004.pdf

[133] 2017 National Emissions Inventory: January 2021 Updated Release, Technical Support Document. Accessed at: www.epa.gov/sites/default/files/2021-02/documents/nei2017_tsd_full_jan2021.pdf

[134] *Id.*

Given the significant role of dairy cows and laying hens in the overall Arizona livestock waste category, these estimation differences likely explain the majority of the increased estimated emissions for this sector between 2014-2020.[135] Absent substantial future methodological changes, ADEQ does not expect the significant increase seen between these two inventories to continue.

[135] Partial information on livestock population counts are available in the USDA 2017 Census of Agriculture, State Profile: Arizona, available at nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/Arizona/cp99004.pdf. However, data for poultry and eggs, as well as hogs, pigs, and aquaculture, was withheld for nondisclosure purposes.

7 Detailed NEI Data: 2014, 2017, and 2020 Inventories

The tables below provide the National Emissions Inventory (NEI) data from the 2014, 2017, and 2020 inventories for each visibility-impairing pollutant and a more detailed emission trend analysis for each subsector, demonstrating the 2014-2020 trend.

7.1 Nitrogen Oxides Emission Inventories

Table 28: Detailed Nitrogen Oxides Emission Inventory, 2014, 2017, and 2020

Section	2014	2017	2020	NOx Reduction (2014-2020, tons)	Percent NOx Reduction (2014-2020)
Biogenics - Vegetation and Soil	13912	16680	12292	-1620	-12%
Commercial Cooking	0	0	0	0	
Fires - Agricultural Field Burning	13	56	178	165	1269%
Fires - Prescribed Fires	932	1596	131	-801	-86%
Fires - Wildfires	3908	5559	10018	6110	156%
Fuel Comb - Comm/Institutional - Biomass	44	44	32	-12	-27%
Fuel Comb - Comm/Institutional - Coal	0	0	0	0	
Fuel Comb - Comm/Institutional - Natural Gas	1588	1813	1356	-232	-15%
Fuel Comb - Comm/Institutional - Oil	27	16	27	0	0%
Fuel Comb - Comm/Institutional - Other	31	159	135	104	335%
Fuel Comb - Electric Generation - Biomass	220	168	231	11	5%
Fuel Comb - Electric Generation - Coal	29128	16425	12275	-16853	-58%
Fuel Comb - Electric Generation - Natural Gas	2222	3663	5943	3721	167%
Fuel Comb - Electric Generation - Oil	78	54	59	-19	-24%
Fuel Comb - Electric Generation - Other	2	4	19	17	850%
Fuel Comb - Industrial Boilers, ICEs - Biomass	2	9	4	2	100%
Fuel Comb - Industrial Boilers, ICEs - Coal	302	0	0	-302	-100%
Fuel Comb - Industrial Boilers, ICEs - Natural Gas	2186	2845	3442	1256	57%
Fuel Comb - Industrial Boilers, ICEs - Oil	3246	2996	2958	-288	-9%
Fuel Comb - Industrial Boilers, ICEs - Other	63	94	128	65	103%
Fuel Comb - Residential - Natural Gas	1747	1593	1779	32	2%
Fuel Comb - Residential - Oil	0	0	0	0	

Fuel Comb - Residential - Other	294	289	354	60	20%
Fuel Comb - Residential - Wood	380	243	280	-100	-26%
Industrial Processes - Cement Manufacturing	2445	2470	2879	434	18%
Industrial Processes - Chemical Manufacturing	148	138	150	2	1%
Industrial Processes - Ferrous Metals	42	46	45	3	7%
Industrial Processes - Mining	263	393	334	71	27%
Industrial Processes - NEC	1406	1474	989	-417	-30%
Industrial Processes - Non-ferrous Metals	231	210	226	-5	-2%
Industrial Processes - Oil & Gas Production	15	9	8	-7	-47%
Industrial Processes - Pulp & Paper	2	2	1	-1	-50%
Industrial Processes - Storage and Transfer	5	6	6	1	20%
Miscellaneous Non-Industrial NEC	125	63	67	-58	-46%
Mobile - Aircraft	5324	4430	3438	-1886	-35%
Mobile - Commercial Marine Vessels			1	1	
Mobile - Locomotives	19468	18012	14799	-4669	-24%
Mobile - Non-Road Equipment - Diesel	20281	18084	13520	-6761	-33%
Mobile - Non-Road Equipment - Gasoline	3532	2356	2292	-1240	-35%
Mobile - Non-Road Equipment - Other	948	688	597	-351	-37%
Mobile - On-Road Diesel Heavy Duty Vehicles	49917	28016	26949	-22968	-46%
Mobile - On-Road Diesel Light Duty Vehicles	4036	3005	3305	-731	-18%
Mobile - On-Road non-Diesel Heavy Duty Vehicles	3585	1921	1176	-2409	-67%
Mobile - On-Road non-Diesel Light Duty Vehicles	61059	49758	25195	-35864	-59%
Solvent - Degreasing		4	0	0	-
Solvent - Industrial Surface Coating & Solvent Use	4	4	5	1	25%
Waste Disposal	1227	337	367	-860	-70%
Total	**234388**	**185732**	**147990**	**-86398**	**-37%**

