

FINAL

MORENCI SULFUR DIOXIDE

NONATTAINMENT AREA

STATE IMPLEMENTATION AND MAINTENANCE PLAN



AIR QUALITY DIVISION

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

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1.0 INTRODUCTION

1.1 Purpose and Regulatory Background

This document consists of the attainment demonstration, maintenance plan, and redesignation to attainment request for the Morenci Sulfur Dioxide (SO₂) Nonattainment Area. The purpose of this document is to demonstrate how the area has met the National Ambient Air Quality Standards (NAAQS) for SO₂ and intends to maintain compliance with the NAAQS. Air quality standards are divided into two types: primary standards based on health effects and secondary standards based on environmental effects such as damage to property, plants, visibility, etc. Both standards are established by Environmental Protection Agency (EPA) for criteria air pollutants such as sulfur dioxide.¹

1.2 History

On March 3, 1978, Environmental Protection Agency (EPA) designated the entire area of Greenlee County nonattainment for SO₂, for lack of a State recommendation (43 FR 8968). On April 10, 1979 (44 FR 21261), EPA approved State of Arizona's request that the SO₂-affected portion of Greenlee County surrounding Morenci be redesignated the 'Morenci SO₂ nonattainment area.' The boundaries of the Morenci nonattainment area are shown in **Table 1.1**.²

Although the current boundaries of the Morenci SO₂ nonattainment area lie solely within Greenlee County, the boundaries of the nonattainment area 50 km buffer include southern portions of Apache County, eastern portions of Graham County and the western parts of three New Mexico counties: Hidalgo, Grant and Catron. (See Map, **Appendix A.1**.)

Phelps Dodge Morenci, Inc. copper smelter facility (PDMI) was the largest SO₂ point source in the Morenci nonattainment area during its operation. PDMI was situated next to the Morenci

¹ Sulfur Dioxide Standards: In 1971, the Environmental Protection Agency (EPA) published the primary and secondary National Ambient Air Quality Standards (NAAQS) for SO₂ (36 FR 81875 (1971)). Secondary annual and 24-hour standards were later eliminated and, at 61 FR 25566 (1996), the primary standard was revised from micrograms per cubic meter, $\mu\text{g}/\text{m}^3$, to parts per million (ppm). The current established NAAQS for SO₂ are:

	<u>Annual</u>	<u>24-hour average</u>	<u>3-hour average</u>
Primary	0.030 ppm	0.14 ppm	
Secondary			0.5 ppm

SOURCE: 40 CFR §§ 50.4 (Primary Standards) and 50.5 (Secondary Standards)

² The boundaries of the Morenci SO₂ Nonattainment Area were codified in 40 CFR § 81.303 and exist today as originally defined in 1979. At that time, the remainder of the county reacquired designation as attainment, reversing the 1978 action.

copper mine, which is currently one of the largest copper-producing operations in North America.³ The Phelps Dodge smelter was located in the Gila River Airshed, just north of the Gila River, at an elevation of about 4,500 feet above sea level. The smelter’s location was at a latitude coordinate of 33°3'49.3" N and a longitude coordinate of 109°20'30.5W. (See **Appendix A** for detailed maps and photographs.) A more detailed description of PDMI smelter operations is found in **Section 2.1**.

Table 1.1 Morenci SO ₂ Nonattainment Area Boundaries		
Morenci Location	Does Not Meet Primary Standards	Unclassifiable
T3S, R28E	X	
T3S, R29E	X	
T3S, R30E	X	
T4S, R28E	X	
T4S, R29E	X	
T4S, R30E	X	
T5S, R28E	X	
T5S, R29E	X	
T5S, R30E		X

Source: 40 CFR § 81.303 (1979)

PDMI was located close to the community of Morenci, in eastern Greenlee county, near the Arizona/New Mexico interstate boundary. Morenci is situated at an elevation of about 4,838 feet and is roughly 8 miles northwest of the town of Clifton, which has been the Greenlee County seat since creation of the County in 1909. The San Francisco River and Chase Creek run through Clifton, which lies at an elevation of 3,464 feet above sea level. PDMI, Morenci and Clifton are scattered along State Highway 191, approximately 178 miles northeast of Tucson, and about 13 miles from Grant County, New Mexico.

On January 28, 1972, in accordance with the provisions of the Clean Air Act (CAA), Arizona submitted a State Implementation Plan (SIP) addressing all major Arizona emission sources. Although the SIP recognized that copper smelters comprised the only significant source category of sulfur dioxide (SO₂) emission in Arizona, Arizona’s SIP failed to provide adequate, responsive control strategies regulating copper smelter emissions. EPA disapproved the portion of the 1972 Arizona SIP related to smelters (37 FR 10849 (1972) and 37 FR 15081 (1972)), as well as

³ The Phelps Dodge Morenci Mine produced 959 million pounds of copper in 1999 and 834 million pounds in 2000.

subsequent submittals in 1976 and 1977.⁴

On September 20, 1979, Arizona submitted a SIP revision to EPA containing a proposed “Multi-Point Rollback Rule” (MPR) and an attainment demonstration that relied on data representativeness and the air quality dispersion characteristics of each nonattainment area during a specific period of data accumulation.

The MPR included performance standards for each existing primary copper smelter (see Arizona Administrative Code (AAC) R18-2-715, R18-2-715.01 & R18-2-715.02). In R18-2-715.01(D), the rule identified January 14, 1986, as the general compliance date for the provisions of the Section. PDMI, however, was subject to a 1981 Delayed Compliance Order and an earlier compliance date of January 1, 1985.⁵

On March 4, 1982, Phelps Dodge responded to EPA, requesting an 18-month delay in its Delayed Compliance Order dates for its Morenci copper smelter, due to financial difficulties. EPA denied the request. On April 17, 1982, PDMI temporarily ceased copper smelting activities, recommencing operations October 12, 1982, initiating use of oxygen-fuel/oxygen-sprinkle smelting systems in its number 3 furnace in November, 1982, as mandated in the PDMI DCO/ITO.

EPA formally approved the 1979 MPR revision on January 14, 1983 (48 FR 1717), requiring that Arizona submit necessary fugitive emissions control strategies and regulations for smelters by August 1, 1984.

PDMI permanently deactivated December 31, 1984. Dismantlement of the Morenci facility began in 1995 and reclamation was complete by December, 1996. (See Photographs in **Appendix A**.) On October 29, 1997, Arizona Department of Environmental Quality (ADEQ) verified that the Phelps Dodge Morenci smelter was closed and dismantled.

1.3 Climate

Greenlee County, which covers a land area of 1,847 square miles, offers diverse terrain and climate, from desert at its southern tip, to high alpine country rising to more than 9,000 feet above

⁴ Arizona submitted several draft smelter regulations to EPA in 1976, which were deemed inadequate by EPA. In January, 1977, Arizona officially submitted to EPA, smelter regulations based on technology specifications, rather than attainment of NAAQS. In May, 1978, Arizona withdrew the 1977 smelter submittal, prior to EPA’s formal disapproval.

⁵ The emission regulations violated were defined in Arizona’s 1979 SIP and in 40 CFR § 52.125(d) and Regulation 7-1-3.6 of the Rules and Regulations for Air Pollution Control of the Arizona State Department of Health (ADHS). After issuance of notices to Phelps Dodge for violations of emission regulations at the Morenci smelter, EPA and PDMI negotiated and agreed to Delayed Compliance/Innovative Technology Orders (DCO/ITOs) under CAA § 113(d)(4) (46 FR 49604 (1981)). EPA issued the final Orders on January 12, 1982 (47 FR 1293). EPA amended the DCO/ITO issued PDMI on July 23, 1984 (49 FR 24090). Although the 1984 amendments to the PDMI consent decree changed some interim compliance dates, the SO₂ compliance deadline remained January 1, 1985.

sea level at points along the Mogollon Rim. The diverse nature of the topography in Greenlee County creates wide temperature variations in the County.

In the Clifton/Morenci area, the hottest month of the year is July, when the average daily maximum temperature is 101.4° Fahrenheit (F) and the average daily minimum temperature is 71.3° F. The coolest month of the year is January, when the average daily maximum temperature is 61.2° F and the average daily minimum temperature is 31.1° F.

In Clifton/Morenci, the heaviest rainfall of the year occurs in July and August; average total precipitation for those months is 2.17 inches and 2.27 inches, respectively. The driest months of the year are May and June, when average total precipitation is 0.22 inches and 0.33 inches, respectively. The average annual precipitation in the Clifton/Morenci area is 12.06 inches.⁶

1.4 Population

During the 1970s when rural counties outpaced the growth of urban counties in the U.S., rural Greenlee County grew by slightly more than 10 percent. However, during the 1980s when Phelps Dodge closed the Morenci smelter (1984), Greenlee County's population declined almost 30 percent, and the unincorporated Morenci area, defined as a 'Census Designated Place' (CDP) by the Census Bureau, lost 34 percent of its population.⁷ The population trend between 1970 and 2000 indicates an approximate, overall 17 percent decline in the Greenlee County population, compared with an almost 50 percent decline in Clifton's population.

