BUREAU OF LAND MANAGEMENT
SOCORRO FIELD OFFICE
RESOURCE MANAGEMENT PLAN REVISION
AND ENVIRONMENTAL IMPACT STATEMENT

AIR QUALITY IMPACT ANALYSIS

Prepared for:

U.S. Department of the Interior
Bureau of Land Management
Socorro Field Office

Prepared by:

URS Corporation

May 2003

TABLE OF CONTENTS

LIST OF TABLES

LIST OF MAPS

ACRONYMS

ADEQ	Arizona Department of Environmental Quality
AQB	New Mexico Air Quality Bureau
BART	Best Available Retrofit Technology
BLM	Bureau of Land Management
°C	degrees Celsius
CALPUFF	California Puff Model
CFR	Code of Federal Regulations
CHDB	Consolidated Highway Data Base
CO	Carbon monoxide
CO_2	Carbon dioxide
ECM	Course scattering data
EIS	Environmental Impact Statement
ELAC	Absorption due to elemental carbon
ENO_3	Ammonium nitrate scattering data
EOMC	Organic extinction data
EPA	United States Environmental Protection Agency
ESO_4	Ammonium sulfate scattering data
°F	degrees Fahrenheit
FLAG	Federal Land Manager's Air Quality Related Values Workgroup
IMPROVE	Integrated Monitoring of Protected Visual Environments
ISC3	Industrial Source Complex model
IWAQM	Interagency Workgroup on Air Quality Modeling
km	kilometer
LAC	Light Absorbing carbon mass
m	meter
MARP	Mining Act Reclamation Program
MECH	emissions from agricultural operations

NAAQS	National Ambient Air Quality Standards
NESHAP	National Emission Standards for Hazardous Air Pollutants
NMAAQS	New Mexico Ambient Air Quality Standards
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NMEMNRD	New Mexico Energy, Minerals and Natural Resources Department
NMSHTD	New Mexico State Highway and Transportation Department
NO_2	Nitrogen Dioxide
NO_3	Ammonium nitrate mass
NO_x	Nitrogen Oxide
NSPS	New Source Performance Standards
NWS	National Weather Service
O_3	ozone
OHV	off-highway vehicle
OMC	Organic mass
PM_{10}	particulate matter of 10 microns or less
$PM_{2.5}$	particulate matter of 2.5 microns or less
ppm	parts per million
PSD	Prevention of Significant Deterioration
RBEXT	Reconstructed aerosol extinction data
RMP	Resource Management Plan
RMPA	Resource Management Plan Amendment
SASEM	Simple Approach Smoke Estimation Model
SIP	State Implementation Plan
SO_2	Sulfur Dioxide
SO_4	Ammonium sulfate mass
SOIL	Fine soil mass
SVR	Standard visual range
TSP	total suspended particulate
$\mu g/m^3$	micrograms per cubic meter

VOC	Volatile Organic Compounds
WIND	emissions from windblown dust from idle fields
WRAP	Western Regional Air Partnership
WSA	Wilderness Study Area

EXECUTIVE SUMMARY

This Air Quality Baseline Report provides a compilation of existing air quality information within Socorro and Catron Counties, New Mexico (Planning Area), and corresponding data for the surrounding region (Study Area) that may influence air quality within these two counties. This study has been prepared to support preparation of a Resource Management Plan Revision (RMPR) and Environmental Impact Statement (EIS) by the Bureau of Land Management (BLM) Socorro Field Office.

The collected information has been reviewed to assess the following:

- completeness of data characterizing existing background pollutant concentrations and baseline visibility
- overall adequacy of emission information on permitted and operating air pollutant emission sources to support a regional simulation of air quality conditions
- quality and extent of meteorological data available for the region
- existence and quality of previous air quality impact analyses for the region
- Clean Air Act requirements that are, or may become, applicable to the Planning Area

CLEAN AIR ACT REQUIREMENTS

Since 1970, the Federal Clean Air Act and subsequent amendments have provided the authority and framework for U.S. Environmental Protection Agency (EPA) regulation of emission sources for certain pollutants that may endanger public health or welfare, and for establishing standards for these pollutants. These standards are referred to as the National Ambient Air Quality Standards (NAAQS), which historically have applied to six criteria pollutants.

Under the Clean Air Act, each state or delegated permitting authority has the responsibility to achieve and maintain air quality that meets the NAAQS. Geographic areas, which may not coincide with political boundaries, are designated as attainment, nonattainment, or unclassified for each of the six criteria pollutants with respect to the NAAQS.

Both the Planning Area and Study Area currently are designated as unclassified for the six criteria pollutants of concern for which the NAAQS apply under the Clean Air Act. These areas are designated as unclassified, because there are limited historical air quality data to make a determination of attainment or nonattainment. Therefore, for permitting of new air emissions sources, these areas are treated as if they are in attainment with the NAAQS.

The State of New Mexico also has ambient air quality standards in place (New Mexico Ambient Air Quality Standards [NMAAQS]), which generally are equal to or more stringent than the Federal standards. BLM-managed activities within the Planning Area are either not subject to such regulations, or are in compliance with such regulations.

PROFILE OF THE PLANNING AREA AND RESOURCES

Air quality in the Planning Area is generally good, and appears to meet the NAAQS and NMAAQS. Ambient air monitoring data for criteria pollutants in Socorro and Catron Counties historically have not been collected; however, air quality can be presumed to be generally good, due in part to the absence of major air emission sources in the region. This is supported by limited ambient air quality data for the Study Area, which extends to adjacent counties in Arizona, to the west of the Planning Area.

Meteorological data for the Planning Area also are limited. None of the meteorological or climate data available within the Planning Area are of sufficient detail or quality to support refined simulations of air quality conditions.

As of the date of this study, ambient air monitoring stations have not been deployed in the Planning Area. The closest ambient pollutant monitoring station within the Study Area is located in Apache County, Arizona at Coyote Hill, approximately 10 miles west of the New Mexico border. The Coyote Hill monitoring station monitors impacts from the Springerville and Coronado generating stations, which are major sources of criteria pollutants and the largest sources of emissions located in the region. Pollutant concentrations recorded at Coyote Hill generally are low compared to ambient air quality standards.

Visibility also is a key factor for assessment of regional air quality, particularly in pristine Class I areas (such as certain wildernesses, national memorial parks, national parks, and international parks). There is no generally accepted scale for acceptable visibility; therefore, differences in this air quality indicator are evaluated on a comparative basis. There are two Class I areas within the Study Area – the Gila Wilderness in Catron County, which is about mid-range for visibility, and the Bosque del Apache National Wildlife Refuge in Socorro County, for which annual trend data are not yet available.

The influence of human-caused pollutant sources is expected to be minimal in the Planning Area, as there are relatively few such sources present, even in comparison to other rural areas in the Southwest. Only eight facilities have air emission permits within Socorro and Catron Counties, and only two of these are in current operation. Both are located in Socorro County and are classified as minor sources, which are defined as emitting less than 100 tons per year (tpy) of any single criteria pollutant.

The only major air emission sources (emitting 100 or more tpy of any single criteria pollutant) in the region encompassing Socorro and Catron Counties and the immediate vicinity are located in Apache County, Arizona. These are the Springerville and Coronado generating stations, which are operating within their emission limits.

There also are a relatively small number of pollutant emission sources that are not required to have an operating permit. Emissions data are not publicly available for these sources; however, it is unlikely that there are a sufficient number of such sources to substantially affect regional air quality or visibility in Class I areas.

Roadway vehicles represent an air pollutant source category that can affect local and regional air quality. Since the Planning Area is sparsely populated, consideration of mobile source emissions may be reasonably limited to three major arteries – U.S. Highway 60, U.S. Highway 380, and Interstate 25.

RECOMMENDATIONS

The general conclusion from review of the available air quality-related information resources for the Planning Area is that additional data are required in some areas to perform a meaningful, quantitative analysis of air quality conditions. In particular, the detailed, quality-assured meteorological data normally used for refined dispersion simulations has not been collected for this area.

There are relatively few substantial emission sources within this region. Available data indicated that no significant impacts on the quality of air have occurred due to existing emission sources in the Planning Area, and within the wider Study Area. The quality of air should remain good based on current information regarding continuing activities. A comprehensive air quality analysis for the Planning Area would become warranted if a substantial air emission source, such as a large mining operation or coal-fired power plant, were to be proposed. However, no such facilities are proposed at this time and therefore no such analysis is necessary.

Air quality impacts also must be a component of planning and executing a program of prescribed burning to reduce the potential for damage from wildfires. The New Mexico open burning permit process requires detailed plans and impact simulations to reduce impacts from such activities. BLM would conduct such an analyses for any prescribed burning operations within the Planning Area.

