FINAL

AJO 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 Ajo Sulfur Dioxide (SO_2) nonattainment area. The purpose of this document is to demonstrate how the area has met the National Ambient Air Quality Standards (NAAQS) for SO_2 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 Pima County nonattainment for SO_2 for lack of a State recommendation (43 FR 8968). On April 10, 1979 (44 FR 21261), EPA approved the State of Arizona's request that the SO_2-affected portion of Pima County surrounding Ajo be redesignated the 'Ajo SO_2 nonattainment area,' the boundaries of which are shown in **Table 1.1**.[2]

Although the current boundaries of the Ajo SO_2 nonattainment area lie solely within Pima County, the boundaries of the nonattainment area 50 km buffer include northern portions of Mexico along its international border with Arizona, eastern portions of Yuma County along the Pima/Yuma County boundary, southern parts of Maricopa County, and a southwestern part of Pinal County along the Pima/Pinal County boundary. (See Map, **Appendix A.1**.)

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[1] Sulfur Dioxide Standards: In 1971, the Environmental Protection Agency (EPA) published the primary and secondary National Ambient Air Quality Standards (NAAQS) for SO_2 (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, $\mu g/m^3$, to parts per million (ppm). The current established NAAQS for SO_2 are:

	Annual	24-hour average	3-hour average
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 Ajo SO_2 nonattainment area were codified in 40 CFR § 81.303 and exist today as defined in 1979. At that time, the remainder of the county acquired designation as attainment, reversing the 1978 action.

Table 1.1 Ajo SO_2 Nonattainment Area Boundaries		
Ajo Location	**Does Not Meet Primary Standards**	**Unclassifiable**
T11S, R6W	X	
T11S, R5W	X	
T12S, R6W	X	
T12S, R5W	X	
T13S, R6W	X	
T11S, R7W		X
T12S, R7W		X
T13S, R7W		X
T13S, R5W		X

SOURCE: 40 CFR § 81.303 (1979)

During its operation, Phelps Dodge Mining Company's Ajo Incorporated (PDAI) operation was the largest point source in the Ajo nonattainment area.[3] PDAI was located in western Pima County near State Highway 85, approximately 110 miles southwest of Phoenix, Arizona, and 131 miles west of Tucson, the county seat. Mexico is about 40 miles to the south. The PDAI copper smelter was situated at the eastern end of the Little Ajo Mountains, at an elevation of 1,760 feet at its base and 2,120 feet at its highest elevation. The geographic coordinates of the former PDAI copper smelter are 32°22'1" N latitude and 112°51'13.2" W longitude. Consult **Appendix A** for detailed maps and photographs of the PDAI smelter; **Chapter 2.1** contains a description of PDAI smelter operations.

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 recognizing that copper smelters comprised the only significant source category of sulfur dioxide (SO_2) 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)). EPA similarly disapproved subsequent Arizona smelter control submittals in 1976 and 1977 for failure to assure the attainment and maintenance of the national standards in a manner consistent with the intent of §110(a)(2)(B)

[3] The Phelps Dodge mining, smelting and generator facilities located in Ajo, Arizona, are also collectively referred to as the Phelps Dodge "New Cornelia Branch."

of the Clean Air Act.[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. This element of Arizona's proposed SO_2 control strategy offered a method of accounting for the high variability inherent in SO_2 emissions from copper smelters.

In 1981, EPA proposed conditional approval of Arizona's MPR SIP revision (46 FR 58098 (1979)). EPA formally approved the revision on January 14, 1983 (48 FR 1717).[5] Arizona's SIP revisions were designed to meet the requirements of CAA §§110 (state implementation plans) and 123 (smelter stack heights) as amended in 1977 and replaced EPA's January 4, 1978, smelter emission limits and SO_2 control regulations applicable to Arizona copper smelters. To complete the Arizona SO_2 SIPs, EPA required that Arizona submit necessary fugitive emissions control strategies and regulations for existing smelters by August 1, 1984.

The MPR included copper smelter 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. In 1983, PDAI was subject to consent decree requirements and an earlier compliance date, December 31, 1985.[6]

The 1981 Delayed Compliance Orders required PDAI to bring its air emissions into compliance with SO_2 SIP emission limitations by December 31, 1985, to avoid federal enforcement actions. On March 4, 1982, Phelps Dodge responded, requesting an 18-month delay in its Delayed Compliance Order dates for its Ajo copper smelter, due to financial difficulties. EPA denied the

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[4] Arizona submitted several deficient draft smelter regulations to EPA in 1976, which were rejected 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] Arizona Code of Rules and Regulations (ACR): Rule (R) 9-3-515 (recodified as Arizona Administrative Code (AAC) R18-2-515; renumbered as R18-2-715 in 1993 as Standards of Performance for Existing Primary Copper Smelters; Site Specific Requirements).