In contrast with the population trend in Morenci of the 1980s, Morenci achieved a 4 percent population growth during the 1990s. Decennial census data for Morenci CDP, Clifton, and Greenlee County are shown in **Table 1.2**. ADES population data for the Morenci CDP are not available for any period prior to 1980.

Table 1.3 portrays the projected growth of Morenci CDP, Clifton, and Greenlee County in five-year increments from 2000 to 2015. The populations of Morenci CDP and Greenlee County are expected to increase by approximately the same growth rate, 9 percent and 10.5 percent, respectively.

The year 2000 ADES population projections for both Clifton and Greenlee County exceed the actual Census counts for those areas, by 18.9 percent for Clifton and by 5.1 percent for Greenlee County (see **Tables 1.2** and **1.3**). Population projections for Morenci, however, more closely reflect the Morenci Census count; the 2000 Morenci Census figure varies from the projected population by only 0.58 percent.

⁶ Source of data is the Arizona Department of Commerce Community Profile for Clifton/Morenci, February, 2001.

⁷ CDPs are delineated for decennial censuses, representing the statistical counterparts of incorporated places. Arizona Department of Economic Security (ADES) population projections for July 1, 1985, reflect that Greenlee County's population declined to 9,052 in 1985 from the April 1, 1980, population figure, 11,406 (see **Chapter 1.4, Table 1.2**). The 1985 population figure for Greenlee County is taken from ADES population projections published October, 2000.

Table 1.2				
Decennial Census Population of Morenci, Clifton, and Greenlee County: 1970-2000				
Year	April 1 1970⁸	April 1 1980	April 1 1990	April 1 2000
Morenci CDP		2,736	1,799	1,879 ⁹
Morenci's decennial change			-34.2%	4.4%
Clifton	5,087	4,245	2,840	2,596
Clifton's decennial change		-16.5%	-33.1%	-8.6%
Greenlee County	10,330	11,406	8,008	8,547
Greenlee's decennial change		10.4%	-29.8%	6.7%

Source: U.S. Bureau of the Census, decennial census counts; Arizona Department of Commerce (Morenci CDP population).

Table 1.3				
Population Projections for Morenci, Clifton, and Greenlee County: 2000-2015				
Year	July 1 2000	July 1 2005	July 1 2010	July 1 2015
Morenci CDP	1,890	1,935	1,993	2,062
Clifton	3,087	3,178	3,278	3,390
Greenlee County	8,984	9,297	9,605	9,923

Source: Arizona Department of Economic Security, August 1, 1997.

Table 1.4 presents ADES population records, reflecting percentage of population change from base year 1997 through 2015, for the Morenci SO₂ nonattainment area. **Appendix C.3** uses the population percentage change factors, in **Table 1.4**, below, to project future SO₂ emissions in the Morenci nonattainment and 50 kilometer boundary areas.

Due to the character of the economy in the Morenci/Clifton area, current and future area population growth or decline is likely to depend upon mining employment opportunities.

⁸ ADES population data do not exist prior to 1980 for the unincorporated Morenci area.

⁹ The 2000 Census shows a population of 1,879 with 754 housing units of which 672 are occupied (10.9% vacant). The number of occupied housing units equals the number of households residing in Morenci with 2.8 persons per household.

Table 1.4 Morenci SO₂ Nonattainment Area ADES Population Projections							
Period Percentage of Change							
	1997	2000	2015	% Change 1997 - 2000	% Change 1997 - 2005	% Change 1997 - 2010	% Change 1997 - 2015
Morenci CDP	1,864	1,890	2,062	1.3%	3.8%	6.9%	10.6%
Clifton	3,022	3,087	3,390	2.1%	5.2%	8.5%	12.2%
Morenci/Clifton¹	4,886	4,977	5,452	1.9%	4.6%	7.9%	11.6%

Source: Arizona Department of Economic Security (ADES), August 1, 1997.

1.5 Economy

Morenci is the home of the Phelps Dodge Morenci copper mine, the largest open-pit copper mine in the U.S. Morenci, and its companion town to the east, Clifton, are historic mining towns established in the late 1800s. Within two years of the 1869 discovery of copper ore in the Clifton area, claims and mines were established. By 1918, most of the early copper mines in the area had been acquired by the Arizona Copper Company. Later, those mines were purchased by the Phelps Dodge Corporation, which had developed its own mining and smelting interests in Morenci.

To date, Phelps Dodge remains a major employer in Greenlee County, as mining and mineral processing dominate the economy.¹¹ Mining activities in the Clifton-Morenci area, for example, employ about two-thirds of the total labor force. Other Morenci employers include government and education. **Table 1.5** shows a selected time series of civilian labor force data.

Table 1.5					
Civilian Labor Force Data for Morenci					
Year	1990	1995	1998	1999	2000
Civilian Labor Force	792	1,188	1,099	1,036	1,012
Number Unemployed	59	74	83	84	53
Unemployment Rate	7.4%	6.2%	7.6%	8.1%	5.2%

Source: Arizona Department of Economic Security. Data represent annual averages. Numbers for 1999 and 2000 are preliminary.

¹⁰ The populations of Morenci/Clifton comprise the population of the Morenci SO₂ Nonattainment Area.

¹¹ Source of data is the Arizona Department of Commerce, county profiles, November, 1999.

1.6 General SIP Requirements

Section 110 and Title I, Part D, subparts 1 and 5 of CAA are applicable to this SIP.

1.6.1 CAA § 110(a)(2)

Section 110(a)(2) sets forth the following requirements for nonattainment areas:

- a. States shall include enforceable emission limitations and other control measures, means, or techniques, as well as schedules and timetables for compliance. (See **Chapter 4.0**).
- b. States shall provide for establishment and operation of appropriate devices, methods, systems, and procedures necessary to monitor, compile, and analyze data on ambient air quality. (See **Chapter 3.0**.)
- c. States shall include programs to provide for the enforcement of the measures described in (a) above, and regulation of the modification and construction of any stationary source within the areas covered by the plan to assure that national ambient air quality standards are achieved, including permit programs as required in part (d) below. (See **Chapter 4.0**.)
- d. SIPs shall contain adequate provisions prohibiting any source or other type of emissions activity within the State from emitting any air pollutant in amounts which will contribute significantly to nonattainment or interfere with measures required to be included in an applicable implementation plan. (See **Chapters 4.0 and 6.0**.)
- e. SIPs shall provide necessary assurances that the state will have adequate personnel, funding, and authority under state law to carry out such implementation plans. (See **Chapter 4.4**.)

1.6.2 CAA § 172(c)

Section 172(c) of CAA, “Nonattainment Plan Provisions,” sets forth the following requirements for nonattainment areas:

- a. Implementation of all reasonably available control measures (RACM) as expeditiously as practicable (CAA § 172(c)(1)) -
RACM is met for PDMI because the facility was completely dismantled and no longer exists. The Phelps Dodge Morenci Mine (PDMM) is the only remaining SO₂ point source in the Morenci nonattainment area. There are five SO₂ point sources in the Morenci nonattainment 50 km boundary area, all located in Graham County: AZCO Mining, Inc. (Phelps Dodge Sanchez Project) (AZCO); Safford Valley Cotton

Growers Cooperative, Inc. (SVCG); Glenbar Gin (GG); A. J. Gilbert Construction Company (AJGC); and Federal Correctional Institution, Bureau of Prisons (FCI). (See **Chapters 4.2** and **4.3** for further explanation of applicable RACM for these sources.)

- b. Reasonable further progress (RFP) must be demonstrated in accordance with CAA §172(c)(2). EPA's RFP requirements stipulate that annual incremental reductions in SO₂ are needed to achieve attainment of the SO₂ NAAQS. -

This submittal maintains that the closure of PDMI on December 31, 1984, demonstrates progress towards and achievement of attainment for the SO₂ primary NAAQS.

- c. A current inventory of actual emissions from all sources of relevant pollutant or pollutants (CAA §172(c)(3)). -

ADEQ Air Quality Division (AQD) maintains a historical and current database of actual emissions from State-permitted point and area sources. All non-permitted source emissions data (area and mobile sources) come from EPA's *AIRData* emission inventories.¹² For historical purposes, ADEQ's inventory lists SO₂ emissions at PDMI during its time of operation. The total SO₂ emissions are based upon the measured fugitive emissions plus total stack emissions. Current emissions data for the remaining point sources are also considered in **Chapter 2.0** and defined in **Appendix C.2**.