1.0 INTRODUCTION

1.1 PURPOSE AND AREA ADDRESSED

The Bureau of Land Management (BLM) Socorro Field Office is preparing a Resource Management Plan Revision (RMPR) and Environmental Impact Statement (EIS) to analyze and update BLM's management of public land in Socorro and Catron Counties, New Mexico. The revision will update current management in response to new legislation, changing polices, and changing uses of public land and its resources that has occurred since the BLM completed the 1989 Resource Management Plan (RMP) for public land in the two counties.

Since the Socorro RMP was implemented nearly 13 years ago, time and experience have demonstrated that many elements of the current Socorro RMP work well and it is BLM's intent to carry these elements forward. However, BLM has determined that some of the existing management decisions are not current with changing circumstances, demographics, resource conditions, and/or polices. Population growth in the region has increased recreational uses of public land, and land acquisitions and disposals have created new areas for the public while closing others. In addition, changing emphasis on fire management, noxious weeds, increasing urbanization and consequent urban-rural interface, new subdivision development, potential oil and gas and carbon dioxide (CO_2) development, off-highway vehicle (OHV) use, and other resource programs necessitate revision of the RMP.

An assessment of existing air quality conditions provides a starting point for planning and guiding future activities to conserve air resources. To facilitate this step for public land in Socorro and Catron Counties, the BLM Socorro Field Office has conducted the baseline study presented in this document. This Air Quality Baseline Report provides a compilation of existing air quality information within Socorro and Catron Counties (Planning Area), and corresponding data for the surrounding region (Study Area) that may influence air quality within these two counties. The collected information has been reviewed to assess the following:

- completeness of data characterizing existing background pollutant concentrations and baseline visibility
- overall adequacy of emission information on permitted and operating air pollutant emission sources to support a regional simulation of air quality conditions
- quality and extent of meteorological data available for the region
- existence and quality of previous air quality impact analyses for the region

- Clean Air Act requirements that are, or may become, applicable to the Planning Area

Based on complete review of the available technical resources, discussion and recommendations related to ambient air impact analysis are provided in Section 4.0. The necessary additional resources and physical data required for such an analysis are outlined, and suitable methods and criteria for assessment of regional air quality are identified.

This baseline study is organized into the following three major sections:

- Section 2.0 – Review of regulations that potentially apply to the Study Area pursuant to the Federal Clean Air Act

- Section 3.0 – Profile of available air quality information and ecosystems in the Planning Area, characterization of air pollutant emission sources within Socorro and Catron Counties and the overall Study Area

- Section 4.0 – Technical discussion and recommendations related to suitable data, methods, and criteria for further analysis of regional air quality

This Air Quality Baseline Report was prepared in support of the resource management planning process. This working document is part of a sequence of steps involved in development of the RMPR/EIS to facilitate planning and management of public land in Socorro and Catron Counties.

Three geographic areas pertaining to this Air Quality Baseline Study are illustrated on the Air Quality Study Area Map (Map 1). The Planning Area encompasses the entirety of Socorro and Catron Counties regardless of jurisdiction or ownership. The Study Area for the air quality encompasses the Planning Area with the addition of a portion of Grant County including the Gila Wilderness Class I area (pristine quality airshed), and the eastern portion of Apache County, Arizona containing two major regional air emission sources and a criteria pollutant monitoring station. BLM's Decision Area refers to public land (BLM land indicated in gold on Map 1), in Socorro and Catron Counties.

1.2 ROSTER OF STAKEHOLDER ENTITIES

In order to assess the air quality of the Study Area, public information sources and agency stakeholders were contacted to gather relevant data, such as ambient monitoring data, management plans, traffic studies, facility air permit conditions, and various other information. The data resources that were used are listed in the reference section (Section 5.0) of this document. The information sources and agency stakeholders along with their jurisdiction and role are listed in Table 1.

TABLE 1
ROSTER OF INFORMATION SOURCES AND STAKEHOLDERS

Stakeholder Entities	Agency Level	Description of Role
U.S. Environmental Protection Agency (EPA)	Federal	Environmental regulatory agency. Establishes National Ambient Air Quality Standards (NAAQS) and technical regulations.
Bureau of Land Management (BLM)	Federal	Public land-management agency.
U.S. Forest Service (Forest Service)	Federal	Planning and management agency for Forest Service land, including Gila Wilderness Area.
U.S. Fish and Wildlife Service (USFWS)	Federal	Planning and management agency for lands held by USFWS, including Bosque del Apache National Wildlife Refuge.
Integrated Monitoring of Protected Visual Environments (IMPROVE)	Federal/State	Monitoring Network – Joint effort of EPA, Federal land managers, and state air agencies administered by Crocker Nuclear Laboratory at the University of California, Davis.
New Mexico Environment Department (NMED)	State – New Mexico	New Mexico environmental regulatory and enforcement agency. Administers State permitting and establishes New Mexico Ambient Air Quality Standards (NMAAQS).
New Mexico Energy, Minerals and Natural Resources Department (NMEMNRD)	State – New Mexico	Regulatory agency for mining operations in the State of New Mexico.
New Mexico State Highway and Transportation Department (NMSHTD)	State – New Mexico	Planning and maintenance for the New Mexico transportation network.
Arizona Department of Environmental Quality (ADEQ)	State – Arizona	Arizona environmental regulatory and enforcement agency. Administers state permitting and administers monitoring stations used for Study Area information resource.

SOURCE: URS Corporation 2003

2.0 CLEAN AIR ACT REQUIREMENTS

The Air Quality Bureau (AQB) of the New Mexico Environment Department (NMED) has the authority and responsibility to enforce air quality regulations and standards in New Mexico, with the exception of tribal land and Bernalillo County. Tribal land is subject only to Federal regulatory requirements, and Bernalillo County has been delegated authority by the U.S. Environmental Protection Agency (EPA) to operate an air quality program separate from the State. BLM actions and use authorizations must comply with all applicable local, State, tribal, and Federal air quality laws, statutes, regulations, standards, and implementation plans. The regulations that have been Federally approved for control of pollutant emissions are incorporated in the New Mexico State Implementation Plan (SIP). Such plans may be developed by individual states and counties as part of the process to establish air quality permitting and compliance programs. The SIP is submitted for EPA approval to ensure Ambient Air Quality Standards are achieved and maintained. The potentially applicable Federal and State regulatory programs for the Planning Area are reviewed in this section.

2.1 FEDERAL LAWS AND REGULATIONS

Since 1970, the Federal Clean Air Act and subsequent amendments have provided the authority and framework for EPA regulation of emission sources for certain pollutants that may endanger public health or welfare, and for establishing appropriate standards for those pollutants. The standards, referred to as the National Ambient Air Quality Standards (NAAQS), historically have applied to six criteria pollutants—sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter of 10 microns or smaller diameter (PM_{10}), lead, and ozone (O_3). The standards are defined in terms of threshold concentration (e.g., micrograms per cubic meter [$\mu g/m^3$) measured as an average for specified periods of time (averaging times). Recently, additional standards have been promulgated for 8-hour average O_3 concentrations and particulate matter of 2.5 microns or smaller diameter ($PM_{2.5}$). Short-term standards (i.e., 1-hour, 8-hour, or 24-hour averaging times) were established for pollutants with acute health effects, while long-term standards (annual averaging times) were established for pollutants with chronic health effects.

Under the Clean Air Act, each state or delegated permitting authority has the responsibility to achieve and maintain air quality that meets the NAAQS. The NAAQS are established for two classes of ambient air quality levels—primary and secondary. The primary standards are concentration levels of pollutants in ambient air, averaged over a specific time interval, designed to protect public health with an adequate margin of safety. The secondary standards are concentration levels judged necessary to protect public welfare and other resources from known or anticipated adverse effects of air pollution. These resources include vegetation/crops, visibility, water resources, buildings or other materials, and personal comfort criteria. Standards for short-term averaging times can be exceeded once per year without violation. A single exceedance of annual averaging time standards during a given year would constitute a violation.

Geographic areas, which may not coincide with political boundaries, are designated as attainment, nonattainment, or unclassified for each of the six criteria pollutants with respect to the NAAQS. If sufficient monitoring data are available, the EPA may designate an area as attainment if air quality is shown to meet the NAAQS. Areas in which air pollutant concentrations exceed the NAAQS are designated nonattainment for specific pollutants and averaging times. Because the status of an area is designated separately for each criteria pollutant, one geographic area may have all three classifications. Typically, nonattainment areas are urban regions and/or areas with higher-density industrial development.