[6] The emission regulations violated were defined in Arizona's 1979 SIP and in 40 CFR § 52.125(d) and 40 CFR § 52.126(b). After issuance of notices of violation to Phelps Dodge for violations of emission regulations at the Ajo smelter, EPA and PDAI had negotiated and agreed to issuance of Delayed Compliance/Innovative Technology Orders (DCO/ITOs) to PDAI, under CAA § 113(d)(4) (46 FR 49604 (1981)). EPA finally issued the Orders on January 12, 1982 (47 FR 1293). EPA amended the 1981 DCO/ITO issued PDAI July 23, 1984; notice of the amended consent decree appeared in 49 FR 24090. The amendments to the consent decree terminated the Innovative Technology Order for the Ajo smelter, revoking the earlier mandate to install an oxygen plant and convert the reverberatory furnace at the Ajo smelter to oxygen fuel/oxygen sprinkle smelting, since those measures were not required to comply with the new MPR emission limits. Accordingly, EPA shortened the SO_2 compliance deadline for PDAI from December 31, 1985, to July 1, 1984.

request. On April 17, 1982, PDAI temporarily ceased copper smelting activities, recommencing operations on May 15, 1984, before permanently deactivating, April 4, 1985.

Dismantlement of the Ajo facility occurred in 1995 and was complete by February, 1996. (See Photographs in **Appendix A.**) On October 15, 1997, Arizona Department of Environmental Quality (ADEQ) verified that the Phelps Dodge Ajo smelter was closed and dismantled.

1.3 Climate

Pima County consists of predominantly Sonoran desert and mountain terrain, with elevations ranging from 1,200 to the 9,185-foot peak of Mount Lemmon. The town of Ajo lies at an elevation of 1,798 feet. As elevations vary, so vary temperatures in Pima County. In Ajo, the hottest month of the year is July, when the average daily maximum temperature is 103.2° Fahrenheit (F) and the average daily minimum is 78.4° F. January is the coolest month of the year with an average daily maximum temperature of 64.1° F and an average daily minimum of 49.9° F.

In Ajo, rainfall generally occurs in two seasons. The wettest months of the year are August when monsoon-type rains produce an average of 2.46 inches of rain, and July, when an average 1.36 inches fall. In December, Pacific winter storms moving across the Southwest may deposit an average of 0.83 inches of rain in Ajo. May and June provide the least precipitation annually, each month producing an average 0.06 inches. The average annual precipitation in Ajo is 8.95 total inches of rain.

During the fall, winter and spring months, unstable portions of northern Mexico's moist air masses may visit Ajo and southern Arizona, resulting in weather effects such as high winds and/or thunderstorms and flash floods.

1.4 Population

The population data for Pima County and the unincorporated Ajo area, designated a 'Census Designated Place' (CDP) by the Census Bureau, were compiled from data developed by the Arizona Department of Economic Security (ADES).[7] **Table 1.2** presents ADES population records for Pima County, the Ajo CDP and Arizona, in addition to estimates for years 2000 through 2015.

Table 1.2 Population Projections

	1997	2000	2015	% Change 1997 - 2000	% Change 2000 - 2015	% Change 1997 - 2015
Pima County	799,375	854,329	1,119,342	6.9%	31.0%	40.0%
Ajo CDP	3,678	3,837	4,533	4.3%	18.1%	23.2%

[7] CDPs are delineated for decennial censuses, representing the statistical counterparts of incorporated places.

Arizona	4,595,379	4,961,953	6,744,754	8.0%	35.9%	46.7%

Source: Arizona Department of Economic Security (ADES) , August 1, 1997. The Ajo CDP projections were prepared by the Pima Association of Governments and approved by ADES, May 12, 1997.

When PDAI closed in 1985, the population of the Ajo CDP significantly declined. Overall, the population of the Ajo CDP declined by more than 40 percent during the 1980s. Decennial census data for Ajo and Pima County are shown in **Table 1.3**.

Table 1.3
Decennial Census Population of Ajo CDP and Pima County: 1960-2000

Year	April 1 1960	April 1 1970	April 1 1980	April 1 1990	April 1 2000
Ajo CDP	7,049	5,881	5,189	2,919	3,705
Ajo population decennial change		-16.6%	-11.8%	-43.7%	26.9%
Pima County	265,660	351,667	531,443	666,957	843,746
Pima County population decennial change		32.4%	51.1%	25.5%	26.5%

Source: U.S. Bureau of Census, decennial census counts.

From a high of more than 7,000 inhabitants in 1960, the population of the Ajo CDP declined each decennial census until recently. During the 1960s and 1970s, the decline of the Ajo CDP was relatively minimal compared to the 1980s decline that exceeded 40 percent. The 2000 Census shows a 27 percent increase in population in the Ajo CDP from 1990-2000. ADES data shows that the overall growth rate in Arizona was 40 percent during this same time period.

The Ajo CDP is projected to grow by slightly more than one percent per annum from 2000 to 2015. **Table 1.4** portrays the projected growth of Ajo CDP and Pima County in five-year increments from 2000 to 2015. The Arizona Department of Economic Security's projection of the Ajo CDP in 2000 shows a population of 3,837 that is projected to grow 18 percent to 4,533 by 2015. By comparison, the projected growth of Pima County is 31 percent.

Table 1.4
Population Projections for Ajo CDP and Pima County: 2000-2015

Year	July 1 2000	July 1 2005	July 1 2010	July 1 2015
Ajo CDP	3,837	4,075	4,304	4,533

Pima County	854,329	943,795	1,031,623	1,119,342

Source: Arizona Department of Economic Security (DES), August 1, 1997. The Ajo CDP was prepared by the Pima Association of Governments and approved by DES May 12, 1997.