- d. Prerequisites for new and modified major stationary sources are defined for the construction and operation of new and modified major stationary sources throughout the nonattainment area (in accordance with CAA §172(c)(5) and CAA §173). -

ADEQ has codified the permit application process in Title 18, Article 3 of the Arizona Administrative Code. On December 5, 2001, at 66 FR 63175, EPA took final action to fully approve the operating permits programs submitted by Arizona on behalf of ADEQ, Maricopa and Pima counties; the rule was effective November 30, 2001. (See **Chapter 7.5**.)

- e. The Plan shall include enforceable emissions limitations and other control measures, means, or techniques, as well as schedule and timetables for compliance, as may be necessary or appropriate to provide for attainment of such standard in such area by the applicable attainment date (CAA §172(c)(6)). -

AAC R18-2-715 contains the required annual average emission limitations and number of three-hour average emission limits for Arizona smelters. AAC R18-715.01, "Standards of Performance for Existing Primary Copper Smelters; Compliance and Monitoring," (see **Attachments A**) set forth the compliance date of January 14, 1986, for monitoring, calibration, measurement system performance

¹² *AIRData* provides access to air pollution data for the entire United States. Website address (as of date published): <http://www.epa.gov/air/data/index.html>

requirements, record keeping, bypass operation, and issuance of notices of violation.¹³ Details regarding controls for the remaining SO₂ sources may be found in **Chapter 4.0**.

- f. Equivalent techniques for modeling, emissions inventory, and planning procedures allowed by the Administrator (CAA §172(c)(8)) -
ADEQ is utilizing a Memorandum from John Seitz, EPA's Director of the Office of Air Quality Planning and Standards, dated October 18, 2000, "Redesignation of Sulfur Dioxide Nonattainment Areas in the Absence of Monitored Data," to make the attainment demonstration for this nonattainment area. (See **Appendix B.1**.)
- g. Contingency measures that can be implemented automatically in the event the area fails to make reasonable further progress (CAA §172(c)(9)) -
The area has met the RFP requirement for attainment, so no specific attainment demonstration contingency measures are necessary. (See **Chapter 5.0**.)

1.6.3 CAA § 175(a)

Section 175(a) of CAA, "Maintenance Plans," sets forth the following maintenance plan requirements for nonattainment areas.¹⁴

- a. State Implementation Plan Revisions
Any state that submits a request to EPA, in accordance with CAA § 107(d), for redesignation of a nonattainment area to attainment for any criteria air pollutant, must also submit a revision of the applicable SIP to ensure maintenance of the primary NAAQS standards in the area for a period of at least 10 years following redesignation.
In this submittal, ADEQ will demonstrate projected attainment of primary NAAQS standards through year 2015.
- b. Subsequent Plan Revisions
Eight years following EPA's redesignation of a nonattainment area to attainment for any criteria air pollutant, in accordance with CAA § 107(d), states shall submit an additional revision of the applicable SIP. The additional revision shall define such new or revised air quality control measures as may be necessary to ensure maintenance of the NAAQS in the redesignated area ten years after the expiration of the ten-year period referred to in subsection (a).

ADEQ commits to the submittal of an additional SIP revision in the year 2013

¹³ Standards of Performance for Existing Primary Copper Smelters; Site-specific Requirements, R18-2-515, renumbered R18-2-715 (1993). The January 14, 1986 compliance date for the provisions of rule AAC R18-2-715.01 were preempted for PDMI by the January 1, 1985, compliance date and provisions in effect in the 1981 PDMI consent decree (see **Chapters 1.2** and **4.0**, as well as footnote 2, **Appendix C.1**).

¹⁴ A discussion of this SIP's maintenance plan can be found in **Chapter 7.0**.

time frame.

c. Nonattainment Requirements Applicable Pending Plan Approval

Pending EPA approval of a SIP revision and request for redesignation of a specific nonattainment area to attainment, applicable nonattainment area requirements shall remain in full force and effect concerning that area.

ADEQ commits to ensuring the continuation of the measures identified in **Chapter 4.0**.

d. Contingency Provisions

Each plan revision submitted under this section shall contain such contingency provisions to assure that the State will promptly correct any violation of the standard which occurs after the redesignation of the area as an attainment area. Such provisions shall include a requirement that the State will implement all measures with respect to the control of the air pollutant concerned before redesignation.

ADEQ has included contingency provisions in this submittal and commits to implementing all such identified contingency measures as are necessary.

1.6.4 CAA §§ 191 and 192

This submittal fulfills the requirements of CAA §§ 191 and 192, “Plan Submission Deadlines” and “Attainment Dates.” With the submittal of this SIP and Maintenance Plan, ADEQ requests redesignation of the Morenci SO₂ nonattainment area to attainment.

2.0 SO₂ EMISSIONS INVENTORY FOR POINT, AREA AND MOBILE SOURCES

2.1 Historical Emissions Inventory: 1980s

Appendices C.5 and **C.6** contain an overview of the Morenci nonattainment area and 50 km boundary point and area sources, SO₂ emitting equipment, control devices, permit controls and emissions inventories.

Point Sources

In the last 15 years of its operation, the equipment and smelting process utilized by the PDMI copper smelter changed significantly as smelting technology changed and advanced and as federal and State emissions limits were developed and implemented.

In 1979, there were two principal operations from which sulfur oxides were emitted at the PDMI copper smelter: the reverberatory furnace smelting operation and the converter operation. At that time, the Morenci smelter consisted of five gas-fired reverberatory furnaces.

Waste heat boilers received the reverberatory furnace off-gases, cooling them to 650°F and facilitating the recovery of large particles and heat. Next, those gases were routed to electrostatic precipitators for final particulate removal, and then were released into the atmosphere through the reverberatory stack. Matte tap and slag skimming fugitives were collected and disposed of through an off-gas stack.

From the reverberatory furnaces, copper matte was routed to nine Pierce-Smith converters, which produced blister copper by removing the remaining iron and sulfur present in the matte. The blister copper product was sent to two sets of anode refining vessels for casting and shipping.

Primary off-gases entered gas coolers located behind each converter and passed through electrostatic precipitators, secondary off-gases from the operating converters were sent to the converter stack. At this point, the primary converter gases merged with the roaster off-gases, which had already passed through a set of cyclones and an electrostatic precipitator. These gases would pass through a gas cooling/cleaning train. This train consisted of a packed scrubbing tower, a spray tower for gas cooling, and four mist precipitator vessels. Two of these trains were constructed so that normal equipment maintenance would not interfere with plan operation.

From the cleaning section, the gases entered a 1400 ton per day (tpd) dual train single absorption acid plant, which produced sulfuric acid. Finally, the tail gases from the acid plant were routed to the converter stack for release to the atmosphere.

Phelps Dodge began renovating its furnace number three to introduce oxygen sprinkle technology in 1980. The number three furnace began operating with oxy-fuel burners on October 23, 1982. At full capacity, this furnace could accept 570 tpd of dry feed and 580 tpd of feed from the bedding plant. In order to provide oxygen for this furnace and nitrogen for the rotary dryer, a 500

tpd oxygen plant was also constructed. The gas-fired rotary dryer received feed from the concentration process. Both the gas-fired and the oxygen-assisted reverberatory furnaces relied on a mixture of dried feed (0.2% moisture) and feed from the bedding plant. The fluidized bed roaster was modified to become a concentrate dryer as part of this modification.

On March 23, 1983, the new rotary dryer, which dried concentrate for the number three furnace, became operational. In the 1983 to 1984 period, a second generation of converter hoods, a Toyo hood system, with improved fugitive gas capture characteristics was installed. Construction of a double-absorption, double-train acid plant was completed in 1984. On June 19, 1984, the first acid plant train became operational. The second acid plant train was put into operation on August 28, 1984.

Emissions monitoring provided volumetric flow rates and sulfur dioxide concentrations of the stack gases through two continuous emissions monitoring stations located at each of the 603-foot stacks and the reverberatory furnace off-gas stack. Continuous monitors were also installed at the outlets of each of the acid plant trains and the gases within the number three furnace were monitored for SO₂, NO_x, O₂, and CO.¹⁵

The 1984 permit year, the smelter major process equipment consisted of: one oxygen-assisted reverberatory furnace, one normal gas-fired reverberatory furnace, one single absorption acid plant, one oxygen plant, nine Pierce-Smith converter furnaces, four anode furnaces, four waste heat boilers, two gas cleaning trains, two continuous emissions monitoring stations, and one rotary dryer.