7.2 Sulfur Dioxide Emission Inventories

Table 29: Detailed Sulfur Dioxide Emission Inventory, 2014, 2017, and 2020

Section	2014	2017	2020	SO_2 Reduction (2014-2020, tons)	Percent SO_2 Reduction (2014-2020)
Commercial Cooking	0	0	0	0	-
Fires - Agricultural Field Burning	3	18	55	52	1733%
Fires - Prescribed Fires	534	1004	62	-472	-88%
Fires - Wildfires	1971	2936	4870	2899	147%
Fuel Comb - Comm/Institutional - Biomass	5	5	0	-5	-100%
Fuel Comb - Comm/Institutional - Coal	0	0	0	0	-
Fuel Comb - Comm/Institutional - Natural Gas	24	32	26	2	8%
Fuel Comb - Comm/Institutional - Oil	8	9	2	-6	-75%
Fuel Comb - Comm/Institutional - Other	0	0	60	60	-
Fuel Comb - Electric Generation - Biomass	20	1	0	-20	-100%
Fuel Comb - Electric Generation - Coal	16827	8476	8090	-8737	-52%
Fuel Comb - Electric Generation - Natural Gas	62	90	132	70	113%
Fuel Comb - Electric Generation - Oil	7	6	5	-2	-29%
Fuel Comb - Electric Generation - Other	0	0	2	2	-
Fuel Comb - Industrial Boilers, ICEs - Biomass	0	0	0	0	-
Fuel Comb - Industrial Boilers, ICEs - Coal	7	0	0	-7	-100%
Fuel Comb - Industrial Boilers, ICEs - Natural Gas	18	22	24	6	33%
Fuel Comb - Industrial Boilers, ICEs - Oil	490	403	192	-298	-61%
Fuel Comb - Industrial Boilers, ICEs - Other	0	4	2	2	-
Fuel Comb - Residential - Natural Gas	10	10	10	0	0%
Fuel Comb - Residential - Oil	0	0	0	0	-
Fuel Comb - Residential - Other	0	0	0	0	-
Fuel Comb - Residential - Wood	59	36	49	-10	-17%
Industrial Processes - Cement Manuf	10	9	7	-3	-30%
Industrial Processes - Chemical Manuf	0	0	0	0	-
Industrial Processes - Ferrous Metals	25	35	38	13	52%
Industrial Processes - Mining	26	41	32	6	23%
Industrial Processes - NEC	1998	1692	2412	414	21%
Industrial Processes - Non-ferrous Metals	21936	24464	391	-21545	-98%

Section	2014	2017	2020	SO_2 Reduction (2014-2020, tons)	Percent SO_2 Reduction (2014-2020)
Industrial Processes - Oil & Gas Production	1	0	1	0	0%
Industrial Processes - Pulp & Paper	0	0	0	0	-
Industrial Processes - Storage and Transfer	0	0	0	0	-
Miscellaneous Non-Industrial NEC	3	2	4	1	33%
Mobile - Aircraft	573	527	352	-221	-39%
Mobile - Locomotives	13	215	12	-1	-8%
Mobile - Non-Road Equipment - Diesel	40	26	10	-30	-75%
Mobile - Non-Road Equipment - Gasoline	15	12	2	-13	-87%
Mobile - Non-Road Equipment - Other	11	13	7	-4	-36%
Mobile - On-Road Diesel Heavy Duty Vehicles	67	70	26	-41	-61%
Mobile - On-Road Diesel Light Duty Vehicles	9	8	1	-8	-89%
Mobile - On-Road non-Diesel Heavy Duty Vehicles	23	5	**5**	-18	-78%
Mobile - On-Road non-Diesel Light Duty Vehicles	438	264	108	-330	-75%
Solvent - Industrial Surface Coating & Solvent Use	0	0	0	0	-
Waste Disposal	357	143	113	-244	-68%
Total	**45590**	**40578**	**17102**	**-28488**	**-62%**

7.3 Particulate Matter with diameter less than 10µm (PM_{10}) Emission Inventories

Table 30: Detailed PM_{10} Emission Inventory, 2014, 2017, and 2020

Section	2014	2017	2020	PM_{10} Reduction (2014-2017, tons)	Percent PM_{10} Reduction (2014-2017)
Agriculture - Crops & Livestock Dust	26838	28994	24377	-2461	-9%
Bulk Gasoline Terminals		0	0	0	-
Commercial Cooking	2459	2765	5535	3076	125%
Dust - Construction Dust	37891	22960	38673	782	2%
Dust - Paved Road Dust	15325	15088	3068	-12257	-80%
Dust - Unpaved Road Dust	117482	65385	20754	-96728	-82%
Fires - Agricultural Field Burning	93	283	828	735	790%
Fires - Prescribed Fires	7530	15265	747	-6783	-90%