The two counties in the Planning Area are designated as "unclassified" with respect to NAAQS as noted in Table 2. This designation indicates that the status of attainment has not been verified through data collection. For permitting of new sources, an unclassified area is treated as an attainment area.

TABLE 2
ATTAINMENT STATUS OF SOCORRO AND CATRON COUNTIES

Pollutant	Socorro County Status	Catron County Status
Carbon monoxide (CO)	Unclassified	Unclassified
Nitrogen dioxide (NO_2)	Unclassified	Unclassified
Sulfur dioxide (SO_2)	Unclassified	Unclassified
Ozone (O_3)	Unclassified	Unclassified
Lead (Pb)	Unclassified	Unclassified
Particulate matter of 10 microns or less (PM_{10})	Unclassified	Unclassified
Particulate matter of 2.5 microns or less ($PM_{2.5}$)	Monitoring in Progress to assess compliance	Monitoring in Progress to assess compliance

SOURCE: *The State of the Environment*, NMED 2001 Report and Interagency Monitoring of Protected Visual Environments (IMPROVE) website

Under the Federal Clean Air Act, areas meeting criteria for relatively pristine air quality may be designated Class I areas. The Clean Air Act defines Class I areas as certain wilderness areas greater than 5,000 acres, national memorial parks greater than 5,000 acres, national parks greater than 6,000 acres, and international parks that were in existence on or before August 7, 1977. Specific provisions are included in Federal and New Mexico air quality regulations to preserve the pristine air quality in Class I areas. All other areas are, by default, identified as Class II areas. Certain areas deserving of preservation may be designated Class II Wilderness Areas, and State requirements or permitting policies may be promulgated to protect the air quality resources in these areas.

New projects within attainment or unclassified areas also must demonstrate conformance with limits on consumption of pollutant "Increment," defined under the Federal Prevention of Significant Deterioration (PSD) program. A PSD Increment is the maximum allowable increase in predicted criteria pollutant concentration above the established baseline concentration for specific averaging times that reflects emissions from sources in a defined area. As each PSD major source is permitted, the amount of available Increment in a given locale is reduced. The Federal and New Mexico ambient air quality standards and the PSD Increments for Class I and Class II areas that pertain to the Planning Area are provided in Table 3.

TABLE 3
FEDERAL AND NEW MEXICO AMBIENT AIR QUALITY STANDARDS AND PSD INCREMENTS

Pollutant	Averaging Period	NAAQS		NMAAQS	PSD Class I Increment ($\mu g/m^3$)	PSD Class II Increment ($\mu g/m^3$)
		Primary	Secondary			
Sulfur dioxide (SO_2)	Annual	0.03 ppm	–	0.02 ppm	2	20
	24-hour	0.14 ppm	–	0.10 ppm	5	91
	3-hour	–	0.50 ppm	–	25	512
Total suspended particulate (TSP)	Annual	–	–	60 $\mu g/m^3$	–	–
	24-hour	–	–	150 $\mu g/m^3$	–	–
Particulate matter of 10 microns or less (PM_{10})	Annual	50 $\mu g/m^3$	50 $\mu g/m^3$	–	4	17
	24-hour	150 $\mu g/m^3$	150 $\mu g/m^3$	–	8	30
Particulate matter of 2.5 microns or less ($PM_{2.5}$)	Annual	15 $\mu g/m^3$	15 $\mu g/m^3$	–	–	–
	24-hour	65 $\mu g/m^3$	65 $\mu g/m^3$	–	–	–
Carbon monixide (CO)	8-hour	9.0 ppm	9.0 ppm	8.7 ppm	–	–
	1-hour	35.0 ppm	35.0 ppm	13.1 ppm	–	–
Nitrogen dioxide (NO_2)	Annual	0.053 ppm	0.053 ppm	0.050 ppm	2.5	25
	24-hour	–	–	0.10 ppm	–	–
Lead (Pb)	Quarterly	1.5 $\mu g/m^3$	1.5 $\mu g/m^3$	–	–	–
Ozone (O_3)	1-hour	0.12 ppm	0.12 ppm	0.12 ppm*	–	–
	8-hour	0.08 ppm		–	–	–
Hydrogen sulfide	1-hour	–	–	0.01 ppm*	–	–

SOURCE: New Mexico Air Pollution Control Board 1998
NOTE: *For the State except for the Pecos-Permian Basin Intrastate Air Quality Control Region where the standard is more lenient.
ppm = parts per million

Prior to their initiation, Federally funded activities such as BLM-sponsored actions within a nonattainment area, must undergo a "conformity" review, per Title 40, Code of Federal Regulations (CFR) Part 93.150 et al., to determine whether the activity is in conformance with the SIP. For purposes of conformity analysis, an unclassified area is treated as an attainment area. At this time, this requirement does not apply to actions within the Planning Area, as it is currently designated as unclassified with respect to Federal and State air quality standards.

In attainment or unclassified areas, PSD program regulations establish rules for New Source Review related to the permitting of new major sources of criteria pollutants. For some of these pollutants (PM_{10}, SO_2, and NO_2) PSD Increments have been promulgated that limit allowable increases in air pollutant concentration within attainment or unclassified areas. These Increments are more restrictive in pristine Class I areas than in all other attainment/unclassified areas that are designated as Class II. For a new proposed source, New Source Review also would include determination of the applicability of New Source Performance Standards (NSPS) (40 CFR Part 60), and National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR Parts 61 and 63). The Federal NSPS and NESHAP establish specific emission and work practice standards for a range and variety of source categories.

In July 1997, EPA proposed the regional haze regulations in conjunction with issuing new NAAQS for $PM_{2.5}$ and an 8-hour average O_3 standard that supersedes the existing 1-hour O_3 standard. The existing O_3 standard will continue to apply to geographic areas that have not achieved conformance (i.e., nonattainment areas). For the new $PM_{2.5}$ standard, regulatory agencies have initiated a three-year period during which air-monitoring data will be acquired to determine present ambient levels of $PM_{2.5}$, since no previous monitoring has been conducted for this pollutant. Designation of areas as attainment or nonattainment of the $PM_{2.5}$ standard is scheduled for 2005.

The extremely fine particles and aerosols that make up atmospheric haze (e.g., sulfates, nitrates, organic carbon, smoke, and soil dust) degrade visual air quality. Visibility impairment, or “haze,” is a result of the scattering and absorption of light by particles and gases in the atmosphere and is a basic indicator of air pollution. The constituents of visible haze also can be transported in the atmosphere up to 100 kilometers (km), or more, from their source. The regional haze regulations were promulgated to improve visibility in 156 Class I areas nationwide. Even though a state may not have any Class I areas, air pollutants released in that state may contribute to impairment in Class I areas in another state. Therefore, monitoring is being conducted to characterize the current and future visibility conditions in these Class I areas.

To control regional haze across large geographic areas, 40 CFR Part 51.308, Regional Haze Program Requirements, or 40 CFR Part51.309, Requirements Related to the Grand Canyon Visibility Transport Commission (Phase II), require each state to file a Regional Haze SIP no later than December 31, 2008. This SIP must list progress goals and rates of progress, current visibility conditions in Class I areas, long-term strategy to achieve progress to reach natural visibility by 2064, and Best Available Retrofit Technology (BART) sources or an emissions trading program. To create its Regional Haze SIP, New Mexico, in concert with other members of the Western Regional Air Partnership (WRAP), will work to evaluate the impact of current emission sources and formulate a plan to improve visibility in the Class I areas. Data from the IMPROVE visibility monitoring effort operated by EPA, Federal land-management agencies, and State air agencies also would be incorporated in this assessment.

The new $PM_{2.5}$ particulate standard should not be a cause of concern for public land in Socorro and Catron Counties. There currently are no ambient monitoring data available to assess attainment status in these New Mexico counties. Since combustion processes (e.g., boilers and internal combustion engines) are the major sources of extremely fine particles, as measured by $PM_{2.5}$, the lack of major sources in these categories in the Planning Area suggests that the area will be in conformance with the $PM_{2.5}$ standard.

2.2 NEW MEXICO LAWS AND REGULATIONS

The State of New Mexico air quality regulations are provided in the New Mexico Administrative Code (NMAC) Title 20, Chapter 2. These regulations establish State ambient air quality standards (NMAAQS) that are equal to or more stringent that the NAAQS. In addition to the criteria pollutants covered by the NAAQS, the State has promulgated ambient air quality standards for Total Suspended Particulate (TSP), hydrogen sulfide, and added a 24-hour NO_2 standard. New Mexico also requires that all pollutant concentrations are expressed in parts per million (ppm) and are adjusted for altitude and temperature at the measurement location. Table 2-2 lists the NAAQS, NMAAQS, and PSD increments.