Historical emissions inventories for the Morenci SO₂ nonattainment and 50 km buffer areas indicate that PDMI was the only major point source for SO₂ emission in those areas until it closed on December 31, 1984. For 1983 and 1984, the final years that PDMI operated, PDMI's average annual SO₂ emission was an estimated 95,271 tons per year (tpy) (see **Appendix C.1**). For the period 1980 through June 30, 1984, PDMI's permitted maximum allowable SO₂ emission, based on the permitted plantwide sulfur emission limit, was 407 tons per day (tpd) sulfur (814 tpd or 297,110 tpy SO₂), based on a full operating year of 365 days.¹⁶

On January 1, 1985, the compliance deadline set forth in PDMI's 1981 consent decree, new Arizona SO₂ emission limitation provisions, which applied to PDMI's stack emissions only, were scheduled for implementation. Arizona's new stack emission provisions established a SO₂ limit of 10,505 pounds per hour (lb/hr) (46,012 tpy).¹⁷ Control provisions governing PDMI's fugitive SO₂

¹⁵ From Arizona Department of Health Services, *Phelps Dodge - Morenci Smelter Evaluation Report for Renewal of Operating Permit for 1984*, March 28, 1984 and the *Phelps Dodge Morenci, Inc. Title V Air Quality Permit Application for the Phelps Dodge Morenci Smelter*, November 1, 1994.

¹⁶ The State of Arizona issued permits with sulfur/SO₂ emission limitations to the PDMI smelter up to and through the date of its closure, December 31, 1984. From 1980 through 1984, the Arizona permits were: #0209-80 (August 21, 1980 - December 31, 1980); #0222-81 (February 4, 1981 - December 31, 1981); #0259-82 (April 30, 1982 - December 31, 1982); #0284-83 (February 17, 1983 - December 31, 1983); and #0322-85 (July 13, 1984 - December 31, 1985).

¹⁷ See footnote 5, **Chapter 1.2**.

emissions had been set forth in the federal DCO/ITO (47 FR 1293 (1982)), and applied to PDMI from January 12, 1982, until its closure on December 31, 1984.¹⁸

Area and Mobile Sources

Based on 1980s Greenlee County ADES population data, ADEQ estimates the combined area and mobile SO₂ emission for all of Greenlee County in 1980 at approximately 97 tpy.¹⁹ The population of the Morenci nonattainment area constituted approximately 61 percent that of Greenlee County in 1980, therefore, ADEQ estimates the combined area and mobile SO₂ emission of the Morenci nonattainment area at 61 percent of 97 tpy, or 59 tpy. (See **Figure 2.2**.)

2.2 Emission Inventory for Attainment Demonstration: 1999

Point Sources

During the operation of its copper smelter and until it closed in 1984, PDMI was the only major SO₂ point source in the Morenci nonattainment area. EPA's Office of Air Quality Planning and Standards (OAQPS) *AIRData Net Tier Report* for 1985 and 1986, (the period following PDMI's closure) reflects no SO₂ point source emissions at all. In 1999, the total SO₂ emissions for point sources was approximately one tpy, not only in the Morenci nonattainment area, but in all of Greenlee County, according to EPA's *AIRData Net Tier Report*. Available data show that no other point, area or mobile source has generated, or currently generates the same high level of sulfur dioxide emissions in the Morenci nonattainment area as those generated by PDMI when in operation (see **Figure 2.1** and **Appendices C.1** and **C.2**).

Currently, there is one SO₂ point source in the Morenci SO₂ nonattainment area, and there are five sources in the 50 km boundary area. The OAQPS EPA *AIRData Net Facility Emission Report* for year 1999 indicates that PDMM is the only SO₂ point source in Greenlee County, producing 100 percent of Greenlee County's SO₂ emissions, - one tpy. (See **Chapter 4.2** and **Appendix C.2** for source facility histories and emission inventory data.)

The five SO₂ point sources in the 50 km boundary area are all located in Graham County:

¹⁸ Among many other fugitive gas capture provisions specified in PDMI's 1981 DCO/ITO, PDMI was required to: continue operation of all existing fugitive gas capture systems (secondary converter hoods, matte tapping hoods, and slag skimming hoods) so as to maximize the capture of all fugitive gases; duct all captured fugitive gases to either of the two main smelter stacks or other EPA-approved stacks; and to conduct studies, construct and install, as required, and in conformance with specific deadlines, new or modified fugitive gas capture, control, and cleaning systems, so as to ensure compliance with federal and State emissions guidelines.

¹⁹ The EPA Office of Air Quality Planning and Standards (OAQPS) *AIRData Net Tier Report* for Greenlee County for 1985 shows total annual combined area and mobile SO₂ emission at 77 tpy. Using the ADES population projection for Greenlee County for 1985, 9,052 (see footnote 8, **Chapter 1.4**), ADEQ calculated annual per capita SO₂ emission in Greenlee County in 1985 at one ton for each 117.56 people. Applying the 1985 Greenlee County rate of area/mobile SO₂ emission to the ADES population figure for Greenlee County for 1980, 11,406 (see **Chapter 1.4, Table 1.3**), ADEQ estimates that in 1980, the Greenlee County area/mobile SO₂ emission was 97 tpy.

- a. AZCO Mining, Inc. (AZCO) (Phelps Dodge Sanchez Project);
- b. Safford Valley Cotton Growers Cooperative, Inc. (SVCG);
- c. Glenbar Gin (GG);
- d. A. J. Gilbert Construction Company (AJGC); and
- e. Federal Correctional Institution, Bureau of Prisons (FCI).

Fig 2.1 Morenci SO₂ Nonattainment Area
Historical Point Source Emissions

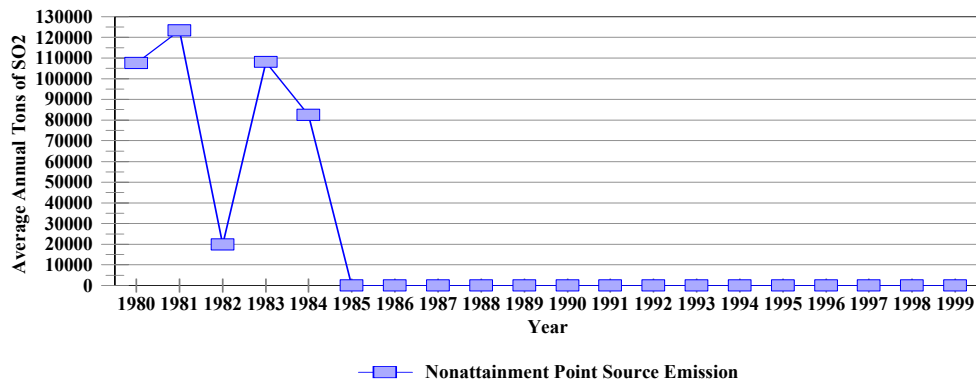


Figure
2.1

reflects the decrease in SO₂ point source emission in the Morenci SO₂ nonattainment and 50 km buffer areas between 1980 and 1999.

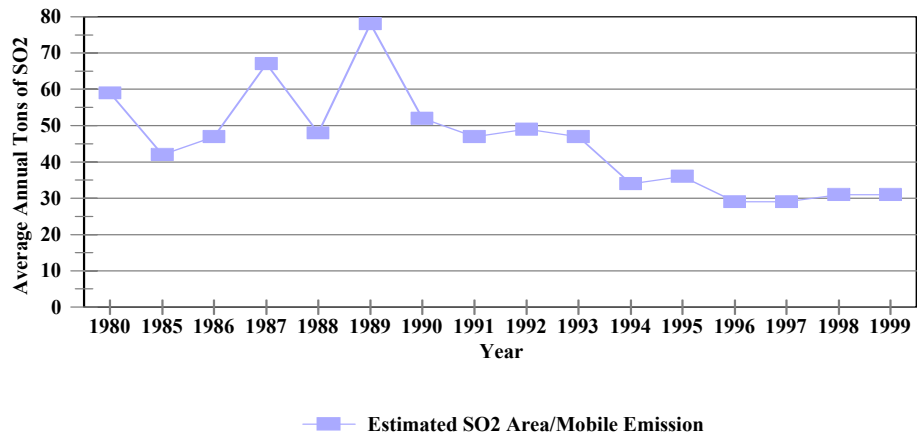
Area and Mobile Sources:

Historical emissions inventories for Greenlee County and the Morenci nonattainment area echo the population trends of those areas over time. Between 1980 and 2000, the combined area and mobile SO₂ emissions in Greenlee County decreased from 97 tpy to 56 tpy, a decrease of about 42.27 percent. Similarly, the Morenci nonattainment area has experienced an estimated decrease from 59 tpy to 31 tpy, a 47.46 percent decrease.²⁰ Chapter 1.4 reflects an overall 25.06 percent decrease in population in Greenlee County between years 1980 and 2000. The decrease in Greenlee County population, however, is not as significant as the overall 35.89 percent population decrease experienced in Clifton/Morenci, the Morenci nonattainment area, during the same period.