Section	2014	2017	2020	PM_{10} Reduction (2014-2017, tons)	Percent PM_{10} Reduction (2014-2017)
Fires - Wildfires	24257	38021	57397	33140	137%
Fuel Comb - Comm/Institutional - Biomass	30	33	15	-15	-50%
Fuel Comb - Comm/Institutional - Coal	0	0	0	0	-
Fuel Comb - Comm/Institutional - Natural Gas	18	27	21	3	17%
Fuel Comb - Comm/Institutional - Oil	2	1	2	0	0%
Fuel Comb - Comm/Institutional - Other	0	0	3	3	-
Fuel Comb - Electric Generation - Biomass	150	75	38	-112	-75%
Fuel Comb - Electric Generation - Coal	2017	1103	1099	-918	-46%
Fuel Comb - Electric Generation - Natural Gas	375	368	728	353	94%
Fuel Comb - Electric Generation - Oil	9	4	3	-6	-67%
Fuel Comb - Electric Generation - Other	0	1	6	6	-
Fuel Comb - Industrial Boilers, ICEs - Biomass	11	19	11	0	0%
Fuel Comb - Industrial Boilers, ICEs - Coal	359	0	0	-359	-100%
Fuel Comb - Industrial Boilers, ICEs - Natural Gas	93	90	69	-24	-26%
Fuel Comb - Industrial Boilers, ICEs - Oil	240	370	224	-16	-7%
Fuel Comb - Industrial Boilers, ICEs - Other	0	1	1	1	-
Fuel Comb - Residential - Natural Gas	68	7	9	-59	-87%
Fuel Comb - Residential - Oil	0	0	0	0	-
Fuel Comb - Residential - Other	0	0	0	0	-
Fuel Comb - Residential - Wood	3188	1918	2417	-771	-24%
Gas Stations			0	0	-
Industrial Processes - Cement Manuf	119	115	166	47	39%
Industrial Processes - Chemical Manuf	44	75	216	172	391%
Industrial Processes - Ferrous Metals	24	26	21	-3	-13%
Industrial Processes - Mining	52189	45712	12914	-39275	-75%
Industrial Processes - NEC	3141	1784	1865	-1276	-41%
Industrial Processes - Non-ferrous Metals	395	676	843	448	113%
Industrial Processes - Oil & Gas Production	0	0	0	0	-
Industrial Processes - Petroleum Refineries		4	3	3	-
Industrial Processes - Pulp & Paper	0	0	51	51	-
Industrial Processes - Storage and Transfer	1470	3104	3005	1535	104%

Section	2014	2017	2020	PM_{10} Reduction (2014-2017, tons)	Percent PM_{10} Reduction (2014-2017)
Miscellaneous Non-Industrial NEC	334	352	310	-24	-7%
Mobile - Aircraft	440	412	370	-70	-16%
Mobile - Locomotives	620	522	379	-241	-39%
Mobile - Non-Road Equipment - Diesel	1658	1413	1022	-636	-38%
Mobile - Non-Road Equipment - Gasoline	1134	641	634	-500	-44%
Mobile - Non-Road Equipment - Other	33	33	32	-1	-3%
Mobile - On-Road Diesel Heavy Duty Vehicles	2642	1677	1186	-1456	-55%
Mobile - On-Road Diesel Light Duty Vehicles	234	166	190	-44	-19%
Mobile - On-Road non-Diesel Heavy Duty Vehicles	146	95	150	4	3%
Mobile - On-Road non-Diesel Light Duty Vehicles	2694	2472	2400	-294	-11%
Solvent - Degreasing		0	0	0	-
Solvent - Industrial Surface Coating & Solvent Use	-4095	-2678	-3001	1095	-27%
Waste Disposal	-4528	-2984	-3261	1267	-28%
Total	**310175**	**253695**	**183742**	**-126433**	**-41%**

7.4 Particulate Matter with diameter less than 2.5µm ($PM_{2.5}$) Emission Inventories

Table 31: Detailed $PM_{2.5}$ Emission Inventory, 2014, 2017, and 2020

Section	2014	2017	2020	$PM_{2.5}$ Reduction (2014-2020, tons)	Percent $PM_{2.5}$ Reduction (2014-2020)
Agriculture - Crops & Livestock Dust	5420	5630	4748	-672	-12%
Bulk Gasoline Terminals		0	0	0	-
Commercial Cooking	2276	2563	5142	2866	126%
Dust - Construction Dust	3787	2296	3866	79	2%
Dust - Paved Road Dust	3625	3738	766	-2859	-79%
Dust - Unpaved Road Dust	11733	6537	2127	-9606	-82%
Fires - Agricultural Field Burning	69	203	683	614	890%
Fires - Prescribed Fires	6381	12939	634	-5747	-90%
Fires - Wildfires	20559	32220	48641	28082	137%
Fuel Comb - Comm/Institutional - Biomass	26	27	14	-12	-46%