New Mexico also has promulgated emission limits and work place standards in NMAC Title 20, Chapter 2 for specific source categories. However, the current Bureau of Land Management (BLM)-managed activities within the Planning Area are either not subject to such regulations, or are in compliance with such regulations. One regulation that will influence management decisions for the area is the restriction of open burning under 20 NMAC 2.60. This regulation requires that BLM obtain a permit before any open burning activity as stated in Section 113, to include forestry or game management, clearance and maintenance of watercourses and flood control channels, or prevention of fire hazards. An example of an activity covered by this rule would be a managed burn intended to reduce the potential for wildfires.

To obtain an open burning permit, BLM must submit: (1) a completed application to include the volume of material or proposed acreage to burn, the location and duration of the burn, the type and size of fuel loading, and the location of potential smoke-sensitive areas that may be affected by the burn; (2) the smoke management plan; (3) a burn plan; and (4) a Simple Approach Smoke Estimation model (SASEM), available at: http://www.adeq.state.az.us/comm/download/air.html.

NMED will approve or deny the permit request based on conformance with criteria in 20 NMAC 2.60 Subpart 113 and the New Mexico Smoke Management Memorandum of Understanding. Smoke dispersion modeling (SASEM or equivalent) also must be submitted defining conditions suitable for burning without violation of Air Quality Standards. NMED typically requires a minimum of one week to issue a permit, which will appoint days and conditions determined by the SASEM that indicate "No Violation" of Air Quality Standards. Clearly, the extent and nature of controlled burns may have an affect on regional air quality as well.

3.0 PROFILE OF THE PLANNING AREA AND RESOURCES

3.1 AIR QUALITY OVERVIEW

The air quality in the Planning Area is generally good and appears to meet the Federal and New Mexico ambient air quality standards. Ambient air monitoring data for criteria pollutants in Socorro and Catron Counties historically have not been collected; however, air quality can be presumed to be generally good, due in part to the absence of major air emission sources in the region. This is supported by limited ambient air quality data for the Study Area, which extends to adjacent counties in Arizona, to the west of the Planning Area.

Two pristine quality airsheds, designated as Class I areas, are located in the Study Area: Gila Wilderness and Bosque del Apache National Wildlife Refuge (NWR) (Map 1). The Clean Air Act defines Class I Federal areas as certain wilderness areas greater than 5,000 acres, national memorial parks greater than 5,000 acres, national parks greater than 6,000 acres, and international parks that were in existence on or before August 7, 1977. Specific provisions are included in Federal and New Mexico air quality regulations to preserve the pristine air quality in Class I areas. Recently, the U.S. Congress set a national goal for improvement of the clarity of existing vistas and to prevent future degradation of visual resources. To ensure progress toward this goal and attain natural background conditions in 60 years, the U.S. Environmental Protection Agency (EPA) has promulgated Regional Haze Regulations, which are being implemented nationwide.

Impending deadlines contained in the Regional Haze Regulations for Protection of Visibility in National Parks and Wilderness Areas have prompted EPA to expand the nationwide Class I area visibility-monitoring network to over 100 sites nationwide. This program, titled Integrated Monitoring of Protected Visual Environments (IMPROVE), is administered by Crocker Nuclear Laboratory at the University of California, Davis. Currently, the IMPROVE measurement program is collecting data to establish baseline visibility and aerosol conditions in Class I areas and to identify chemical species and emission sources responsible for the existing visibility impairment. These data then will be used to determine long-term trends and assess progress towards the national visibility goal. Currently, there are two IMPROVE monitoring sites in the Study Area as shown on Map 1. These sites are located in the two Class I areas, Gila Wilderness managed by the Forest Service in Catron County and Bosque del Apache NWR managed by the U.S. Fish and Wildlife Service in Socorro County.

3.2 REGIONAL CLIMATE AND TOPOGRAPHY

The Planning Area is considered an environmental transition zone that comprises six types of ecosystems, or landscape units as illustrated on the Air Quality Landscapes Map (Map 2). The environmental factors that distinguish these units include the type and density of natural vegetation, meteorology, and topography. Taken together, these features can influence the local air quality. In turn, the long-term conservation of the flora and fauna within each ecosystem is affected by trends in air quality. This section provides an overview of the climate and topographic features of the Planning Area, as divided into landscape units.

3.2.1 Chupadera Mesa Piñon-Juniper Upland

The eastern end of the Planning Area encompasses the major landforms of the Chupadero Mesa and the southern end of the Los Pinos Mountains on the north, and the northern end of the Obscura Mountains on the south. Elevations range from 5,500 to 6,500 feet above sea level and exceed 7,500 feet in the mountains. Areas with this type of mountainous, or "complex" terrain usually have shifting wind patterns. Daily cycles of wind direction are caused by thermally driven drainage flows that typically are "upslope" during warm daylight periods and "downslope" during evening and night cooling. Local meteorological data are needed to evaluate the interaction between these complicated wind patterns and air quality. Air quality also is affected by precipitation, which in this portion of the Planning Area varies from approximately 14 to 18 inches per year.

The Great Plains Province begins a short distance to the east on the other side of the northern tip of the Sacramento Mountains. This plains-like landscape contrasts with the mesa and mountain landforms of the piñon-juniper zones of the Colorado Plateau and the Basin and Range province in the central and western parts of the Planning Area. In less mountainous terrain, the winds tend to be more persistent and direction is less variable. Vegetation primarily is piñon-juniper woodland but grades into juniper savannah and plains-mesa grassland on the eastern edge of the Planning Area. This piñon-juniper woodland is a rolling landscape that features limestone hills and shallow drainage valleys.

3.2.2 Rio Grande Valley Desertscrub and Grassland Zone

The Rio Grande Valley landscape unit is defined as including the Rio Grande Valley floor and adjacent desert scrub and grassland areas. Elevations generally range from 4,500 to 5,500 feet above sea level. Along the river, this unit includes the southern end of the Albuquerque Basin on the north and the San Marcial Basin on the south. To the east of the river, the unit includes part of the Caballo Uplift and the Jornada del Muerto Basin. Ladrone Peak and the southern end of

Sierra Lucero represent "sky islands" (that is, high elevation areas surrounded by lower elevation zones) within this belt of grasslands, reaching elevations of more than 9,000 and 7,000 feet, respectively. Such isolated features tend to have less effect on wind patterns, and therefore the meteorology would be expected to be more typical of the valley floor.

There are two narrow strips of designated Class I area land within the Rio Grande Valley, consisting of the eastern and western sections of the Bosque del Apache NWR. An IMPROVE visibility monitoring station is now operating in this Class I area.

The overall meteorology in this unit is affected by the topography of the valley and surrounding terrain. The direction of the broad valley will tend to channel the lower elevation winds that disperse air pollutants. Annual precipitation in this unit is approximately 8 to 12 inches.

3.2.3 Colorado Plateau Piñon-Juniper Upland

The Colorado Plateau piñon-juniper upland zone is defined to encompass much of the northwestern part of the Planning Area, extending west of the Rio Grande Valley and north of the Plains of San Agustin and the Gila River Headwater Mountains zone. From east to west, the landforms in this unit include the southern ends of the Lucero Uplift, Acoma Basin, Zuni Uplift, and Zuni Basin. Elevations generally range from 6,000 to 7,500 feet, but the Datil, Gallinas, and Bear Mountains form a large "sky island" rising to approximately 9,000 feet. This high plain topography is characterized by relatively persistent and uniform-direction winds. The annual precipitation in this area is approximately 10 to 16 inches.

3.2.4 Basin and Range Piñon-Juniper Upland

The Basin and Range piñon-juniper upland zone is defined to encompass much of the south-central part of the Planning Area, extending southwest of Magdalena through Dusty on Alamosa Creek to the Gila Cliff Dwellings National Monument. This is a very sparsely inhabited area today, with few emission sources of air pollutants, and a lack of meteorological data for simulation of air quality conditions. The very large Gila Wilderness Class I area is roughly bisected by the southern boundary of the Planning Area. An IMPROVE visibility monitoring station is operating in the Class I area, just north of the Planning Area boundary.

Base elevations range from approximately 6,500 to 7,500 feet above sea level, but much of the unit is encompassed within the sky islands of the Magdalena, San Mateo, and Luera Mountains, and Pelona Mountain, which exceed elevations of 9,000 feet. This complex terrain is characterized by daily shifting wind patterns. Annual precipitation varies from approximately 12 to 16 inches at the lower elevations and up to 28 inches at the higher elevations.