1.5 Economy

Ajo was one of several early settlements in Arizona in which mining and copper smelting were of prominent importance. Originally, ores from Ajo were shipped to smelters in Wales, and later, to a Phelps Dodge smelter in Douglas, Arizona, before Phelps Dodge began smelting in Ajo in 1950. For several decades, more than 1,000 persons were employed by Phelps Dodge at Ajo, until its closure in 1985.

According to ADES, the Ajo CDP civilian labor force (average annual) increased by more than 20 percent from 751 in 1990 to 905 in 2000. Employment for the first quarter in 2001 averaged 924. The growth of the Ajo CDP may be attributed to additional employers in the local economy, as well as new retirees moving into the area. Employment is mainly in the commercial, service, and tourism sectors. Unemployment has declined from 6.7 percent in 1990 to 4.2 percent in 2000.

Table 1.5 shows a selected time series of civilian labor force data.

Table 1.5
Civilian Labor Force Data for Ajo CDP

Year	1990	1995	1998	1999	2000
Civilian Labor Force	751	907	869	908	905
Number Unemployed	50	44	35	42	38
Unemployment Rate	6.7%	4.8%	4.0%	4.6%	4.2%

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

The economic viability of this area is enhanced by the scenic attractions, a casino, and other amenities. The area serves as a gateway for tourists to Mexico, Organ Pipe Cactus National Monument, Cabeza Prieta National Wildlife Refuge, and Tohono O'odham Indian Reservation.

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 and/or local air quality control districts, shall include enforceable emission limitations and other control measures, means, or techniques, as well as schedules and

timetables for compliance.[8] (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 and/or local air quality control districts, shall include a program 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 a permit program 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 the applicable implementation plan. (See **Chapters 4.0, 6.0** and **7.0**.)

e. SIPs shall provide necessary assurances that the State, and/or local air quality control districts, will have adequate personnel, funding, and authority under State (and, as appropriate, local) law to carry out such implementation plans. (See **Chapter 4.4** and organizational charts for ADEQ and Pima County Department of Environmental Quality (PDEQ) in **Attachments B**.)

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 PDAI because the facility was completely dismantled and no longer exists. There are no remaining major SO_2 point sources in the Ajo nonattainment or 50 km buffer areas. Although minor, the Phelps Dodge Diesel-Powered Generator Station (PDG) is the only remaining SO_2 point source in the Ajo nonattainment area. The only SO_2 point source in the Ajo nonattainment area 50 km buffer is the Gila Bend Regional Landfill (GBRL).[9] (See **Chapter 4.2** for further explanation of applicable RACM for these sources.)

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[8] Arizona Revised Statutes (A.R.S.) § 49-402 authorizes the air quality permitting and enforcement authority of all regional agencies. Pima County Department of Environmental Quality (PDEQ), and Maricopa County Environmental Services Department (MCESD), as authorized under (A.R.S.) § 49-402, retain adequate funding and employ adequate personnel to administer the air quality program.

[9] See **Appendix A.1** for location of 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 SO_2 are needed to achieve attainment of the SO_2 NAAQS. -

This submittal maintains that the closure of PDAI on April 4, 1985, demonstrates progress towards and achievement of attainment for the SO_2 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 AIR*Data* emission inventories.[10] For historical purposes, ADEQ's inventory lists emissions from SO_2 units at PDAI during its time of operation. The total SO_2 emissions are based upon the measured fugitive emissions plus total stack emissions. Current emissions data for the remaining point sources are also contained in **Chapter 2.0**.

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). -

The ADEQ AQD has codified the permit application process in Title 18, Article 3 of the Arizona Administrative Code (AAC). On December 5, 2001, EPA took final action to fully approve the ADEQ, MCESD and PDEQ operating permits programs; the rule was effective November 30, 2001.[11] (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 requirements, record keeping, bypass operation, and issuance of notices of violation.[12] Details regarding control for the remaining SO_2 sources may be found in **Chapter 4.0**.

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[10] AIR*Data* 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

[11] 66 FR 63175, Wednesday, December 5, 2001

[12] Standards of Performance for Existing Primary Copper Smelters; Site-specific Requirements, R18-2-515, renumbered R18-2-715 (1993).

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.[13]

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 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**.

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

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 Ajo SO_2 nonattainment area to attainment.

2.0 SO_2 EMISSIONS INVENTORY FOR POINT, AREA AND MOBILE SOURCES

2.1 Historical Emissions Inventory: 1980s

Point Sources

The historical emissions inventories for the Ajo SO_2 nonattainment and 50 km buffer areas indicate that PDAI was the primary point source for SO_2 emission. One of the newest and smallest of the Phelps Dodge copper smelters, PDAI was used by Phelps Dodge to test innovative smelting technology throughout the 1970s and 1980s. In 1970, there were two principal operations from which sulfur oxides were emitted at the PDAI copper smelter: the reverberatory furnace smelting and the converter operations.