²⁰ EPA Office of Air Quality Planning and Standards (OAQPS), *AirData Net Air Pollution Sources - Sulfur Dioxide*, years 1985 through 1999 was the basis for calculating area and mobile source emissions. ADEQ used correlations between Greenlee County population and the population of the Morenci nonattainment area to project SO₂ emissions for the Morenci nonattainment area. (See Appendix C.4.)

Figure 2.2 illustrates projected area/mobile SO₂ emission for the Morenci nonattainment area for years 1980 through 1999.

**Fig 2.2 Morenci Nonattainment Area
Area and Mobile Emission**



3.0 MONITORING NETWORK

Protocols for SO₂ monitoring are found in 40 CFR Part 50, Appendix A, Reference Method for the Determination of Sulfur Dioxide in the Atmosphere, Part 58, Subpart B, Section 58.14, Special Purpose Monitors, Subpart C, Section 58.20, State and Local Air Monitoring Stations, Air Quality Surveillance: Plan Content, and Subpart D, Section 58.30, National Air Monitoring Stations (NAMS).

3.1 SO₂ Monitoring

In 1969, the Air Quality Evaluation Unit of the Abatement Section of the Arizona State Department of Health, Division of Air Pollution Control (ADHS), began ambient SO₂ air quality monitoring in Arizona. ADHS established a total of eight coulometric SO₂ monitors around the seven smelter towns in Arizona, including one in Clifton between October 1, 1969, and December 31, 1969.²¹

With the approval of the Arizona Department of Health Services (ADHS), Phelps Dodge began ambient SO₂ air quality monitoring at its Morenci smelter facility in 1974. **Table 3.1** shows two coulometric State of Arizona monitors were also activated that year. By 1984, both Arizona coulometric monitors had been replaced with pulsed fluorescent monitors. Both State sites were deactivated in early 1985, after the smelter closed. **Table 3.2** shows sites and locations of stationary and mobile SO₂ ambient air quality monitors, all coulometric, owned and operated by Phelps Dodge from 1979 through the 1980s. See **Appendix A, Section A.2** for a detailed historical map of all Arizona and PDMI SO₂ ambient air quality monitoring sites for the Morenci nonattainment area.

Table 3.1 State of Arizona Morenci SO ₂ Ambient Air Quality Monitors		
Monitor Site	Site Location	Activation - Deactivation
Cadillac Point	Latitude 33°05'20.1"N, Longitude 109°22'48.8"W	1974 - 1985
Stargo	Latitude 33°04'17.6"N, Longitude 109°21'46.3"W	1974 - 1985

Source: *Air Quality Control for Arizona Annual Report, Arizona Department of Health Services, 1974 - 1985*

All monitors owned and operated by Phelps Dodge in the vicinity of the Phelps Dodge Morenci smelter were deactivated when PDMI ceased operations, December 31, 1984. Currently there are no ambient SO₂ monitors in the Morenci area. Due to the shutdown of the primary SO₂ point source and resultant termination of the monitoring network, and as outlined in Director John Seitz's October 18, 2000, Memorandum, "Redesignation of Sulfur Dioxide Nonattainment Areas in the Absence of Monitored Data" (see **Appendix B.1**), redesignation for this area does not require eight current consecutive quarters (two years) of quality-assured, violation-free data.

²¹ Arizona State Department of Health, Environmental Health Services, Division of Air Pollution Control, *Sulfur Dioxide Monitoring Network Study*, 1969.

Table 3.2 Phelps Dodge Morenci SO ₂ Ambient Air Quality Monitors		
Stationary Monitors		
Monitor Site	Site Location	Activation - Deactivation
Cadillac Point	Latitude 33°05'22.9"N, Longitude 109°22'43.7"W	1974 - 1984
Fina Station	Latitude 33°03'14.3"N, Longitude 109°18'59"W	1974 - 1984
Fairbanks	Latitude 33°02'10.19"N, Longitude 109°19'37.2"W	1976 - 1984
Metcalf	Latitude 33°06'47.1"N, Longitude 109°22'25.2"W	1974 - 1984
Oroville	Latitude 33°05'28.6"N, Longitude 109°18'25.2"W	1974 - 1981
Stargo	Latitude 33°04'14"N, Longitude 109°21'44"W	1974 - 1984
Eagle Creek	Latitude 33°03'20.1"N, Longitude 109°25'33.7"W	1974 - 1979
Mobile Monitors		
Mobile - Standpipe	Latitude 33°02'58.8"N, Longitude 109°23'9.9"W	1979 - 1984
Mobile - Center Market	Latitude 33°03'24.7"N, Longitude 109°19'50.4"W	1979 - 1980
Mobile - Buena Vista	Latitude 33°03'25.8"N, Longitude 109°19'59.3"W	1982 - 1984
Mobile - Lower Stargo	Latitude 33°03'55.5"N, Longitude 109°21'20.5"W	1981 - 1984
Mobile - Newtown	Latitude 33°04'33.1"N, Longitude 109°21'19.8"W	1980 - 1982

Source: *Air Quality Control for Arizona Annual Report, Arizona Department of Health Services, 1974 - 1985*

3.2 Historical Data Analysis

Since monitoring in the Phelps Dodge Morenci smelter area began, the highest concentrations of SO₂ in Clifton/Morenci occurred in the early 1970s, with levels recorded at 219 to 237 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) in 1975. Forty-nine exceedances of the SO₂ 24-hour average standard at PDMI were recorded in 1976; the next highest number of 24-hour exceedances, 42, occurred in 1981. In 1981, five exceedances of the SO₂ annual average standard were also recorded. **Appendix D** contains a review of the SO₂ ambient air quality monitoring data in the Morenci nonattainment area. A review of **Appendix D** data verifies that the last recorded exceedances of the 24-hour and annual primary standards, as well as of the 3-hour secondary SO₂ NAAQS in the Morenci nonattainment area, occurred in 1984.

4.0 CONTROL MEASURES

4.1 Reasonably Available Control Technology (RACT)

Reasonably Available Control Technology (RACT) is the emissions control level for sources located in the SO₂ nonattainment areas. RACT is determined, in part, by the technological and economic feasibility of the control for the specific source and area.²²

4.1.1 Definition of RACT #1: AAC Rule 18-2-715.01

Technology Description

Chapter 1.2 confirms that PDMI was subject to all the requirements in R18-2-715.01(A)-(T), which define, “Standards of Performance for Existing Primary Copper Smelters; Compliance and Monitoring.” The January 14, 1986, compliance date for the provisions of this rule, in accordance with R18-2-715.01(D), was preempted for PDMI by the compliance date and provisions in effect in the 1981 PDMI consent decree. Compliance was achieved when Phelps Dodge permanently closed the copper smelter on December 31, 1984.

Estimated SO₂ Emission Reduction

Closure of the PDMI copper smelter in 1984 resulted in SO₂ emission reductions in 1985 of at least 46,012 tpy, based on permitted SO₂ stack emission limits effective for PDMI, January 1, 1985. (See **Appendix C.1**.)

Responsible Agency and Authority for Implementation

ADEQ is the responsible agency, with authority designated by:

- ARS § 49-104; and
- ARS § 49-422.

Implementation Schedule

PDMI’s compliance with the rule was effective with closure of the facility, December 31, 1984.

Level of Personnel and Funding Allocated for Implementation

No additional personnel is required.

Enforcement Program

ADEQ is responsible for enforcing performance standards for existing primary copper smelters through inspections, issuance of compliance correspondence, and the development of other

²² US EPA Office of Air and Radiation, Office of Air Quality Planning and Standards, “SO₂ Guideline Document,” February 1994.

escalated enforcement actions as facts dictate.²³

Monitoring Program

For purposes of determining compliance, ADEQ required PDMI to install, calibrate, maintain, and operate a measurement system for continuously monitoring SO₂ concentrations and for stack gas volumetric flow rates. An hour of smelter emissions was considered to have been continuously monitored if the emissions from all monitored stacks, outlets, or other approved measurement locations were measured for at least forty-five minutes of any hour in accordance with the requirements of AAC R18-2-715.01(K)(4).

As required by AAC R18-2-715.01(L), PDMI measured at least 95 percent of the hours during which emissions occurred in any month, and the smelter also complied with the requirement to measure any of the twelve consecutive hours of emissions per R18-2-715.01(M). ADEQ's historical records reflect no occurrence of any monitoring violation at this facility.