3.2.5 Plains of San Agustin High Grasslands

The Plains of San Agustin High Grasslands landscape unit is a high, expansive closed basin at the junction of the Colorado Plateau, mountainous Transition Zone, and Basin and Range province. The Plains are just east of the Continental Divide at an elevation of just less than 7,000 feet. Natural vegetation is primarily grassland. Average annual precipitation is about 11 inches. High plain topography of this kind typically experiences relatively persistent and uniform direction winds.

3.2.6 Gila River Headwater Mountains Zone

The Gila River Headwater Mountains landscape unit encompasses the southwestern part of the Planning Area. This area is primarily the high, headwaters of the Gila River consisting of the Mogollon-Datil Volcanic Field. Named mountain ranges from north to south include the Gallo, Mangas, San Francisco, Tularosa, Saliz, and Kelly Mountains, as well as the northern parts of the Mogollon Mountains and the Black Range. This unit also includes the Gila National Forest, with the northern half of the Gila Wilderness Class I area.

This area is typified by complex, more mountainous terrain that exhibits daily shifting wind patterns caused by drainage flows within local topography. Elevations typically are above 7,500 feet. Maximum elevations in this zone approach 11,000 feet. Average annual precipitation in this region varies between 18 and 35 inches.

This type of ecosystem potentially is more sensitive to deterioration in air quality. Mixed ponderosa pine woodlands dominate the natural vegetation between 7,500 and 9,500 feet elevation. Alpine Woodlands with Douglas fir and other high altitude species are present in the limited areas of these higher elevations. Alpine vegetation can be vulnerable to changes in soil chemistry caused by deposition of sulfur and nitrogen species transported from large sources (e.g., power plants) located upwind. Assessment of air quality for such areas can assist in maintaining the forest resources.

3.3 REGIONAL METEOROLOGY AND AVAILABLE DATA

Limited meteorological data are collected at a number of weather and climate monitoring stations across the Planning Area. Typically these installations are operated by the National Weather Service (NWS), Middle Rio Irrigation District, or the National Resources Conservation Service. The station identification and parameters monitored at these sites are listed in Tables 4 and 5, and indicated on Maps 1 and 2. For the weather stations listed in Table 4, monitored data are limited to temperature, total precipitation, and snowfall. Additional climate parameters, namely humidity, wind speed, and direction are measured at four meteorological stations located within the Planning Area: two at Bosque del Apache NWR in Socorro County and two in Catron County. These stations are described in Table 5.

It should be noted that none of the meteorological or climate data available within the Planning Area are of sufficient detail or quality to support refined simulations of air quality conditions. The specifications for model-ready meteorological data are provided as part of the Prevention of Significant Deterioration permitting program established under the Clean Air Act (Title 40, Code of Federal Regulations Part 52 and Appendices). Generally, these data are to be collected for identifiable airsheds within a given region. The observations consist of both surface and upper atmosphere conditions. Additional discussion of meteorological data requirements for air quality modeling is provided in Section 4.0.

TABLE 4
NATIONAL WEATHER SERVICE METEOROLOGICAL STATIONS - SOCORRO AND CATRON COUNTIES

NWS Meteorological Stations				Monitored Parameters		
Name	**Latitude**	**Longitude**	**NWS Number**	**Temperature max/min (°F)**	**Precipitation (inches)**	**Snowfall (inches)**
Adobe Ranch	3334	10754	290119	65 / 26	12.0	18.2
Augustine 2 E	3405	10737	290640	66 / 30	11.3	10.1
Beaverhead Ranger	3325	10807	290818	67 / 29	14.8	18.6
Bernardo	3425	10650	290915	75 / 37	7.9	3.8
Bingham 2 NE	3355	10621	290983	71 / 40	10.7	7.4
Bosque del Apache	3346	10654	291138	77 / 39	8.8	5.0
Fence Lake 1 N	3439	10840	293180	66 / 31	14.3	30.5
Gila Hot Springs	3312	10813	293530	72 / 34	16.2	5.4
Glenwood	3319	10853	293577	75 / 40	15.9	1.6
Hickman	3431	10756	293969	63 / 30	12.3	25.4
Hood Ranger Station	3343	10847	297386	71 / 32	15.6	6.3
Jewett Ranger Station	3359	10838	294375	65 / 28	14.4	29.9
Luna Ranger Station	3350	10856	295273	66 / 26	16.3	20.7
Magdalena	3407	10714	295353	68 / 37	11.8	5.0
Pietown 19 NE	3430	10754	296812	62 / 36	15.5	49.7
Quemado	3421	10830	297180	67 / 30	10.7	23.0
Socorro	3405	10653	298387	74 / 41	9.4	6.7

SOURCE: Western Regional Climate Center, New Mexico Climate Summaries,
http://www.wrcc.dri.edu/summary/mapnm.html

TABLE 5
REGIONAL CLIMATE DATA STATIONS – SOCORRO AND CATRON COUNTIES

Monitoring Site	Operating Agency	Temperature	Precipitation	Humidity	Wind Direction	Wind Speed
Bosque del Apache N	Middle Rio Irrigation District Network	X	X	X	X	X
Bosque del Apache	Middle Rio Irrigation District Network	X	X	X	X	X
Frisco Divide	National Resources Conservation Service Snowpack Telemetry (SNOTEL) Weather Station	X				X
Silver Creek	National Resources Conservation Service SNOTEL Weather Station	X				X

SOURCE: New Mexico State University Climate Data, http://weather.nmsu.edu/cgi-shl/cns/uberpage.pl

3.4 AMBIENT AIR POLLUTANT MONITORING

As of the date of this study, ambient air monitoring stations have not been deployed in the Planning Area. The closest ambient pollutant monitoring station within the air resource Study Area is in Apache County, Arizona at Coyote Hill, approximately 10 miles west of the New Mexico border and 2 miles north of U.S. Route 60. This station was established in part to monitor impacts from the Springerville Generating Station (approximately 7.5 miles west of New Mexico and 12.5 miles north of U.S Route 60) and the Coronado Generating Station (approximately 12 miles west of New Mexico and 27 miles north of U.S. Route 60). These two coal-fired generating stations are major sources for criteria pollutants and the largest source of emissions located in the region. The location of these major sources and the Coyote Hill monitoring station are shown on Map 1.

The Coyote Hill monitoring station records ambient air concentrations of nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter of 10 micron diameter or less (PM_{10}). For reference, a summary of recent published data from this station, as presented in the Arizona Department of Environmental Quality (ADEQ) 2001 Air Quality Report, is listed in Table 6. To illustrate the air quality in this region, note that the highest 24-hour average PM_{10} concentration recorded in the past year was 20 micrograms per cubic meter ($\mu g/m^3$). This is well below the National Ambient Air Quality Standard (NAAQS) of 150 $\mu g/m^3$ for this pollutant over a 24-hour average. Concentrations of other pollutants generally were low compared to ambient air quality standards.

TABLE 6
2000 MONITORING DATA AT COYOTE HILL STATION, SPRINGERVILLE, ARIZONA

Pollutant, Station, and Standard	Annual Average	Maximum Values			Number of Valid Samples
		One-Hour Average	Three-Hour Average	24-Hour Average	
Nitrogen Dioxide (NO_2)					
Station	0.001 ppm	0.021 ppm	--	0.005 ppm	7,858
NAAQS	0.053 ppm				
Sulfur Dioxide (SO_2)					
Station	0.65 $\mu g/m^3$	--	47 $\mu g/m^3$	11 $\mu g/m^3$	7,718
NAAQS	0.03 ppm		0.50 ppm	0.14 ppm	
Particulate matter of 10 microns or less (PM_{10})					
Station	9.6 $\mu g/m^3$	--	--	20 $\mu g/m^3$	42
NAAQS	50.0 $\mu g/m^3$			150 $\mu g/m^3$	

SOURCE: Arizona Department of Environmental Quality's FY 2001 Air Quality Reports
NOTES: ppm = parts per million

3.5 VISIBILITY MONITORING IN CLASS I AREAS

The clarity of scenic vistas is a key factor that distinguishes pristine Class I Areas. Consequently, the potential for visibility degradation in future years is a key issue for assessment of regional air quality. Reduction in regional visibility generally results from the combined effects of emissions from multiple sources throughout a given region or airshed. However, there are cases where a single dominant emission source may contribute more significantly to reduction in visibility due to specific climate and wind patterns.

The two Class I areas within the Planning Area are included in the IMPROVE visibility monitoring network. This nationwide Class I area network is administered by Crocker Nuclear Laboratory at the University of California, Davis. Currently, the IMPROVE measurement program is collecting data to establish baseline visibility and aerosol conditions in Class I areas and to identify chemical species and emission sources responsible for the existing visibility impairment. In future years, data collected from the IMPROVE network will be used to determine current levels of visibility in Class I areas nationwide, to construct long-term trends, and to quantify improvements in visibility in the future.