In early 1970, the smelter consisted of a single reverberatory furnace and two 13-foot x 30-foot Peirce-Smith converters. The natural gas (principally methane) reverberatory furnace heated and reduced copper ore concentrates and limerock, producing slag, matte and an off-gas. The resultant steam was piped to steam turbines at the power house. Slag was skimmed from a hole in the furnace into a pot mounted on a railroad car and transported to a slag dump. The off-gas was conveyed by flue to an electrostatic precipitator (dust collector). Matte was delivered to a "ladle" in the converter aisle, handled by an overhead crane, and poured into a converter for further treatment. Conversion involved pressurized oxidation of the matte and removal of iron. Gases from the furnace and converters were confined to separate balloon flues and conveyed to the entrance of the Cottrell Plant, where they mixed and passed through a pipe-type Cottrell unit for removal of particulate matter. The gases then entered a 360-foot concrete stack for dispersal into the atmosphere. To reduce fugitive emissions, the stack was lined with acid-resisting brick laid in acid-proof mortar, with 2 inches of fiberglass insulation between the concrete and brick lining. The marketed product, blister copper, was transferred to an anode furnace where it was refined and cast into anode bars to be shipped.[14]

Throughout the 1970s, Phelps Dodge continued making improvements at PDAI designed to mitigate SO_2 emissions. The construction included an additional converter and converter air blower, new converter hoods, flues and auxiliary equipment, a complete acid plant, a complete SO_2 absorption and stripping system designed to produce liquid SO_2 for acid plant feed, 3 converter waste heat boilers, two electrostatic precipitators, and related handling equipment.

As the result of 1981 DCO/ITO negotiations with EPA, Phelps Dodge made plans to introduce oxygen sprinkle smelting and smelting by oxygen fuel at its Ajo smelter. However, oxygen smelting technology was never implemented at PDAI, instead, PDAI made changes to the converter, sulfuric acid plant, and fugitive gas capture equipment systems and/or operations and maintenance.[15]

PDAI's last full operating years, prior to its closure, were 1980 and 1981. In 1980, PDAI's annual SO_2 emissions were 33,102 tons per year (tpy); in 1981, the annual emissions were an estimated 39,596 tpy. PDAI's permitted SO_2 emission in 1981 was 178 tons per day (64,970 tpy), assuming an operating year of 365 days. (See **Appendix C.1**.)

Area and Mobile Sources

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[14] Phelps Dodge Corporation - New Cornelia Branch, Ajo, Arizona, W. G. Hogue, Manager, letter regarding Petition for Conditional Permit, Smelter and Auxiliary Facilities, October 15, 1970

[15] PDAI and EPA negotiated implementation of the substitute SO_2 reduction technology. EPA terminated PDAI's 1981 Innovative Technology Order in 1984. See footnote 6, **Chapter 1.2**.

Using ADES population data for 1980, area/mobile source emissions for this period were approximately 20 tpy. (See **Figure 2.2**.)

2.2 Emissions Inventory for Attainment Demonstration: 1999

Point Sources

During the operation of its copper smelter and until it closed April 4, 1985, PDAI was the only major SO_2 point source in the Ajo nonattainment area. After PDAI's closure, SO_2 point source emissions from non-ferrous metals processing fell significantly for Pima County: from 14,473 tpy in 1985 to 800 tpy in 1990. In the Ajo SO_2 nonattainment area, point source emissions from non-ferrous metals processing reduced from 12,850 tpy in 1985, to an estimated 50 tpy in 1990.[16] The total SO_2 emission for point sources in 1999 was less than one tpy in the nonattainment area. 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 Ajo nonattainment area as those generated by PDAI when in operation.

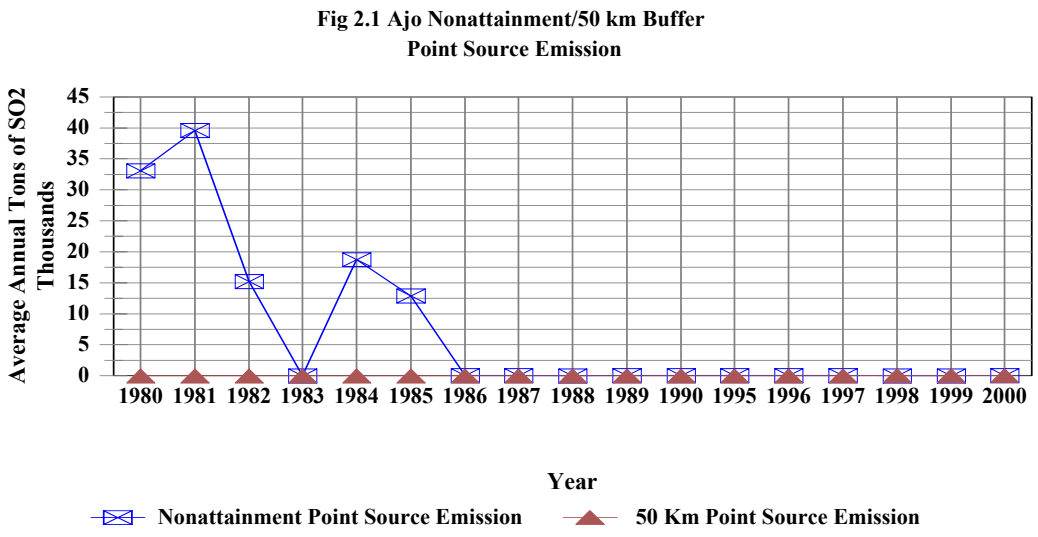
Currently, there is one SO_2 point source in the Ajo SO_2 nonattainment area, and one SO_2 point source in the 50 km buffer area. The sole SO_2 source in the nonattainment area is the Phelps Dodge New Cornelia Branch Diesel-Powered Generators (PDG), which has been permitted since 1994. The sole point source in the 50 km buffer area is the Gila Bend Regional Landfill, which was permitted by Maricopa County in 1998, but has not yet been constructed. (See **Appendix C.2** for emission inventory data.)