Section	2014	2017	2020	$PM_{2.5}$ Reduction (2014-2020, tons)	Percent $PM_{2.5}$ Reduction (2014-2020)
Fuel Comb - Comm/Institutional - Coal	0	0	0	0	-
Fuel Comb - Comm/Institutional - Natural Gas	17	26	20	3	18%
Fuel Comb - Comm/Institutional - Oil	2	1	2	0	0%
Fuel Comb - Comm/Institutional - Other	0	0	3	3	-
Fuel Comb - Electric Generation - Biomass	150	11	38	-112	-75%
Fuel Comb - Electric Generation - Coal	1928	892	966	-962	-50%
Fuel Comb - Electric Generation - Natural Gas	185	367	727	542	293%
Fuel Comb - Electric Generation - Oil	9	3	2	-7	-78%
Fuel Comb - Electric Generation - Other	0	1	6	6	-
Fuel Comb - Industrial Boilers, ICEs - Biomass	10	15	10	0	0%
Fuel Comb - Industrial Boilers, ICEs - Coal	67	0	0	-67	-100%
Fuel Comb - Industrial Boilers, ICEs - Natural Gas	77	89	63	-14	-18%
Fuel Comb - Industrial Boilers, ICEs - Oil	221	352	199	-22	-10%
Fuel Comb - Industrial Boilers, ICEs - Other	0	1	1	1	-
Fuel Comb - Residential - Natural Gas	65	6	7	-58	-89%
Fuel Comb - Residential - Oil	0	0	0	0	-
Fuel Comb - Residential - Other	0	0	0	0	-
Fuel Comb - Residential - Wood	3184	1915	2412	-772	-24%
Gas Stations			0	0	-
Industrial Processes - Cement Manuf	84	74	124	40	48%
Industrial Processes - Chemical Manuf	23	17	158	135	587%
Industrial Processes - Ferrous Metals	14	18	20	6	43%
Industrial Processes - Mining	6609	5860	1679	-4930	-75%
Industrial Processes - NEC	1027	1243	680	-347	-34%
Industrial Processes - Non-ferrous Metals	328	497	506	178	54%
Industrial Processes - Oil & Gas Production	0	0	0	0	-
Industrial Processes - Petroleum Refineries		4	3	3	-
Industrial Processes - Pulp & Paper	0	0	37	37	-
Industrial Processes - Storage and Transfer	479	611	597	118	25%
Miscellaneous Non-Industrial NEC	265	286	246	-19	-7%

Section	2014	2017	2020	$PM_{2.5}$ Reduction (2014-2020, tons)	Percent $PM_{2.5}$ Reduction (2014-2020)
Mobile - Aircraft	391	362	331	-60	-15%
Mobile - Commercial Marine Vessels			0	0	-
Mobile - Locomotives	572	507	368	-204	-36%
Mobile - Non-Road Equipment - Diesel	1608	1371	990	-618	-38%
Mobile - Non-Road Equipment - Gasoline	1046	592	582	-464	-44%
Mobile - Non-Road Equipment - Other	33	33	32	-1	-3%
Mobile - On-Road Diesel Heavy Duty Vehicles	2006	1111	750	-1256	-63%
Mobile - On-Road Diesel Light Duty Vehicles	172	117	139	-33	-19%
Mobile - On-Road non-Diesel Heavy Duty Vehicles	51	38	48	-3	-6%
Mobile - On-Road non-Diesel Light Duty Vehicles	933	916	635	-298	-32%
Solvent - Degreasing		0	0	0	-
Solvent - Industrial Surface Coating & Solvent Use	0	1	4	4	-
Waste Disposal	3537	1395	1605	-1932	-55%
Total	**78969**	**84885**	**80611**	**1642**	**2%**

7.5 Ammonia Emission Inventories

Table 32: Detailed Ammonia Emission Inventory, 2014, 2017, and 2020

Section	2014	2017	2020	NH_3 Reduction (2014-2017, tons)	NH_3 Percent Reduction (2014-2017)
Agriculture - Fertilizer Application	4203	31040	29729	25526	607%
Agriculture - Livestock Waste	23828	36077	38677	14849	62%
Bulk Gasoline Terminals			0	0	-
Dust - Construction Dust			0	0	-
Fires - Agricultural Field Burning	37	184	370	333	900%
Fires - Prescribed Fires	1225	2526	116	-1109	-91%
Fires - Wildfires	3821	6069	8932	5111	134%
Fuel Comb - Comm/Institutional - Biomass	0	0	0	0	-
Fuel Comb - Comm/Institutional - Coal	0	0	0	0	-
Fuel Comb - Comm/Institutional - Natural Gas	6	6	5	-1	-17%

Section	2014	2017	2020	NH_3 Reduction (2014-2017, tons)	NH_3 Percent Reduction (2014-2017)
Fuel Comb - Comm/Institutional - Oil	0	0	0	0	-
Fuel Comb - Comm/Institutional - Other	0	0	0	0	-
Fuel Comb - Electric Generation - Coal	269	66	59	-210	-78%
Fuel Comb - Electric Generation - Natural Gas	177	232	272	95	54%
Fuel Comb - Electric Generation - Oil			0	0	-
Fuel Comb - Electric Generation - Other			0	0	-
Fuel Comb - Industrial Boilers, ICEs - Biomass	0	0	0	0	-
Fuel Comb - Industrial Boilers, ICEs - Coal	0	0	0	0	-
Fuel Comb - Industrial Boilers, ICEs - Natural Gas	49	82	31	-18	-37%
Fuel Comb - Industrial Boilers, ICEs - Oil	9	8	8	-1	-11%
Fuel Comb - Industrial Boilers, ICEs - Other	1	1	2	1	100%
Fuel Comb - Residential - Natural Gas	206	338	378	172	83%
Fuel Comb - Residential - Oil	0	0	0	0	-
Fuel Comb - Residential - Other	0	0	0	0	-
Fuel Comb - Residential - Wood	179	104	133	-46	-26%
Gas Stations			0	0	-
Industrial Processes - Cement Manuf	10	10	5	-5	-50%
Industrial Processes - Chemical Manuf	1031	122	1012	-19	-2%
Industrial Processes - Ferrous Metals			0	0	-
Industrial Processes - Mining	10	6	4	-6	-60%
Industrial Processes - NEC	10	2590	2577	2567	25670%
Industrial Processes - Non-ferrous Metals	1	0	2	1	100%
Industrial Processes - Oil & Gas Production		0		0	-
Industrial Processes - Pulp & Paper			0	0	-
Industrial Processes - Storage and Transfer			1	1	-
Miscellaneous Non-Industrial NEC	0	1184		0	-
Mobile - Commercial Marine Vessels			0	0	-
Mobile - Locomotives	12	12	12	0	0%
Mobile - Non-Road Equipment - Diesel	26	26	28	2	8%
Mobile - Non-Road Equipment - Gasoline	16	9	10	-6	-38%
Mobile - On-Road Diesel Heavy Duty Vehicles	130	134	182	52	40%