As required by 40 CFR § 60.47(b), "Emission Monitoring for Sulfur Dioxide," PDMI maintained records of all average hourly emissions measurements. The records of such emissions were retained for at least two years following the date of measurement. All of the emission measurement results were expressed as pounds per hour of SO₂, summarized monthly and submitted to the Director of the ADEQ within twenty days after the end of each month:

- a. The annual average of the month;
- b. The total number of hourly periods during the month in which measurements were not taken and the reason for loss of measurement for each period;
- c. The number of three-hour emissions averages which exceeded each of the applicable emissions levels listed in R18-2-715.01(F) for the compliance periods ending on each day of the month being reported;
- d. The date on which a cumulative occurrence limit listed in R18-2-715.01(F) was exceeded if such exceedance occurred during the month being reported.

4.1.2 Definition of RACT #2: AAC Rule 18-2-715.02

Technology Description

Compliance with the provisions of AAC 18-2-715.02, which defines the parameters of the, "Standards of Performance for Existing Primary Copper Smelters; Fugitive Emissions," was required for all applicable sources as of January 14, 1986. The rule required sources to measure and evaluate fugitive emissions from various smelters.

Estimated SO₂ Emission Reduction

Closure of the PDMI copper smelter in 1984 resulted in SO₂ emission reductions in 1985 of

²³ See footnote 17, **Chapter 2.1**.

at least 46,012 tpy, based on permitted SO₂ stack emission limits effective for PDMI, January 1, 1985. (See **Appendix C.1**.)

Responsible Agency and Authority for Implementation

ADEQ was the responsible agency with authority designated by:

- ARS § 49-104(A)(11); and
- ARS § 49-422.

Implementation Schedule

Compliance with the rule by PDMI was effective with the facility's closure, December 31, 1984.

Level of Personnel and Funding Allocated for Implementation

No additional personnel is required.

Enforcement Program

ADEQ is responsible for enforcing performance standards for existing primary copper smelters through inspections, issuance of compliance correspondences (NOCs, NOVs, and orders), and the development of other escalated enforcement actions as facts dictate.

Monitoring Program

See **Chapter 4.1.1**.

4.2 Controls for Existing Point Sources in the Morenci SO₂ Nonattainment Area

Phelps Dodge Morenci, Inc. Copper Mine (PDMM)

The Phelps Dodge Morenci open-pit copper mine, ore processing and copper extraction facilities, located at 33°03'54" N latitude and 109°20'32" W longitude, have been in existence and permitted by ADHS and ADEQ since the early 1970s.²⁴ PDMM, permitted to operate 8,760 hours per year, produces copper through conventional milling and froth flotation. ADEQ considers PDMM a major source, with potential emission rates greater than 100 tons per year, of the following pollutants: SO₂, NO_x, and particulates. Recent PDMM emissions inventory data for SO₂, however, indicate nominal emission levels, at approximately one ton per year. (See **Appendix C.2** for SO₂ emissions data.)

At PDMM, the Metcalf Combined Cycle Powerhouse, Diesel Generator SU-46, and the Morenci Steam Powerhouse are the only permitted sources of SO₂ and are subject to similar

²⁴ ADEQ issued Title V permit #M110734P1-99 May 30, 2001, expiration date May 30, 2006, to Phelps Dodge Morenci, Inc. for operation of the Morenci mine. Previous PDMM permits issued were: #0024 (1971-1972); #0046 (1972-1973); #0070 (1973-1974); #0092 (1974-1975); #0115 (1975-1977); #0143 (1977-1978); #0171 (1978-1979); #0196 (1979-1980); #0245-82 (1981-1982); #0260-83 (1982-1983); #0300-84 (1983-1984); and #0325-85 (1984-1985).

emissions limitations and standards. (See **Appendix C.6** for an overview of the PDMM, its SO₂ emitting equipment, control devices, permit controls and emissions inventories.)

Metcalf's two gas turbines in the Combined Cycle Powerhouse were manufactured in 1970, which exempts them from provisions of 40 CFR § 60, Subpart GG, "Standards of Performance for Stationary Gas Turbines." The turbines are currently subject to AAC R18-2-719, "Standards of Performance for Existing Stationary Rotating Machinery," and the process weight rate equations, opacity provisions and SO₂ standards therein, apply. The two Metcalf boilers are subject to the provisions in AAC R18-2-703, "Standards of Performance for Existing Fossil-Fuel Fired Steam Generators and General Fuel-Burning Equipment," since their 1970 manufacture predated the August 17, 1971, trigger date requiring application of the provisions of 40 CFR § 60, Subpart D, "Standards of Performance for Fossil-Fuel Fired Steam Generators."

Diesel Generator SU-46, a Caterpillar 4600 kilowatt diesel generator, was manufactured in 1971 and is subject to the provisions AAC R18-2-719, "Standards of Performance for Existing Stationary Rotating Machinery," and its process weight equation, opacity and sulfur dioxide standards.

The Morenci Steam Powerhouse consists of four Combustion Engineering boilers, all manufactured prior to 1966, and two Foster Wheeler superheaters, both manufactured prior to 1944. Like the Metcalf boilers, because of their manufacture date, the Steam Powerhouse boilers are not regulated by the provisions of 40 CFR § 60, Subpart D. Similarly, due to their age, the superheaters are not subject to 40 CFR § 60, Subpart Dc, "Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units." Unlike the Metcalf boilers, however, the smaller Morenci Steam Powerhouse boilers and the Steam Powerhouse superheaters are all subject to the provisions of AAC R18-2-724, "Standards of Performance for Fossil-Fuel Fired Industrial and Commercial Equipment," and to the process weight equation, SO₂ and opacity standards, therein.

Other applicable Arizona rule and statute provisions may also affect and control source emissions, including: permit revision and termination conditions; source reporting terms, monitoring and recordkeeping provisions; compliance certification and source inspection and testing requirements; emissions limits/standards; and permit deviation reporting.

4.3 Controls for Point Sources in the 50 km Buffer Area

AZCO Mining, Inc. (AZCO) (Phelps Dodge Sanchez Project)

AZCO Mining, Inc. operates an open-pit, heap leach copper mine facility at 32°53'00" N latitude and 109°33'00" W longitude, which has been permitted by ADEQ since the early 1990s.²⁵ All emission limits for the source are based on a 24 hour-per-day, 365-day-per-year, 8,760 hour-per-year operating schedule.

²⁵ ADEQ Class II permit #091168P0-99, revised by permit #1000066 (December 20, 1994 - December 20, 1999). A permit and renewal application are currently in review.

AZCO equipment and sources for which permitted SO₂ emissions limits are calculated include only the AZCO boiler, the SO₂ emission from which ADEQ limits to a maximum 25.5 tpy, restricting the horsepower (hp) of the boiler to 250 hp. ADEQ's permit requires "beads," foam or other ADEQ-approved control method, to limit the sulfuric acid mist emissions from the AZCO solution extraction, electrowinning (SX-EW) tankhouse.

Particulate matter constitutes the most significant mine emission. Actual annual SO₂ emission for the AZCO mine falls far under its maximum allowable emission. In 1999, AZCO's annual SO₂ emission was 0.031 tpy. (See **Appendix C.2** for SO₂ emissions data.)

Safford Valley Cotton Growers Cooperative, Inc. (SVCG)

The Safford Valley Cotton Growers Coop, Inc. (SVCG) facility, permitted by ADEQ, is located at 31°58'36" N latitude and 109°44'41" W longitude and operates at 2,950 feet above mean sea level.²⁶ The source's operating hours per year are limited by the nature of the cotton ginning business, growing seasons, and the operational capacity of its equipment.

ADEQ's permit regulates the cotton gin facility, which operates two cotton gins, each of which has three 3MMBtu/hr burners and one 2MMBtu/hr burner. Each cotton gin is capable of producing 15 bales per hour (7500 pounds per hour lint). Long-cone cyclones, which are affixed to the unloading fan, the dryers/cleaners, the overflow fan, the lint cleaner fans, mote fan, cyclone robber system, trash fans, and battery condenser, are used to remove particulate matter from the ginning process exhaust air. The facility's engines are fueled by natural gas, the combustion of which informs the facility's source of SO₂ emissions.

Sulfur dioxide emissions from SVCG are considered extremely minor, with a maximum operational SO₂ emission potential of approximately 0.07 tpy. (See **Appendix C.2** for SO₂ emissions data and **Appendix C.6** for an overview of sources, emissions and controls.)

Glenbar Gin, Inc. (GG)

The Glenbar Gin (GG) facility, permitted by ADEQ, is located at 32°55'1.99" N latitude and 109°51'24" W.²⁷ The source's operating hours are limited by the nature of the cotton ginning business, growing seasons, and the operational capacity of its equipment.