See **Figure 2.1** for Ajo nonattainment and 50 km boundary area SO_2 emissions history and **Appendix C.1** for a history of smelter emissions, 1980 through 1985.

[16] EPA's National Emission Trends (NET) database, as reported in AIR*Data* for years 1985 through 1989 was used in demonstrating SO_2 emission in attainment following PDAI's April, 1985 closure. In developing its NET SO_2 Arizona emission projections for 1985 through 1989, EPA only corrected for the permanent closure of one copper smelter in Arizona: the Phelps Dodge Douglas Reduction Works, in 1987. No mention is made in EPA's *Procedures Document for National Emission Inventory, Criteria Air Pollutants, 1985-1999* (EPA OAQPS), March 2001, of projected emission adjustments made to the Pima County data for the closure of the Phelps Dodge, Ajo copper smelter. For this reason, 1986 through 1989 NET SO_2 emission data is artificially high for Pima County and should not be considered representative.

Area and Mobile Sources

As **Chapter 2.1** indicates, historical emissions inventories demonstrate that no significant area or mobile SO_2 sources existed in the Ajo SO_2 nonattainment area either prior to or following closure of the Phelps Dodge Ajo copper smelter in 1985. The trend has continued through the 1990s. (See **Figure 2.2**.)



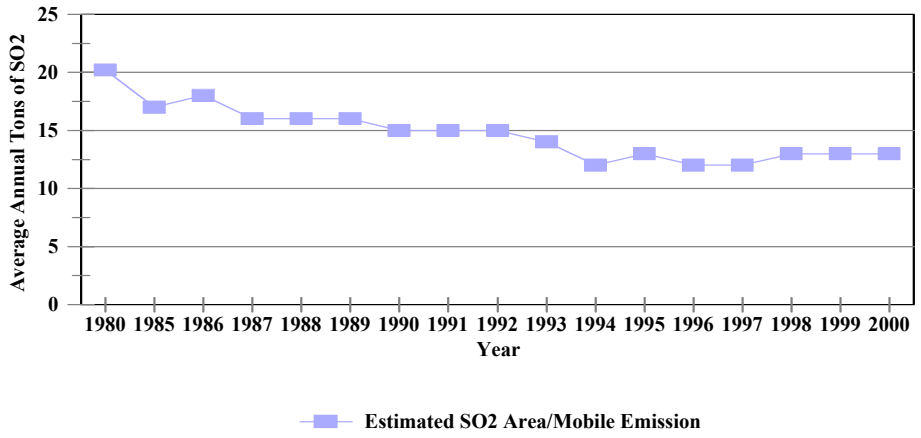
The cumulative annual average emission levels of area and mobile SO_2 sources in the Pima County area generally decreased between 1985 and1999. For example, area and mobile source emissions were estimated at 4,602 tpy in 1986 and, in 1996, they were reflected as 2,963 tpy in Pima County. Data available for 1999 reflect SO_2 emission for all source categories averaging 3,299 tpy in Pima County.[17] Overall, 1999 Pima County area and

[17] 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

mobile source emission levels reflect a reduction of 28.34% from 1986, a trend echoed in the area and mobile source SO_2 emission for the Ajo nonattainment area. (See area and mobile emissions inventories for Pima County and the Ajo nonattainment area in **Appendix C.4** and area/mobile projections in **C.5**.)

Appendix C.6 provides an overview of facility types, emitting and control equipment, permit emission limits, operating rates, emission calculation methods and historical annual SO_2 emissions inventories in the Ajo nonattainment area and 50 km boundary areas.

Fig 2.2 Ajo Nonattainment Area
Area and Mobile Emission



then used population growth factors for the Ajo nonattainment area between 1997 and each of the years for which inventory is projected to estimate the Pima County inventory.

3.0 MONITORING NETWORK

Protocols for SO_2 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 SO_2 Monitoring Network

As early as June 23, 1969, Arizona State Department of Health, Division of Air Pollution Control (ADHS), began ambient SO_2 air quality monitoring, using a coulometric monitor at the Arizona Department of Transportation (ADOT),Well Road, Ajo site. In 1979, ADHS replaced its coulometric monitor with a fluorescent monitor at the ADOT site, which was located at latitude 32°25' and longitude 112°50'.[18]

With ADHS approval, Phelps Dodge began ambient SO_2 air quality monitoring at its Ajo smelter facility in 1974. Coulometric monitoring units were established at four locations:

a. at latitude 32°22'16.1"N and longitude 112°51'41.8"W, the 'Town Square' site;

b. at latitude 32°22'4.8"N and longitude112°49'50.2"W, the 'South Tailings Dam' site;

c. at latitude 32°22'3.4"N and longitude 112°52'33.9"W, the 'Camelback Mountain' site;

d. and at latitude 32°23'0.8"N and longitude 112°51'10.19"W, the 'Oxidation Pond' site.