The Bosque del Apache NWR IMPROVE sampling station came on line in April 2000; therefore, annual trend data are not yet available for this site. The Gila Wilderness sampling station has been active since April 1994. Data from this station are publicly available and provide insight into the current regional visibility.

The IMPROVE monitoring sites have aerosol samplers that periodically collect four concurrent ambient air samples: one PM_{10} sample on a Teflon filter, and three $PM_{2.5}$ samples on Teflon, nylon, and quartz filters to quantify haze-constituent aerosols (sulfate, soil, organic carbon, elemental carbon, and nitrate). The aerosol samplers are programmed to collect two 24-hour samples per week, or 104 total samples per year. At the Gila Wilderness, the site operates an integrating nephelometer in addition to the IMPROVE aerosol samplers. The nephelometer station performs an optical measurement of the scattering of light in the atmosphere and records concurrent relative humidity on an hourly basis.

Composite data are listed in Table 7 for the Gila Wilderness IMPROVE site, showing five-year averages for key parameters from 1994 to 1999. These data are listed as a baseline, and are used to establish trends within the area and also at a nationwide level. The trends are reviewed by sorting each year's data based on concentration levels. The data are divided into three categories, according to a relative visibility level defined as the 0^{th} to 20^{th} percentile or best visibility days (Group 10), the 40^{th} to 60^{th} percentile or intermediate visibility days (Group 50), and the 80^{th} to 100^{th} percentile or worst visibility days (Group 90). These categories represent the distribution of the measured conditions for each parameter. In absolute terms, there is no generally accepted scale for acceptable visibility; therefore, differences in this air quality indicator are evaluated on a comparative basis. Table 8 shows the range of data from the Gila Wilderness Area monitoring site, in comparison with data from Denali National Park and Preserve in Alaska (considered as having the best visibility) and similar parameters from a Class I area in the industrialized northeastern United States (having relatively poor visibility). With respect to most of the visibility parameters, the Gila Wilderness exhibits values that are about mid-range between those characterizing very high and relatively poor visibility.

Several haze constituent species are measured using the ambient aerosol sampling method. As listed in Table 3-4, the aerosol monitored data, referenced as the ambient mass data, include concentrations of total mass (PM_{10}), coarse mass ($PM_{2.5}$- PM_{10}), fine mass ($PM_{2.5}$), ammonium sulfate mass (SO_4), ammonium nitrate mass (NO_3), organic mass (OMC), light absorbing carbon mass (LAC), and fine soil mass (SOIL). The integrating nephelometer data, referenced as reconstructed light extinction data, measures the blockage of transmitted light. These data are based on the following parameters, the standard visual range (SVR), reconstructed aerosol extinction (RBEXT), ammonium sulfate scattering (ESO_4), ammonium nitrate scattering (ENO_3), organic extinction (EOMC), absorption due to elemental carbon (ELAC), and course scattering (ECM).

TABLE 7
1994 – 1999 AVERAGE VISIBILITY MONITORING DATA FOR GILA WILDERNESS AREA FROM IMPROVE NETWORK MONITOR

Monitored Variable	Best Visibility Days (Group 10)	Intermediate Visibility Days (Group 50)	Worst Visibility Days (Group 90)
Ambient mass data (µg/m^3) for aerosol components – five-year average			
Total mass (PM_{10})	4.50	9.23	14.72
Coarse mass ($PM_{2.5}$ - PM_{10})	2.82	5.62	6.73
Fine mass ($PM_{2.5}$)	1.36	3.14	7.34
Ammonium sulfate mass (SO_4)	0.51	1.19	2.24
Ammonium nitrate mass (NO_3)	0.07	0.13	0.15
Organic mass (OMC)	0.40	0.93	3.73
Light absorbing carbon mass (LAC)	0.08	0.15	0.47
Fine soil mass (SOIL)	0.31	0.74	0.76
Reconstructed light extinction data – five-year average			
Standard visual range (SVR)	223 Km	152 Km	83 Km
Reconstructed aerosol extinction (RBEXT)	7.50 1/Mm	15.75 1/Mm	37.10 1/Mm
Ammonium sulfate scattering (ESO_4)	2.69 1/Mm	5.75 1/Mm	11.90 1/Mm
Ammonium nitrate scattering (ENO_3)	0.36 1/Mm	0.63 1/Mm	0.79 1/Mm
Organic extinction (EOMC)	1.60 1/Mm	3.72 1/Mm	14.90 1/Mm
Absorbtion due to elemental carbon (ELAC)	0.84 1/Mm	1.54 1/Mm	4.71 1/Mm
Course scattering (ECM)	2.00 1/Mm	4.11 1/Mm	4.79 1/Mm

SOURCE: IMPROVE summary data 2002

TABLE 8
1994 – 1999 AVERAGE VISIBILITY MONITORING DATA FOR THREE IMPROVE NETWORK MONITORS (Group 50 Data)

Monitored Variable	Denali National Park and Preserve, AK	Gila Wilderness Area, NM	Brigantine National Wildlife Refuge, NJ
Ambient mass data (µg/m^3) for aerosol components – five-year average			
Total mass (PM_{10})	3.66	9.23	20.59
Coarse mass ($PM_{2.5}$ - PM_{10})	2.44	5.62	11.53
Fine mass ($PM_{2.5}$)	1.14	3.14	8.27
Ammonium sulfate mass (SO_4)	0.43	1.19	4.34
Ammonium nitrate mass (NO_3)	0.05	0.13	0.96
Organic mass (OMC)	0.40	0.93	2.10
Light absorbing carbon mass (LAC)	0.09	0.15	0.51
Fine soil mass (SOIL)	0.17	0.74	0.37
Reconstructed light extinction data – five-year average			
Standard visual range (SVR)	222 Km	152 Km	51 Km
Reconstructed aerosol extinction (RBEXT)	7.65 1/Mm	15.75 1/Mm	66.86 1/Mm
Ammonium sulfate scattering (ESO_4)	3.13 1/Mm	5.75 1/Mm	37.70 1/Mm
Ammonium nitrate scattering (ENO_3)	0.40 1/Mm	0.63 1/Mm	8.43 1/Mm
Organic extinction (EOMC)	1.61 1/Mm	3.72 1/Mm	8.39 1/Mm
Absorbtion due to elemental carbon (ELAC)	0.87 1/Mm	1.54 1/Mm	5.06 1/Mm
Course scattering (ECM)	1.63 1/Mm	4.11 1/Mm	7.29 1/Mm
SOURCE: IMPROVE summary data 2002			

The Cooperative Institute for Research in the Atmosphere analyzed the IMPROVE data to determine trends in the aerosol concentrations and extinction (*Spatial and Seasonal Patterns and Temporal Variability of Haze and Its Constituents in the United States: Report III)*. Using these values, the Institute plotted the data to identify and evaluate diurnal patterns. It was determined that the visible haze patterns at the Gila Wilderness area are typical for sites in the Southwest. The haziest days occur in the summer and the best visibility occurs in the winter. This pattern currently reflects natural conditions, with minimal contribution from large anthropogenic sources. However, if large emission sources were to be sited in a manner such that haze constituents would be transported to the Class I areas, then regional visibility may be degraded further.

3.6 REVIEW OF EMISSION SOURCE INFORMATION

The influence of anthropogenic air pollutant sources is expected to be minimal in the Planning Area, as there are relatively few such sources present, even in comparison to other rural areas in the Southwest. Elevated local concentrations of PM_{10} would occur occasionally in the Planning Area, similar to other arid areas of the State of New Mexico. These events normally can be attributed to wind-blown dust over disturbed land surfaces, and emissions from vehicles on unpaved roads.

On a regional basis, unpaved roads are expected to be a prevalent source of these particulates. Large power generation emission sources to the west of the Planning Area also would be expected to affect the air quality in Socorro and Catron Counties under some conditions. Long-range transport along prevalent west to east winds of haze precursors, nitrates, and sulfates would tend to reduce visibility and increase deposition of sulfur and nitrogen compounds. In particular, such impacts may affect the Gila Wilderness Class I area, which is approximately 90 miles southeast of the generating stations. The following discussion reviews available information regarding air pollutant emission sources in the Study Area.