Section	2014	2017	2020	NH_3 Reduction (2014-2017, tons)	NH_3 Percent Reduction (2014-2017)
Mobile - On-Road Diesel Light Duty Vehicles	28	29	28	0	0%
Mobile - On-Road non-Diesel Heavy Duty Vehicles	41	29	123	82	200%
Mobile - On-Road non-Diesel Light Duty Vehicles	1933	1895	1834	-99	-5%
Solvent - Degreasing			0	0	-
Solvent - Industrial Surface Coating & Solvent Use			0	0	-
Waste Disposal	161	182	577	416	258%
Total	**37419**	**82961**	**85107**	**47688**	**127%**

7.6 Volatile Organic Compounds Emission Inventories

Table 33: Detailed Volatile Organic Compounds Emission Inventory, 2014, 2017, and 2020

Section	2014	2017	2020	VOCs Reduction (2014-2020, tons)	Percent VOCs Reduction (2014-2020)
Agriculture - Livestock Waste	1772	2886	3090	1318	74%
Biogenics - Vegetation and Soil	1850671	831263	421008	-1429663	-77%
Bulk Gasoline Terminals	732	827	479	-253	-35%
Commercial Cooking	330	406	756	426	129%
Fires - Agricultural Field Burning	31	213	906	875	2823%
Fires - Prescribed Fires	17619	36323	1673	-15946	-91%
Fires - Wildfires	54923	87247	128396	73473	134%
Fuel Comb - Comm/Institutional - Biomass	6	7	5	-1	-17%
Fuel Comb - Comm/Institutional - Coal	0	0	0	0	-
Fuel Comb - Comm/Institutional - Natural Gas	83	86	67	-16	-19%
Fuel Comb - Comm/Institutional - Oil	1	0	2	1	100%
Fuel Comb - Comm/Institutional - Other	1	5	6	5	500%
Fuel Comb - Electric Generation - Biomass	83	68	87	4	5%
Fuel Comb - Electric Generation - Coal	343	251	195	-148	-43%
Fuel Comb - Electric Generation - Natural Gas	147	96	196	49	33%
Fuel Comb - Electric Generation - Oil	11	1	0	-11	-100%
Fuel Comb - Electric Generation - Other	0	0	4	4	-
Fuel Comb - Industrial Boilers, ICEs - Biomass	0	0	0	0	-

Section	2014	2017	2020	VOCs Reduction (2014-2020, tons)	Percent VOCs Reduction (2014-2020)
Fuel Comb - Industrial Boilers, ICEs - Coal	1	0	0	-1	-100%
Fuel Comb - Industrial Boilers, ICEs - Natural Gas	61	89	184	123	202%
Fuel Comb - Industrial Boilers, ICEs - Oil	219	199	217	-2	-1%
Fuel Comb - Industrial Boilers, ICEs - Other	2	5	6	4	200%
Fuel Comb - Residential - Natural Gas	101	93	103	2	2%
Fuel Comb - Residential - Oil	0	0	0	0	-
Fuel Comb - Residential - Other	11	11	14	3	27%
Fuel Comb - Residential - Wood	3907	2195	2639	-1268	-32%
Gas Stations	9777	9394	7290	-2487	-25%
Industrial Processes - Cement Manufacturing	30	31	58	28	93%
Industrial Processes - Chemical Manufacturing	0	113	301	301	-
Industrial Processes - Ferrous Metals	25	28	38	13	52%
Industrial Processes - Mining	9	51	43	34	378%
Industrial Processes - NEC	473	1520	1714	1241	262%
Industrial Processes - Non-ferrous Metals	90	132	139	49	54%
Industrial Processes - Oil & Gas Production	214	198	146	-68	-32%
Industrial Processes - Petroleum Refineries	0	0	0	0	-
Industrial Processes - Pulp & Paper	176	176	90	-86	-49%
Industrial Processes - Storage and Transfer	325	411	328	3	1%
Miscellaneous Non-Industrial NEC	1484	1754	6133	4649	313%
Mobile - Aircraft	1946	2050	1686	-260	-13%
Mobile - Locomotives	989	836	618	-371	-38%
Mobile - Non-Road Equipment - Diesel	2205	1789	1311	-894	-41%
Mobile - Non-Road Equipment - Gasoline	27521	15359	14685	-12836	-47%
Mobile - Non-Road Equipment - Other	203	129	111	-92	-45%
Mobile - On-Road Diesel Heavy Duty Vehicles	3808	1839	1248	-2560	-67%
Mobile - On-Road Diesel Light Duty Vehicles	1296	761	531	-765	-59%
Mobile - On-Road non-Diesel Heavy Duty Vehicles	1268	1014	1082	-186	-15%
Mobile - On-Road non-Diesel Light Duty Vehicles	45575	41290	26210	-19365	-42%
Solvent - Consumer & Commercial Solvent Use	36591	37088	39564	2973	8%
Solvent - Degreasing	1427	1389	810	-617	-43%