In 1976, Phelps Dodge established five more coulometric monitors in the area of its Ajo smelter:

e. the 'Gibson' site, at latitude 32°22'38"N and longitude 112°52'43.8"W;

f. the 'Shelton' site, at latitude 32°23'30.1"N and longitude 112°52'28.8"W;

g. the 'Miller' site, at latitude 32°25'18.5"N and longitude 112°52'10.8"W;

[18] Arizona State Department of Health, Environmental Health Services, Division of Air Pollution Control, *Sulfur Dioxide Monitoring Network Study*, 1969. Coulometric Beckman instruments Model 906 Sulfur Dioxide Analyzers and Bristol Model 760 Dynamaster Strip Chart Recorders were placed at designated sites throughout Arizona in 1969 for the detection of SO_2. The earliest Ajo ambient air sampling site, at 600 North 2nd Avenue in Ajo, tested data from March 19, 1969 until April 15, 1969, until the activation of the Well Road, ADOT site.

h. the 'Well No. 1' site, at latitude 32°27'22"N and longitude 112°50'10.8"W;[19]

i. and the 'Hotshot' site, at latitude 32°20'47.8"N and longitude 112°48'42.5"W.

Since monitoring of the Ajo Phelps Dodge facility began, the highest number of recorded exceedances in any single year occurred in 1974. The last recorded 24-hour or annual average exceedances of the primary NAAQS at PDAI occurred in 1984. Monitors at all PDAI sites and at the ADHS Well Road site were removed after PDAI ceased operations, April 4, 1985. A map of the PDAI and State of Arizona ambient air quality monitoring sites for the Phelps Dodge, Ajo copper smelter may be found in **Appendix A**, **Section A.2**.

Currently there are no operating ambient SO_2 monitors in the Ajo area. Due to the shutdown of the primary SO_2 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.

3.2 Historical Data Analysis

A review of the SO_2 monitoring data in the nonattainment area, which data are provided in **Appendix D**, verifies that:

a. The last recorded exceedance of either the 24-hour or annual SO_2 NAAQS in the Ajo nonattainment area occurred in 1984.

b. During the network's history, annual average SO_2 levels were generally one-half of the current NAAQS standard (0.030 ppm or 80 $\mu g/m^3$).

[19] Phelps Dodge removed its Well No. 1 site in 1978.

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 Ajo and any other SO_2 nonattainment area. RACT is determined, in part, by the technological and economic feasibility of the control for the specific source and area.[20]

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

Technology Description

As stated in **Chapter 1.2**, PDAI was subject to and in compliance with 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 PDAI by the compliance date and provisions in effect in the 1981 PDAI consent decree. Phelps Dodge permanently closed its copper smelter on April 4, 1985.

Estimated SO_2 Emission Reduction

Closure of the PDAI copper smelter in 1985 resulted in a potential 26,132 tpy SO_2 emission reduction from stack and fugitive emissions that same year, based on 1985 permitted SO_2 stack emission limits.[21] (See **Appendix C.1**.)

Responsible Agency and Authority for Implementation

ADEQ is the responsible agency with authority designated from:

- ARS § 49-104; and
- ARS § 49-422.

Implementation Schedule

Compliance with the rule by PDAI was effective with the facility's shutdown date, April 4, 1985.

Level of Personnel and Funding Allocated for Implementation

No additional personnel is required.

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[20] US EPA Office of Air and Radiation, Office of Air Quality Planning and Standards, "SO_2 Guideline Document," February 1994.

[21] Emission reduction figure is based upon projected emissions between April and December, 1985, assuming continued, potential PDAI SO_2 emission at its previously permitted level, 8900 pounds per hour (38,982 tpy) in an operating year of 365 days.

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 escalated enforcement actions as facts dictate.[22]

Monitoring Program

For purposes of determining compliance, ADEQ required PDAI to install, calibrate, maintain, and operate a measurement system for continuously monitoring SO_2 concentrations and for stack gas volumetric flow rates.[23] 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 are 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), PDAI 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," PDAI 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 SO_2, 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.

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[22] The State of Arizona issued permits with SO_2 emission limitations to the PDAI copper smelter up to and through the date of its closure, April 4, 1985. From 1980 through 1985, State of Arizona permits were: #0216-80 (October 7, 1980 - December 31, 1980); #0232-81 (April 6, 1981 - December 31, 1981); #0254-82 (March 16, 1982 - December 31, 1982); #0285-83 (February 28, 1983 - December 31, 1983) and #0312-85 (May 16, 1984 - May 1, 1985).

[23] Only applicable for stacks emitting 5 percent or more of the allowable annual average SO_2 emissions (R18-2-715.01(K)).

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 SO_2 Emission Reduction

Closure of the PDAI copper smelter in 1985 resulted in potential 26,132 tpy SO_2 emission reduction from stack and fugitive emissions that same year, based on 1985 permitted SO_2 emission limits.[24] (See **Appendix C.1**.)

Responsible Agency and Authority for Implementation

ADEQ is the responsible agency with authority designated by:

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

Implementation Schedule

Compliance with the rule by PDAI was effective with the facility's shutdown date, April 4, 1985.

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 Ajo SO_2 Nonattainment Area

Phelps Dodge New Cornelia Branch Diesel-Powered Generators (PDG)

At 32°22'7" N latitude and 112°51'25" W longitude, Phelps Dodge currently maintains four dual-fuel and diesel-fuel-fired Nordburg engines, model FSG-1316 HSG, and four Electric Machine Company 900-520 amp generators that during operation emit NO_x, SO_x, CO, VOC, PM and HAPs.

[24] See footnote 21, **Chapter 4.0**.

PDEQ has been the current permitting authority, since 1998, for the source.[25] Phelps Dodge has only operated the generators as emergency/back-up electric supply in recent years.[26] When Phelps Dodge does operate the generators, long-established practice is to use a 5 percent diesel and 95 percent natural gas fuel mixture, which minimizes SO_2 emission.