ADEQ's permit regulates the cotton gin facility, which consists of 12 long staple stands, two 158-saw short staples, ten cleaners (incline and superjet), two dryers, four lint cleaners, one press, and associated equipment, with a maximum operational capacity of 16 bales per hour.

Sulfur dioxide emissions from GG are considered extremely minor, with a maximum operational SO₂ emission potential of approximately 0.01 tpy. (See **Appendix C.2** for SO₂

²⁶ ADEQ has issued Class II operating renewal permit #1001589 to the Safford Valley Cotton Growers Coop, Inc.

²⁷ ADEQ issued Class II permit #090183P1-99, August 20, 1999, to Glenbar Gin, Inc.; permit #26390 is currently under ADEQ review for renewal.

emissions data and **Appendix C.6** for an overview of sources, emissions and controls.)

A. J. Gilbert Construction Company (AJGC)

The A. J. Gilbert Construction Company hot mix asphalt facility, permitted by ADEQ, is located near Safford, Arizona, at about 32°48'7.38" N latitude and 109°42'28.55" W longitude.²⁸ Annual hours of operation are not restricted for this source.

ADEQ's permit for AJGC incorporates provisions of 40 CFR § 60 Subpart I (AAC R18-2-901, Subpart I), which defines "Standards of Performance for Hot Mix Asphalt Facilities," which are applicable to fixed or portable hot mix asphalt facilities consisting of any combination of the following: dryers; systems for screening, handling, storing and weighing hot aggregate; systems for loading, transferring and storing mineral filler; systems for mixing hot mix asphalt; as well as loading, transfer, and storage systems associated with emissions control. (See **Appendix C.6** for additional State regulation pertinent to AJGC.)

Primary SO₂ emissions sources for this facility are the generator stack and the drum mix burner. When the facility's generators use number two diesel fuel, the generator's maximum potential SO₂ emissions are estimated at 10.4 tpy. If the drum mix burner is fueled using number two diesel fuel, the drum mix burner's maximum potential SO₂ emissions are estimated at 51.2 tpy. The facility's maximum potential SO₂ emissions are estimated, therefore, at 61.6 tpy. A wet scrubber is used to control asphalt plant stack emissions. An ADEQ permit process restriction limits generator use by the facility to 7,700 hours annually. (See **Appendix C.2** for SO₂ emissions data and **Appendix C.6** for an overview of sources, emissions and controls.)

Federal Correctional Institution Safford, Bureau of Prisons (FCI)

ADEQ has current permit authority over the Federal Correctional Institution, Bureau of Prisons, in Safford. ADEQ's permit covers FCI's emergency generator, which is located at 32°46'.0001" N latitude and 109°43'.0001" W.²⁹ FCI operates an Onan, model 750 DFHA, 1030 horsepower emergency generator, the only SO₂ emitting equipment on site. ADEQ's permit requires that FCI operate its generator in accordance with applicable provisions of federal and State regulations. In addition, in its permit, ADEQ authorizes FCI to burn only low sulfur diesel fuel in the generator and limits the hours of operation of the generator engine to no more than 500 hours for any given consecutive 12-month period. During maximum equipment operation, ADEQ estimates that the Onan generator will potentially emit up to 0.42 tpy SO₂ annually.

4.4 Controls for Area and Mobile Source in the Morenci Nonattainment Area

Sulfur dioxide emission data in **Appendix C.4** reflect that SO₂ emissions from the area and mobile source categories in the Morenci SO₂ nonattainment area, an estimated 31 tons in 1999,

²⁸ ADEQ issued Class II permit #1000188, September 18, 1996, to A. J. Gilbert Construction Company; this permit is currently under ADEQ review for renewal.

²⁹ ADEQ issued Class II permit #1000596 to the Federal Correctional Institution in Safford, on March 11, 1998.

generally comprise an estimated 55 percent of the total area and mobile emissions in Greenlee County. Projected future SO₂ emissions from the area and mobile source categories, as reflected in **Appendix C.5**, using ADES population projections for the Morenci nonattainment area, demonstrate nominal growth for the area through 2015. Area and mobile emission categories are considered relatively minor.

5.0 CONTINGENCY MEASURES

5.1 Prevention of Significant Deterioration (PSD)

ADEQ has a PSD permitting program that was established to preserve the air quality in areas where ambient standards have been met by requiring stationary sources to undergo preconstruction review before the facility is constructed, modified, or reconstructed and to apply Best Available Control Technology (BACT).³⁰ This program will apply to any major source wishing to locate in the area, once redesignated to attainment (See **Chapter 7.0**, “Maintenance Plan”).

³⁰ AAC R18-2-406, “Permit Requirements for Sources Located in Attainment and Unclassifiable Areas.”

6.0 CONFORMITY PROVISIONS

Section 176(c)(1)(A) of CAA requires SIPs to contain information regarding the State's compliance with conformity requirements. As stated in 40 CFR § 93.153(b), "Conformity determinations for federal actions related to transportation plans, programs and projects developed, funded, or approved under title 23 U.S.C. or the Federal Transit Act (40 U.S.C. 1601 et seq.) must meet the procedures and criteria of 40 CFR part 51, subpart T, in lieu of the procedures set for in this subpart."

Federal rule 40 CFR § 93.103(b) waives transportation conformity for SO₂ nonattainment areas, but general conformity for the Morenci, Greenlee County area, must still be addressed to assure SO₂ emissions from any federal actions or plans do not exceed the rates outlined in 40 CFR § 93.153(b)(1). Criteria for making determinations and provisions for general conformity as outlined in 58 FR 63214 (1993) can be located in R18-2-1438 of the Arizona Administrative Code.

There is currently one federal agency-related point source in the Morenci SO₂ nonattainment area, the Federal Correctional Institution, Bureau of Prisons, whose emissions fall far below the trigger level for general conformity analysis. ADEQ believes that this source will neither cause nor contribute to any new violations of the NAAQS, interfere with any provisions in this SIP for compliance with the NAAQS, nor increase the frequency or severity of NAAQS violations in the Morenci nonattainment area. ADEQ is not aware of any future federal plans or actions affecting air quality in the Morenci, Greenlee County area, contemplated in the next decade, through year 2015.

7.0 MAINTENANCE PLAN

ADEQ reaffirms its intention to adopt, submit as a SIP revision, and implement expeditiously, any and all measures needed to ensure maintenance of the NAAQS in the event that an exceedance of the NAAQS is monitored or modeled.

Section 107(d)(3) of CAA requires that nonattainment areas have a fully-approved maintenance plan meeting the requirements of CAA § 175(a) before they can be redesignated to attainment. Section 175(a) of CAA further requires such a SIP revision provide for maintenance of the NAAQS for at least ten years after the redesignation to attainment. A subsequent SIP revision providing for maintenance of the NAAQS for an additional ten years is due eight years into the first ten-year maintenance period.

As indicated in Director John Seitz's Memorandum, "Redesignation of Sulfur Dioxide Nonattainment Areas in the Absence of Monitored Data," dated October 18, 2000, four specific requirements for demonstration of maintenance are necessary: (1) future emission inventory projections, (2) dispersion modeling to show no SO₂ violations are projected for the maintenance period, (3) commitment for PSD requirements, and (4) commitment to resume monitoring. These requirements are outlined in the following sections.

7.1 Emissions Projections

Arizona does not anticipate the construction of additional SO₂ point sources within the Morenci nonattainment area. However, should growth occur, ADEQ's permit program limits all emissions as part of the construction of new point sources or the upgrading of existing sources.

ADEQ projects actual emissions of SO₂ from area/mobile sources may grow as the population of the Morenci nonattainment area grows. Based on ADES projections, an approximate 11.6 percent increase in the population of the Morenci SO₂ nonattainment area between 1997 and 2015 would produce the trends in SO₂ emissions reflected in **Table 7.1** for the area in the year 2015. (See also **Appendices C.3**, and **C.5**.) As noted in **Section 1.4**, the population of Greenlee County, as a whole, is growing just slightly (1.90 percent) faster than that of the Morenci nonattainment area. The population of the Morenci nonattainment area has consistently represented approximately 55 percent of the population of Greenlee County; ADES does not project that correlation to change between now and 2015.

Area/mobile SO₂ emission projections reflected in **Table 7.1** for the Morenci nonattainment area are estimates taken from available area/mobile SO₂ emission data for Greenlee County and projected for the known population of the Morenci nonattainment area (Morenci/Clifton). ADEQ Permit and Compliance records are the basis for point source SO₂ emission estimates reflected in **Table 7.1** for the Morenci nonattainment area.