3.6.1 Permitted Sources in the Planning Area

Within Socorro and Catron Counties there are only eight facilities with air emission permits issued by NMED, of which only two are apparently in current operation. The closed facilities with NMED permits include a coal crusher at Fence Lake Mine, a sawmill, concrete batch and asphalt plants, auto body paint shop, and a lead smelter. Both of the operational facilities are located in Socorro County and are classified as minor sources, which are defined as emitting less than 100 tons per year of any single criteria pollutant. Dicaperl operates the Socorro Perlite Plant and the National Radio Astronomy Observatory operates fuel-burning equipment at the Very Large Array facility. According to data received from the NMED Air Quality Bureau (AQB), the

Socorro Perlite Plant is the largest source of emissions and operates within their allowable emission rates for all criteria pollutants, with the exception of volatile organic compounds (VOCs). The Observatory has reported no actual emissions since 1997. The 2001 air emissions and allowable emission limits for these sources are listed in Table 9.

TABLE 9
2001 ANNUAL AIR EMISSION DATA FOR MINOR PERMITTED FACILITIES IN THE PLANNING AREA

Facility Name	Pollutant	Annual Emission Rate (tons/year)	
		Actual Reported	Permit Allowable
Dicaperl – Socorro Perlite Plant	Carbon monoxide (CO)	1.66	2.2
	Nitrogen dioxide NO_2)	6.25	8.3
	Lead (Pb)	0	0.2
	Particulate matter of 10 microns or less (PM_{10})	32.02	36.29
	Particulate matter of 2.5 microns or less ($PM_{2.5}$)	0	0
	Total Suspended Particulate (TSP)	32.02	59.97
	Sulfur dioxide (SO_2)	20.02	32.5
	Volatile organic compounds (VOCs)	0.33	0.1
Radio Astronomy Observatory	Carbon monoxide (CO)	0	19.1
	Nitrogen dioxide NO_2)	0	72.8
	Lead (Pb)	0	1.1
	Particulate matter of 10 microns or less (PM_{10})	0	0
	Particulate matter of 2.5 microns or less ($PM_{2.5}$)	0	1.1
	Total Suspended Particulate (TSP)	0	3.6
	Sulfur dioxide (SO_2)	0	3.2
	Volatile organic compounds (VOCs)	0	

SOURCE: NMED AQB Facility Emissions database 2002

3.6.2 Major Permitted Sources in the Study Area

The only major air emission sources in the region encompassing Socorro and Catron Counties and the immediate vicinity are located in Apache County, Arizona. A major source for permitting purposes is defined as a source or facility that has the maximum potential to emit 100 tons or more per year of any single criteria pollutant. The Springerville Generating Station and Coronado Generating Station are coal-fired, utility power plants that are major sources for all criteria pollutants, except lead. In particular, utility-scale, fossil fuel combustion sources such as these facilities represent regional sources of haze precursors such as nitrates, sulfates, and extremely fine particles. Since these aerosols and fine particles can be transported in the atmosphere up to 100 kilometers (km), or more, from their source, these generating stations should be considered in the air quality Study Area. The 2002 emission test results for the Springerville and Coronado Generating Stations are listed in Table 10.

TABLE 10
2002 ANNUAL AIR EMISSION DATA AND ALLOWABLE LIMITS FOR MAJOR PERMITTED SOURCES IN THE STUDY AREA

Facility		Pollutant	Allowable Emissions (lb/MMBTU)	Actual Emissions (lb/MMBTU)	Below Allowable Limit
Coronado Generating Station	Unit 1	Particulate (PM)	0.1	0.015	Yes
		Nitrogen Oxides (NO_X)	0.7	0.450	Yes
		Sulfur Dioxide (SO_2)	0.8	0.624	Yes
	Unit 2	Particulate (PM)	0.1	0.014	Yes
		Nitrogen Oxides (NO_X)	0.7	0.453	Yes
		Sulfur Dioxide (SO_2)	0.8	0.679	Yes
Springerville Generating Station	Unit 1	Particulate (PM)	0.034	0.007	Yes
		Nitrogen Oxides (NO_X)	0.697	0.411	Yes
		Sulfur Dioxide (SO_2)	0.690	0.496	Yes
	Unit 2	Particulate (PM)	0.034	0.007	Yes
		Nitrogen Oxides (NO_X)	0.697	0.390	Yes
		Sulfur Dioxide (SO_2)	0.690	0.508	Yes

SOURCE: Arizona Department of Environmental Quality 2002

3.6.3 Nonpermitted Sources

In addition to the permitted sources in the Planning Area, there are a relatively small number of pollutant emission sources that are not required to have an operating permit. There are three mineral mines in Socorro County that are examples of such sources. Additional examples are the Fence Lake Coal Mine and five mineral mines located in Catron County. Mining operations are regulated under the Mining Act Reclamation Program (MARP) and, unless the air emissions are significant, are not permitted or tracked by NMED. Emissions data are not publicly available for sources that do not require permits. However, it is unlikely that there are a sufficient number of such sources to substantially affect regional air quality or visibility in Class I areas. An air quality assessment of the Planning Area should include an approximate treatment of such sources, based on expected distribution of mining or other emission source categories in the region.

Agricultural operations are another example of air pollutant emission sources that are exempt from permitting that likely affect air quality, both locally and regionally. During tilling operations and burning of waste material, air emissions of particulates and products of combustion occur. There are published emission models from the EPA that allow estimates to be derived for emissions from various phases of agricultural operations during a year (MECH) and windblown dust from idle fields (WIND). Similar to the treatment of other nonpermitted sources, an air quality assessment may be designed to include an approximate treatment of agricultural sources, based on distribution of such areas.

3.6.4 Mobile Sources

Roadway vehicles represent an air pollutant source category that can affect local and regional air quality. The emissions include NO_X, CO, and PM_{10}, which may warrant consideration in assessment of ambient air quality in the Planning Area. Air pollutant emissions from vehicle exhaust typically are quantified using accepted statistical models that consider the emission profile of generic vehicle populations, along with traffic counts that measure daily or annual number of vehicles passing on specified roadways. These emissions normally are modeled following methods recommended by the EPA that represent the emissions as a "line-source" along the roadway path.

Since the Planning Area is sparsely populated, consideration of mobile source emissions may be reasonably limited to three major arteries as follows:

- U.S. Route 60 runs east to west through the north-central section of both counties
- U.S. Route 380 runs east to west through central Socorro County
- Interstate 25 runs north to south through central Socorro County

The New Mexico State Highway and Transportation Department is responsible for highway improvement projects and identification of transportation needs for the State of New Mexico. The department has performed traffic count studies on all major roadways in the State and has published data for 1999 through 2001 in the Consolidated Highway Data Base (CHDB) report titled "Road Segments by Traffic (Annual Average Daily Traffic) Info." From these references, current and projected traffic count data is available that would be used in baseline or future assessments of the effects of mobile sources on air quality.

One interesting feature relative to mobile source effects is the routing of Interstate 25, which passes between the east and west sections of the Bosque del Apache NWR Class I area. This situation potentially represents a case where highway emissions may influence ambient air concentrations or visibility in a Class I area.

4.0 DISCUSSION AND RECOMMENDATIONS

4.1 OVERVIEW OF EXISTING AIR QUALITY DATA RESOURCES

A general conclusion from review of the available air quality-related information resources for the Planning Area is that additional data are required in some areas to perform a meaningful, quantitative analysis of air quality conditions. In particular, the detailed, quality-assured meteorological data normally used for refined dispersion simulations has not been collected for this area. An important data source for ambient conditions, which recently has been implemented, is the Integrated Monitoring of Protected Visual Environments (IMPROVE) monitoring network stations in the two pristine Class I areas located in the Planning Area.

There are relatively few substantial emission sources within this region. Air quality permitting agencies have sufficient emission data for larger sources both in the Planning Area and the surrounding region. To characterize the diverse air pollutant sources that may influence air quality in the Planning Area, it would be advisable to consider large sources near the Planning Area, mobile source contributions from larger roadway routes, and smaller area sources such as fugitive dust generated from agricultural activities and travel on unpaved roads.

A comprehensive air quality analysis for the Planning Area would become warranted if a substantial air emission source, such as a large mining operation or coal-fired power plant, were to be proposed. In such an event, normal Prevention of Significant Deterioration (PSD) air quality permitting requirements would prescribe ambient air impact simulations. This would address the incremental increase in pollutant concentrations near the proposed source. Also, the visibility and chemical deposition effects in the Class I areas within 100 kilometers (km) would have to be evaluated. Even if a major source were not considered for the region, an air quality analysis to establish baseline conditions in the Class I areas would have value.

The following sections discuss the overall technical approach and suitable tools for an air quality evaluation in the Planning Area. Most of the resources that would be utilized have been developed to support new source air permitting, and have been accepted by the U.S. Environmental Protection Agency (EPA) and state permitting agencies as providing defensible, quantitative indications of air quality.