Current permit SO_2 emission limits are:

a. Although PDG is permitted to burn diesel fuel and/or natural gas in the four engines, diesel fuel use is limited to no more than five percent of the total annual operating time for each generator;

b. Annual allowable operating hours are 8,772, based on one engine operating fulltime for one year, including the time to operate a second engine during switchover; and

c. Total facility annual potential to emit is 49.2 tons of SO_2 per year, based on an estimated potential 12.3 tons of SO_2 per year from each of the four generators, operating concurrently, using purely diesel fuel, for the full number of allowable annual operating hours.

As source function is limited to emergency/back-up use, actual average SO_2 emission for this source each year since 1998 has been at less than one ton per year (1 tpy). (See **Appendix C.2** for current emissions data.)

Additional permit controls for this source include all applicable Pima County Code (PCC), Arizona Revised Statute (A.R.S.) and SIP provisions defining and regulating: permit revision and termination conditions; source reporting, monitoring and recordkeeping; compliance certification; source inspection and testing requirements; emissions limits/standards; permit deviation reporting; opacity standards and scenarios etc.

4.3 Controls for Point Sources in the 50 km Buffer Area

Gila Bend Regional Landfill

The permit for the Gila Bend Regional Landfill, which when constructed will be located at a latitude coordinate of 32°57'50" N and a longitude coordinate of 112°48'46" W, was issued by Maricopa County May 4, 1998.[27] This facility has neither been constructed nor operated to date,

[25] ADEQ Class I permit #M190416P1-99 was issued May 10, 1994 PDEQ permit #998 for the Phelps Dodge Diesel-Powered Generators is currently under review.

[26] In 1996, the Phelps Dodge generators ceased supplying electrical power to the unincorporated area of Ajo. PDG did not operate at all in either 1998 or 1999. In year 2000, PDG operated only in June, July, August, September and October, and in 2001, PDG operated only in August and October. Phelps Dodge maintains the generators for use in the event of future high electricity costs.

[27] On May 3, 1998, Maricopa County issued permit V97003 to Continental Waste Industries, Inc., for the Gila Bend Regional Landfill. The permit is effective for five years, until May 3, 2003.

therefore, there neither have been nor currently are any SO_2 or other emissions generated by this source.

Maricopa County has relied upon the regulations, "Standards of Performance for Municipal Waste Landfills," as defined in 40 CFR § 60, Subpart WWW, containing applicable new source performance standards (NSPS), when issuing the permit, which regulates total VOCs (calculated as methane); NO_x, SO_x, CO, PM and HAPs.

With respect to SO_2 emission limitations, Maricopa County permit #V97003 limits the Gila Bend Regional Landfill, at full buildout, to:

a. maximum SO_2 emission to 24.1 tons per year for the entire facility during any rolling twelve-month period with a best available control technology (BACT) trigger at 25 tpy; and

b. maximum SO_x emission from enclosed flares, based on a three-hour rolling average, to 0.018 pounds per million British Thermal Units (lb/MMBtu) of landfill gas, as well as 132 pounds per day.

(See **Appendix C.2** for emissions data.)

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

As SO_2 emission data in **Appendices C.3** and **C.5** indicate, these source categories are considered minor.

5.0 CONTINGENCY MEASURES

5.1 Prevention of Significant Deterioration (PSD)

ADEQ and PDEQ have PSD permitting programs that were 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).[28] These permitting programs will apply to any major source wishing to locate in the area, once redesignated to attainment. (See **Chapter 7.0**.)

[28] 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 SO_2 nonattainment areas, but general conformity for the Ajo, Pima County area must still be addressed to assure SO_2 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 63253, are located in R18-2-1438 of the Arizona Administrative Code. There are no federal plans or actions affecting air quality currently in the Ajo, Pima County area, nor are any foreseen through the 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 (see **Appendix B.1**), four specific requirements for demonstration of maintenance are necessary: (1) future emission inventory projections, (2) dispersion modeling to show no SO_2 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 SO_2 point sources within the Ajo nonattainment area. However, should growth occur, the ADEQ and PDEQ permit programs limit all emissions as part of the construction of new point sources or the upgrading of existing sources. The effect on existing point sources as a result of implementation of the maintenance plan are reflected in **Table 7.1** and in **Appendix C.3**.

ADEQ projects actual emissions of SO_2 from area/mobile sources may grow as the population of the Ajo nonattainment area grows. Based on ADES projections, an approximate 23 percent increase in the population of the Ajo SO_2 nonattainment area between 1997 and 2015 would produce slight upward trends in SO_2 emissions to 2015. (See **Appendix C.5**.) As noted in **Chapter 1.4**, the population of Pima County, as a whole, is growing significantly faster than that of the Ajo CDP or nonattainment area.[29]

Area/mobile SO_2 emission projections reflected in **Table 7.1** for the Ajo nonattainment area are estimates taken from available area/mobile SO_2 emission data for Pima County and projected for the population of the Ajo nonattainment area (the Ajo CDP). ADEQ and PDEQ Permit and Compliance records are the basis for point source SO_2 emission estimates reflected below, for the Ajo nonattainment area.

[29] The population of Pima County was projected at 799,375 in 1997, and the 2015 population is projected at 1,119,342, yielding a 40 percent increase in population and area/mobile emissions in Pima County, overall.