Section	2014	2017	2020	VOCs Reduction (2014-2020, tons)	Percent VOCs Reduction (2014-2020)
Solvent - Dry Cleaning	12	18	15	3	25%
Solvent - Graphic Arts	5147	1930	725	-4422	-86%
Solvent - Industrial Surface Coating & Solvent Use	6404	5584	6826	422	7%
Solvent - Non-Industrial Surface Coating	7680	6315	6863	-817	-11%
Waste Disposal	3632	1950	1921	-1711	-47%
Total	**2089362**	**1095420**	**680519**	**-1408843**	**-67%**

8 Determination of the Adequacy of Existing Implementation Plan

Under 40 CFR §51.308(g)(6), each regional haze progress report must contain:

> An assessment of whether the current implementation plan elements and strategies are sufficient to enable the State, or other States with mandatory Class I Federal areas affected by emissions from the State, to meet all established reasonable progress goals for the period covered by the most recent [regional haze] plan.

In addition, under 40 CFR §51.308(h), "the State must also take one of the actions listed in this section based upon the information presented in the progress report."

The options for action under this section are:

Subsection of regional haze rule	Action
40 CFR §51.308(h)(1)	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 declaration that revision of the existing implementation plan is not needed at this time.
40 CFR §51.308(h)(2)	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.
40 CFR §51.308(h)(3-4)	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. 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.

8.1 Assessment of Class I Areas Affected by Emissions from Arizona

To understand the impact of emissions from Arizona on Class I areas outside the state, ADEQ reviewed the "Western Regional Air Partnership (WRAP) State Source Group Contributions - U.S. Anthro" modeled data analysis available on the WRAP Technical Support System (TSS).[136]

The analysis is limited to impacts from ammonium nitrate and ammonium sulfate extinction at each site, which ADEQ has determined is an adequate proxy for total nitrate and sulfate extinction based on past visibility modeling analysis. ADEQ reviewed the impact of Arizona emissions on the Class I areas in each surrounding state (California, Nevada, Utah, Colorado, and New Mexico).

8.1.1 California

In the WRAP modeling analysis of anthropogenic visibility impairment attributed to ammonium sulfate ($(NH_4)_2SO_4$) or ammonium nitrate (NH_4NO_3) at Class I areas in California as defined by the Comprehensive Air quality Model with extensions'(CAMx) Particulate Source Apportionment tool (PSAT) for the 2028 On the Books (2028OTBa2) model scenario, no California Class I area saw impairment above a de minimis level from Arizona emissions on the most impaired days.

8.1.2 Nevada

ADEQ did not identify any significant impact from Arizona emissions on Nevada's Class I area.

8.1.3 Utah

ADEQ determined that the impact from Arizona emissions on Utah's Class I areas are generally de minimis. The modeling identifies a 0.03 deciview impact from nitrate and a 0.04 deciview impact from sulfate at Bryce Canyon resulting from Arizona emissions, as well as a 0.04 deciview impact from sulfate at Capitol Reef National Park, but ADEQ determines that these impacts do not represent a significant share of overall impacts on Utah Class I areas from emissions outside the state and do not warrant additional controls on Arizona sources.

[136] WRAP State Source Group Contributions - U.S. Anthro. Colorado State University. Accessed July 18, 2024 at: https://views.cira.colostate.edu/tssv2/Express/ModelingTools.aspx

8.1.4 Colorado

ADEQ determined that the impact from Arizona emissions on Colorado's Class I areas are generally de minimis. The modeling identifies:

- a 0.08 deciview impact from nitrate and 0.09 deciview impact from sulfate at WEMI1 monitor for Weminuche Wilderness, La Garita Wilderness, Black Canyon of the Gunnison National Park;
- a 0.03 deciview impact from nitrate and 0.05 deciview impact from sulfate at the WHRI1 IMPROVE monitor for several wilderness areas in Colorado;
- a 0.05 deciview impact from nitrate and a 0.07 deciview impact from sulfate at Great Sand Dunes National Park; and
- a 0.08 deciview impact from sulfate 0.04 deciview impact from nitrate at Mesa Verde National Park.

All other sites in Colorado saw de minimis impact from Arizona emissions.

ADEQ determines that these impacts do not represent a significant share of overall impacts on Colorado Class I areas from emissions outside the state and do not warrant additional controls on Arizona sources.