Table 7.1 Average Annual SO₂ Emission Projections for 2015 in the Morenci SO₂ Nonattainment Area in Tons Per Year (tpy)				
Type of Source	1980 SO ₂ Emission	1997 SO ₂ Emission	Multiplier (based on population growth projections)	2015 Projected, Worst-Case SO ₂ Emission ³¹
Area and Mobile Sources ³²	59.00	29.00	1.116	32.36
Point Sources	107,555.00 ³	3.27	1.116	3.65
Annual Totals	107,614.00	32.27		36.01

SOURCE: EPA NET Inventory Report, 1997

Table 7.1 shows that SO₂ emissions for the Morenci nonattainment area have decreased an estimated 99 percent from SO₂ emissions in 1980; emissions projected for the year 2015 are calculated at 0.033 percent of 1980 levels, as shown in calculation, below. (**Appendices C.3** and **C.5** contain additional point source and area/mobile SO₂ emission projection data.)

$$\frac{36 \text{ Tons in 2015}}{107,614 \text{ Tons in 1980}} = 0.033 \text{ Percent}$$

7.2 Modeling

In the event that new sources are built, ADEQ commits to doing the appropriate modeling before any permitting actions are finalized. Current nonattainment area sources' emissions are so minimal that dispersion modeling is not necessary.

7.3 PSD Permit Requirements

AAC R18-2-406 will apply after redesignation for any new point source. (See **Appendix B.1**).

³¹ Sulfur dioxide emission projections are calculated using base year 1997.

³² Consistent with emissions data found in the EPA AIRData website, emissions 'area' source emissions include mobile sources. For area and mobile sources, SO₂ emission projections are calculated using population growth projections.

³³ **Appendix C.1** reflects 1980 annual SO₂ emissions of 107,554 tpy for the Phelps Dodge copper smelter. The only other source in the Morenci nonattainment area was the Phelps Dodge Morenci Mine, for which one tpy is added to the smelter emissions for a total of 107,555 tpy.

7.4 Commitment to Resume Monitoring

There is no current monitoring for SO₂ within the Morenci nonattainment area. However, ADEQ is prepared to resume monitoring in accordance with Director John Seitz's October 18, 2000, Memorandum, "Redesignation of Sulfur Dioxide Nonattainment Areas in the Absence of Monitored Data," outlining the requirements for resuming monitoring. (See **Appendix B.3**.) ADEQ commits to resume monitoring before any major source of SO₂ emissions commences operation.

7.5 Contingency Measures

As required in Director John Calcagni's Memorandum, "Procedures for Processing Requests to Redesignate Areas to Attainment," this maintenance plan contains contingency measures to accommodate potential New Source Review (NSR) and Prevention of Significant Deterioration (PSD) problems. The provisions of AAC R18-2-403, "Permits for Sources Located in Nonattainment Areas," and those of AAC R18-2-406, "Permit Requirements for Sources Located in Attainment and Unclassified Areas," are designed to address NSR and PSD requirements applicable to SO₂ sources (see **Appendix B**).³⁴

³⁴ New AAC Sections R-18-2-403 and R-18-2-406 were adopted effective November 15, 1993. New Source Review standards are defined in 40 CFR § 51.307, Prevention of Significant Deterioration standards, in 40 CFR § 51.166.

8.0 REFERENCES

Arizona Copper Smelter Handbook, Arizona Mining Association, Phoenix, Arizona, July 14, 1988.

Arizona Testing Manual for Air Pollutant Emissions (Revision E), Arizona Department of Air Quality, May 15, 1989.

Attainment Determination Policy for Sulfur Dioxide Nonattainment Areas, Memorandum from Director Sally L. Shaver to Regional Office Air Division Directors, U.S. Environmental Protection Agency, January 26, 1995.

Breathing Easier: A Report on Air Quality in California, Arizona, Nevada, & Hawaii, U.S. Environmental Protection Agency, EPA-909-R-95-001, Region 9, Air and Toxics Division, San Francisco, California, May 1995.

National Annual Industrial Sulfur Dioxide Emission Trends 1995- 2015, U.S. Environmental Protection Agency, EPA 454-R-95-001, Air and Radiation, Research Triangle Park, N.C., June 1995.

Procedures for Processing Requests to Redesignate Areas to Attainment, Memorandum from Director John Calcagni to the Regional Office Air Division Directors, U.S. Environmental Protection Agency, September 4, 1992.

Redesignation of Sulfur Dioxide Nonattainment Areas in the Absence of Monitored Data, Memorandum from Director John R. Seitz to the Regional Office Air Division Directors, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, October 18, 2000.

Section 107 Designation Policy Summary, Memorandum from Director Sheldon Meyers to the Regional Office Air Division Directors, U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Washington DC, April 21, 1983.

Sulfur Dioxide Guideline Document, U.S. Environmental Protection Agency, EPA-452/R-94-008, Research Triangle Park, North Carolina, February 1994.

Supplemental D to Compilation of Air Pollutant Emission Factors, Volume I: Stationary Point and Area Sources (AP- 42 5th Edition), U.S. Environmental Protection Agency, EPA-454-F-9903, Department of Commerce, National Technical Information Service, Springfield, Virginia, August 31, 1998.

APPENDICES

APPENDIX A **Photographs and Map of Area**

- Section A.1 Point Sources in the Morenci Nonattainment and 50 Km Boundary Areas
- Section A.2 Ambient Air Quality Monitoring Sites around the Phelps Dodge Morenci, Inc. Copper Smelter
- Section A.3 Photograph of PDMI before Shutdown and Dismantling
- Section A.4 Photograph of PDMI after Dismantling

APPENDIX B **EPA Guidance Memoranda**

- Section B.1 Redesignation of Sulfur Dioxide Nonattainment Areas in the Absence of Monitored Data, October 18, 2000, Director John Seitz
- Section B.2 Attainment Determination Policy for Sulfur Dioxide Nonattainment Areas, January 26, 1995, Director Sally L. Shaver
- Section B.3 Procedures for Processing Requests to Redesignate Areas to Attainment, September 4, 1992, Director John Calcagni
- Section B.4 Section 107 Designation Policy Summary, April 21, 1983, Director Sheldon Meyers

APPENDIX C **Emissions Inventory**

- Section C.1 Historical Point Source Morenci Nonattainment Area Emission (Phelps Dodge Morenci Branch Copper Smelter)
- Section C.2 Current Point Source Emission Inventories (Morenci SO₂ Nonattainment and 50 Km Boundary Areas)
- Section C.3 Projected Point Source Emission Inventories (Morenci SO₂ Nonattainment and 50 Km Boundary Areas)
- Section C.4 Historical and Current Area and Mobile Source Emission Inventories, 1985 through 1999 (Greenlee County and Morenci SO₂ Nonattainment Area)
- Section C.5 Historical and Projected SO₂ Area and Mobile Source Emission Inventories (Morenci SO₂ Nonattainment Area and Greenlee County)
- Section C.6 Annual and Projected SO₂ Point Source Emission Inventories, Morenci Nonattainment Area and 50 Km Boundary - Overview

APPENDIX D **Monitoring Network**

- Tables A - H SO₂ Ambient Air Quality Monitoring Network Data for the Morenci Nonattainment Area, 1979 through 1985

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Photographs and Maps of Area

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APPENDIX D

Monitoring Network

- Table A 1979 Sulfur Dioxide Data Ambient Air Quality Data Summary
- Table B 1980 Sulfur Dioxide Data Ambient Air Quality Data Summary
- Table C 1981 Sulfur Dioxide Data Ambient Air Quality Data Summary
- Table D 1982 Sulfur Dioxide Data Ambient Air Quality Data Summary
- Table E 1983 Sulfur Dioxide Data Ambient Air Quality Data Summary
- Table F 1984 Sulfur Dioxide Data Ambient Air Quality Data Summary
- Table G 1985 Sulfur Dioxide Data Ambient Air Quality Data Summary
- Table H Summary, Sulfur Dioxide Monitoring Exceedances, 1979 - 1984

ATTACHMENTS

- **Attachments A Relevant Administrative Codes**
Arizona Administrative Code (AAC)
 - **AAC R18-2-202** (Sulfur Oxides)
 - **AAC R18-2-403** (Permits for Sources Located in Nonattainment Areas)
 - **AAC R18-2-406** (New Source Review)
 - **AAC R18-2-715** (Standards of Performance for Existing Primary Smelters)
 - **AAC R18-2-715.01** (Standards of Performance for Existing Primary Copper Smelters; Compliance and Monitoring)
 - **AAC R18-2-715.02** (Standards of Performance for Existing Primary Copper Smelters; Fugitive Emissions)

- **Attachments B Government Agency Organization Charts**
 - **Arizona Department of Environmental Quality Chart**

- **Attachments C Public Hearing Documentation**
 - **Public Notice and Hearing Documentation**
 - **Written Comments**
 - **Responsiveness Summary**