Table 7.1 Annual SO_2 Emission Projections for 2015 in the Ajo SO_2 Nonattainment Area in Tons Per Year (tpy)				
Type of Source	1985 SO_2 Emission	1997 SO_2 Emission	Multiplier (based on population growth projections)	2015 Projected, Worst-Case SO_2 Emission[30]
Area and Mobile Sources[31]	17 tpy	12 tpy	1.23	15 tpy
Point Sources	12,850 tpy	49 tpy[32]	1.23	61 tpy
Annual Totals	**12,867 tpy**	**61 tpy**		**76 tpy**

SOURCE: EPA NET inventory report, 1997

Overall, **Table 7.1** shows that SO_2 emissions for the Ajo nonattainment area have decreased an estimated 99% from 1985 levels; emissions projected for the year 2015 are estimated to be 0.59 percent of 1985 levels, as shown, below.

$$\frac{\textbf{76 Tons in 2015}}{\textbf{12,867 Tons in 1985}} = \textbf{0.59 Percent}$$

7.2 Modeling

In the event that new sources are built, ADEQ commits to doing the appropriate modeling before any permitting actions are finalized.

7.3 PSD Permit Requirements

AAC R18-2-406 and Pima County Code (PCC) 17.16.590 will apply after redesignation for any new point source. (See **Attachments A**.)

7.4 Commitment to Resume Monitoring

There is no current monitoring for SO_2 within the Ajo 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.1**.) ADEQ commits

[30] Sulfur dioxide emission projections are calculated using base year 1997 and potential to emit rather than current actual emission, which is 1 ton per year (tpy).

[31] As consistent with EPA AIR*Data*, emissions 'area' source emissions include mobile sources. For area and mobile sources, SO_2 emission projections are calculated using population growth projections.

[32] The only point source currently in the Ajo SO_2 nonattainment area is Phelps Dodge Generator Station, for which potential emission figures are represented in **Table 7.1**. (See **Chapter 4.2** and **Appendix C.2**.)

to resume monitoring before any major source of SO_2 emissions commences operation.

Since SO_2 NAAQS monitoring began in the nonattainment area in 1969, average ambient annual levels were generally one-half of the NAAQS of 80 $\mu g/m^3$.

7.5 Contingency Measures

As required in Director John Calcagni's 1992 Memorandum, "Procedures for Processing Requests to Redesignate Areas to Attainment" (**Appendix B.3**), the contingency measure for the maintenance plan includes the provisions of AAC R18-2-403 and PCC 17.16.560, "Permits for Sources Located in Nonattainment Areas," and those of AAC R18-2-406 and PCC 17.16.590, "Permit Requirements for Sources Located in Attainment and Unclassifiable Areas." The rules, designed to address NSR and PSD requirements applicable to SO_2 sources, should be applied in sufficient time to ensure the maintenance of attainment and of Ajo air quality.[33] (See **Attachments A**.)

[33] 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.

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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** **Ajo Nonattainment and 50 Kilometer Boundary Areas and Sulfur Dioxide Point Sources**
- **Section A.2** **Ambient Air Quality Monitoring Sites Surrounding the Phelps Dodge Ajo, Inc. Copper Smelter**
- **Section A.3** **Photograph of PDAI Before Shutdown and Dismantling**
- **Section A.4** **Photograph of PDAI 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 Inventories

- **Section C.1** **Historical Point Source Emission Inventory (Phelps Dodge New Cornelia Branch Copper Smelter)**
- **Section C.2** **Current Point Source Emission Inventories (Ajo SO_2 Nonattainment and 50 km Buffer Areas)**
- **Section C.3** **Projected Point Source Emission Inventories (Ajo SO_2 Nonattainment and 50 km Buffer Areas)**
- **Section C.4** **Historical and Current Area and Mobile Source Emission Inventories, 1985 through 1999 (Pima County and Ajo SO_2 Nonattainment Area)**
- **Section C.5** **Projected Area and Mobile Source Emission Inventories (Pima County and Ajo SO_2 Nonattainment Area)**
- **Section C.6** **Annual SO_2 Emissions Inventories, Ajo Nonattainment Area and 50 Km Boundary - Overview**

APPENDIX D

Monitoring Network

- **SO_2 Ambient Air Quality Monitoring Network Data for the Ajo SO_2 Nonattainment Area, 1979 through 1985**

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)

Pima County Administrative Code (PCC)

- **PCC 17.16.550** (General)
- **PCC 17.16560** (Permits for Sources Located in Nonattainment Areas)
- **PCC 17.16.570** (Offset and Net Air Quality Benefit Standards)
- **PCC 17.16.590** (Permit Requirements for Sources Located in Attainments and Unclassifiable Areas)
- **PCC 17.16.600** (Air Quality Impact Analysis and Monitoring Requirements)
- **PCC 17-16-610** (Innovative Control Technology)
- **PCC 17.16.620** (Air Quality Models)
- **PCC 17.16.630** (Visibility Protection)
- **PCC 17.16.640** (Special Rule for Non-Operating Sources of Sulfur Dioxide in Sulfur Dioxide Nonattainment Areas)

- **Attachments B Government Agency Organization Charts**

  - **Arizona Department of Environmental Quality Chart**
  - **Pima County Department of Environmental Quality Chart**

- **Attachments C Public Hearing Documentation**

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