8.1.5 New Mexico

ADEQ determined that the impact from Arizona emissions on New Mexico's Class I areas are generally de minimis. The modeling identifies:

- a 0.09 deciview impact from nitrate and a 0.13 deciview impact from sulfate at Bandelier National Park.
- a 0.04 deciview impact from nitrate and a 0.12 deciview impact from sulfate at Gila Wilderness.
- a 0.07 deciview impact from nitrate and a 0.10 deciview impact from sulfate at San Pedro Parks Wilderness.
- a 0.07 deciview impact from nitrate and a 0.07 deciview impact from sulfate at Wheeler Peak/Pecos Wilderness Areas.

All other sites in New Mexico saw de minimis impact from Arizona emissions.

ADEQ determines that these impacts generally do not represent a significant share of overall impacts on New Mexico Class I areas from emissions outside the state. Further, for an area like Gila Wilderness where Arizona emissions are a relatively larger share of overall impacts at the site due to lower total impairment, ADEQ determines that these Arizona emissions are not impeding visibility progress or interfering with achievement of New Mexico's reasonable progress goals under the regional haze rule.

New Mexico's SIP revision for the second regional haze planning period indicates that each New Mexico Class I area with greater than de minimis impacts from Arizona emissions (listed above) meets or exceeds the adjusted uniform rate of progress glidepath calculated for the area. As of development of this progress report, the New Mexico Environmental Department (NMED) has not requested that Arizona consider additional controls on Arizona sources to reduce impacts on New Mexico Class I areas.

Therefore, ADEQ determines that the impacts from Arizona emissions on New Mexico Class I areas do not warrant additional controls on Arizona sources.

8.2 Periodic Assessment of Arizona's Smoke Management Program

40 CFR §51.308(g)(8) requires:

> For a state with a long-term strategy that includes a smoke management program for prescribed fires on wildland that conducts a periodic program assessment, a summary of the most recent periodic assessment of the smoke management program including conclusions if any that were reached in the assessment as to whether the program is meeting its goals regarding improving ecosystem health and reducing the damaging effects of catastrophic wildfires.

As discussed in Section 6.4.1, The Role of Fire in Arizona Emission Trends, smoke from wildfire and prescribed burning are a significant source of $PM_{2.5}$ and, to a lesser extent, PM_{10} in Arizona. Arizona's smoke management program, governed by the rules in Arizona Administrative Code (A.A.C.) Title 18, Chapter 2, Article 15 ("Article 15") manages these emissions by ensuring that prescribed burns take place using best management practices for smoke and under optimal conditions for smoke dispersion to minimize negative impacts and reduce overall emissions from fire.

In early 2002, ADEQ established a Fire Emissions Work Group (FEWG) to discuss visibility issues related to fire emissions and to make recommendations to ADEQ for the Regional Haze SIP. Fifteen stakeholders, representing public and private entities in geographically diverse areas of the State, agreed to participate in the work group. The FEWG helped ADEQ draft the original Article 15 rules and create the State's enhanced smoke management program.

ADEQ, on average, approves 440 prescribed fire requests per year, with the majority of prescribed burns taking place in the cooler months. ADEQ staff meteorologists and air quality specialists review burn requests from land managers that contain information on the acreage and fuel type of the burn, the time, date, and location of the burn, and key contacts for information requests and sharing. This review ensures that burns only occur when weather conditions allow for adequate dispersion of smoke and other pollutants from the fires, minimizing negative health and visibility impacts on people and ecosystems.

The previous rules regulating prescribed fires contained outdated terms and provisions that do not completely align with the industry standards developed by the National Wildfire Coordination Group (NWCG), which provides national leadership to prescribed fire operations. This misalignment caused confusion for stakeholders. Through internal review and discussion with stakeholders, ADEQ determined the Article 15 smoke management rules required updates for clarity and ease of use for federal and state land managers conducting prescribed burns.

ADEQ found the rules contained several outdated terms and descriptions of procedures that no longer matched actual practice as closely as when the rules were drafted, causing confusion and delay during land manager submittal of burn requests and ADEQ review of those requests.

In 2023, ADEQ submitted a SIP revision to the EPA containing final revisions to the Article 15 rules to update the terminology, realign the program with NWCG standards, and streamline the program for stakeholders.

ADEQ's revised Article 15 rules now align with national standards for smoke management and facilitate continued oversight of prescribed burning on public lands in Arizona, with continued benefits to both forest health and emission impacts from smoke.

As part of the rule revisions, ADEQ assessed the performance of its smoke management program and determined that, pursuant to §51.308(g)(8), the program is meeting its goals regarding improving ecosystem health and reducing the damaging effects of catastrophic wildfires.

8.3 Declaration of Adequacy

Based on the emission reductions and visibility progress resulting from implementation of effective controls under the regional haze program as discussed in previous sections of this report, Arizona determines that the current implementation plan elements and strategies are sufficient to enable the State, or other States with mandatory Class I Federal areas affected by emissions from the State, to meet all established reasonable progress goals for the period covered by the most recent regional haze plan.

For this reason, this progress report shall also serve as Arizona's formal declaration pursuant to §51.308(h)(1) that revision of the existing regional haze implementation plan is not needed at this time.

9 Public Process and Federal Land Manager (FLM) Consultation

As required under §51.308(i)(2), ADEQ provided a formal review and consultation period to federal agencies that manage Class I areas in Arizona or neighboring states (National Park Service, US Forest Service, and US Fish and Wildlife Service). ADEQ provided a complete draft report for review on August 27, 2024 and provided 60 days for comment, through October 28.

However, all three agencies indicated they did not intend to provide any feedback or formal comments on the draft report during the consultation period. Written evidence of these waivers of review are provided below.

Following ADEQ's public process to provide the general public an opportunity to review and comment on the draft report, a summary of any comments received and ADEQ's responses to them will be attached to this report.

Figure 25: Waiver of Progress Report Review by National Park Service

10/16/24, 2:41 PM State of Arizona Mail - Re: [EXTERNAL] Scheduling Request: 2025 AZ Regional Haze Progress Report

Gmail

Alex Ponikvar <ponikvar.alex@azdeq.gov>

Re: [EXTERNAL] Scheduling Request: 2025 AZ Regional Haze Progress Report

Peters, Melanie <Melanie_Peters@nps.gov> Tue, Sep 24, 2024 at 1:47 PM
To: Kelly Poole <poole.kelly@azdeq.gov>, "Salazer, Holly" <Holly_Salazer@nps.gov>, "Rose, Anita - FS, NM" <anita.rose@usda.gov>, "Allen, Tim" <tim_allen@fws.gov>, "Ming, Jaron E" <jaron_ming@fws.gov>, "King, Kirsten L" <kirsten_king@nps.gov>
Cc: Alex Ponikvar <ponikvar.alex@azdeq.gov>

Hello Kelly,
The NPS appreciates this opportunity to participate in FLM consultation on the Arizona second planning period regional haze progress report. However, due to competing workload priorities the NPS does not plan to provide consultation feedback on this progress report. Thank you for understanding. We look forward to continued work with Arizona for clean air and clear views in the future.
Best,
Melanie

p.s. I will still be happy to attend an overview presentation if you decide to proceed with one.

--
Melanie V. Peters
NPS, Air Resources Division

Office: 303-969-2315
Cell: 720-644-7632

Figure 26: Waiver of Progress Report Review by US Forest Service

RE: [EXTERNAL] Scheduling Request: 2025 AZ Regional Haze Progress Report

Rose, Anita - FS, NM <anita.rose@usda.gov> Tue, Sep 24, 2024 at 2:22 PM
To: "Peters, Melanie" <Melanie_Peters@nps.gov>, Kelly Poole <poole.kelly@azdeq.gov>, "Salazer, Holly" <Holly_Salazer@nps.gov>, "Allen, Tim" <tim_allen@fws.gov>, "Ming, Jaron E" <jaron_ming@fws.gov>, "King, Kirsten L" <kirsten_king@nps.gov>
Cc: Alex Ponikvar <ponikvar.alex@azdeq.gov>

Kelly,

I am in a similar situation here in the Forest Service and am not planning to provide feedback on the progress report. I am certainly willing to attend an overview presentation if you want to proceed with that. Thanks for your continued efforts.

Anita Rose
Regional Air Program Manager and Climate Change Coordinator

Ecosystem Resources and Environmental Planning (EREP)

Forest Service

Southwestern Region (Region 3)

p: 505-842-3437
anita.rose@usda.gov

333 Broadway Blvd SE
Albuquerque, NM 87102
www.fs.usda.gov

Caring for the land and serving people

Figure 27: Waiver of Progress Report Review by US Fish and Wildlife Service

Gmail

Alex Ponikvar <ponikvar.alex@azdeq.gov>

Re: [EXTERNAL] Request RE: 2025 AZ Regional Haze Progress Report Consultation
1 message

Allen, Tim <tim_allen@fws.gov> Tue, Oct 22, 2024 at 3:37 PM
To: Alex Ponikvar <ponikvar.alex@azdeq.gov>
Cc: Kelly Poole <poole.kelly@azdeq.gov>

Hi Alex and Kelly,

You are correct. I do not plan to formally respond to AZ's RH progress report. The presentations were sufficient and informative.

Thank you,

Tim Allen
U.S. Fish & Wildlife Service

10 Conclusion

As demonstrated in the preceding sections, Arizona's regional haze control strategies have been fully implemented and have contributed to significant decreases in anthropogenic emissions of visibility-impairing pollutants. These emission trends indicate that anthropogenic emissions are not limiting or impeding reasonable visibility progress at Arizona's Class I areas. Arizona commits to further analysis of visibility impairment at Class I areas in further regional haze planning periods and progress reports.

The table below lists the ADEQ staff who contributed work to development of this report.

Table 34: ADEQ Staff contributing to this report

Staff	Role
Alex Ponikvar	Planning
Allison Price	Planning and Technical
Yi Li	Technical
Caitlyn Zaremba	Technical
Kelly Poole	Manager, Planning and Research Unit
Chelsey Fenton	Manager, Planning and Analysis Unit
Jessica Wood	Technical Review
Rene Nsanzineza	Technical Review
Elias Toon	Technical and Planning Review
Zac Dorn	Planning Review