4.2 REGIONAL AIR QUALITY IMPACT STUDY APPROACH

Assessments of regional air quality usually are based on large-scale atmospheric dispersion simulations. Depending on the modeling approach, the area of interest may be broken up into "airsheds" that can be characterized by a single, representative set of meteorological data.

Alternatively, there are regional models that can accommodate a composite of several such data sets. While numerous specialized models have been published from academic or regulatory agency sources, there are three widely accepted models that would be recommended for the Planning Area:

- ISC3 - Industrial Source Complex Short Term and Long Term – proven dispersion simulation tool for modeled areas up to 50 km radius; a so-called "near field" analysis. Accommodates multiple emission, topography influences, and uses data from a single meteorological station representing a given airshed. This model is widely used for air permitting purposes, to assess the impact on ambient pollutant concentrations attributable to proposed new sources.

- CALPUFF – Regional, long-range model that is accepted for simulation of regional haze, and deposition of specified chemical species. For permitting purposes, CALPUFF is used to assess impacts in Class I areas surrounding proposed major source projects. This model can evaluate the incremental haze contribution from a singe source, or assess the cumulative effect of multiple sources. It operates in both screening mode and more rigorous refined mode based on a regional "wind field."

To perform a quantitative analysis of air quality in the Planning Area, the first step would be to gather suitable meteorological data. To accomplish this, several stations would be deployed within distinct airsheds for at least a full 12-month period. A concurrent, single year of model-ready data from several stations would allow a dispersion model to be used to assess current pollutant concentrations throughout the Planning Area, and make preliminary projections of future conditions. Additional years of data would allow greater confidence in future projections, since a broader range of representative meteorology would be captured. A discussion is provided in this section of the basic requirements for such data sets.

For a regional analysis, a roster of air pollutant emission sources would be constructed from available air permit data, and from a survey of nonpermitted activities within the Study Area. A suitable roster would include permitted major sources that could affect the Planning Area, such as two large coal-fired power plants (Springerville and Coronoado) in eastern Arizona, mobile sources on larger highways, and estimates of minor and nonpermitted air pollutant sources in the area.

The simulation models would be designed to evaluate key air quality criteria:

- conformance with National Ambient Air Quality Standards (NAAQS), and prediction of actual ambient concentration distribution

- regional haze generation in Class I areas, and potentially other sensitive areas in the Planning Area

- level of sulfate and nitrate deposition rates, in units of kilograms per hectare, in Class I areas and potentially other sensitive areas

4.3 METEOROLOGICAL DATA

For near-field ambient air impact assessment within a radius of 50 km, single-site meteorological data can be used if representative of conditions within a given airshed. For these purposes, an airshed can be defined as a geographic area that can be characterized by a single-site meteorological data set. If a large source is to be situated in an area, data from the proposed project site are preferred over National Weather Service (NWS) data to more accurately represent conditions in the locale of the facility.

For meteorological data to be acceptable for dispersion modeling, several EPA guidelines must be followed. The regulations and requirements associated with meteorological data recorded for possible use in regulatory dispersion modeling are covered in the Clean Air Act Amendments of 1990, under Part D, Prevention of Significant Deterioration, and in Title 40, Code of Federal Regulations (CFR) Part 52.21. These regulations refer to minimum data capture requirements, siting criteria, and data quality. The requirements for obtaining and maintaining accurate and valid meteorological data for modeling purposes are presented in EPA *Ambient Monitoring Guidelines for PSD, May 1987 (EPA-450/4-87-007)* and the *Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements (as revised August, 1989) (EPA/600/R-94/038d).*

The surface meteorology parameters that are required as part of a data set collected at a given location for simulation modeling include the following:

- dry bulb temperature – at two tower elevations for stability calculations

- wet bulb temperature or relative humidity

- precipitation as rain or snow

- barometric pressure

- solar insolation – the energy flux to the earth's surface

- wind speed

- wind direction in compass degrees

Specialized meteorological data that characterize the conditions in the upper atmosphere also are required for a regional analysis. One such characteristic is the so-called mixing height, and depth of the mixing layer, which in turn are indicators of the stability of the atmosphere. The deeper the atmospheric mixing layer, the more stable that layer is, and the harder it is for pollutants to disperse vertically. If conditions produce a shallower mixing layer, pollutants are more readily dispersed vertically. The physical data for upper air parameters generally are obtained by twice-daily atmospheric soundings conducted using instruments on high-altitude balloons. In the more sparsely populated western states, there may only be a few stations conducting such soundings and they are not always associated with population centers. Although it cannot be confirmed from public sources, the closest likely source for upper air data near the Planning Area is the White Sands Missile Range located in the extreme southeast corner of Socorro County. Based on review of available data at least one, complete, quality-assured resource for upper air data would have to be identified as part of a comprehensive air quality analysis for the Planning Area.

Turbulence and sunlight are other factors in assessing atmospheric stability. Therefore, stability class information is derived from merging the surface and upper air data. Meteorologists have adopted an atmospheric stability classification system (based on the intensity of solar radiation and wind speeds) developed by Pasquill that provides an indicator of turbulence. There are seven stability classes from A to G, where A corresponds to extremely unstable, G corresponds to extremely stable (nighttime) and D corresponds to neutral conditions. Stability classes A, B, and C describe situations that have low wind speeds and moderate-to-high solar radiation. These conditions promote effective dispersion. Neutral conditions (stability class D) can occur any time and can have moderate-to-low solar radiation and higher wind speeds. Stability classes E, F, and G are the least favorable to dispersion. These conditions usually occur at night and have low wind speeds and clear skies.

As a general statement, stability classes E and F occur less frequently in the desert and stability classes B, C, and D are the most common. In the winter, stability classes E, F, and G can occur more often. Also, inversions can form frequently in the winter and tend to trap pollutants near the surface.

4.4 EMISSION SOURCE INFORMATION

As part of this study, essentially all the current and quantitative emission rate information for existing sources available from public sources has been reviewed. However, to operate a quantitative simulation model, the emission rates and characteristic stack parameters are required. These parameters include the stack height and diameter, exhaust flow rate, and exhaust temperature. For area sources, such as emissions from disturbed soil areas or mining operations, the size of the area is needed, along with soil silt content, average moisture, and other physical data would be used to estimate emissions. Major sources must provide the required stack parameters when applying for air permits. This information would be retrievable from the Arizona Department of Environmental Quality (ADEQ) or New Mexico Environment Department (NMED). However, for minor sources and nonpermitted sources such data would have to be developed as an engineering estimate for use in simulations.

4.5 APPLICABLE SIMULATION MODELS

Current practice is to simulate regional air quality conditions on a local or "near-field" scale – typically within a radius of approximately 50 km, and on a long-range or "far-field" scale of 100 km or more for visibility impacts. Specialized models have been developed that accommodate this analysis structure.

4.5.1 Near-Field Assessment with ISC3

The Industrial Source Complex (ISC3) is used for refined dispersion analysis of ground-level pollutant concentration changes due to a roster of sources operating during one or more modeled years of meteorological data. The ISC3 model is a steady-state Gaussian plume model that simultaneously simulates the spread of stack plumes from multiple sources. The ISC3 model was designed to specifically support the EPA regulatory modeling programs. The *Guideline on Air Quality Models* (EPA 1986, revised 1995) recommends the use of ISC3 for multiple sources, rural or urban areas, with building downwash, and 1-hour to annual averaging times.

The selection of rural or urban dispersion coefficients for use in a specific ISC3 modeling exercise should follow either a land use procedure or a population density procedure. The land use procedure is considered more effective. The land use classification scheme proposed by A.H. Auer in *Correlation of Land Use and Cover with Meteorological Anomalies, Journal of Applied Meteorology,* 1978, is the method recommended by the EPA. This method assigns a land-use category for twelve different conditions, ranging from uninhabited scrub wilderness, to high-density commercial, urban areas. If 50 percent or more of the area surrounding a modeled source consists of "rural" categories, then a set of dispersion parameters consistent with rural conditions are used. Conversely, if there are significant developed areas surrounding a source, then "urban" dispersion parameters are appropriate for the ISC3 model.

The design of the receptor grid is a key factor determining the ability of an ISC3 analysis to quantify ambient impacts. Conventional practice is to develop an orthogonal grid of regularly spaced receptor points. It is at these points that the model will predict both short-term and annual average pollutant concentrations. The receptors also should be defined by both location (north and east coordinates) and by elevation. The spacing distance is selected by the analyst to best represent the topography and features of the modeled region. For example, a tighter grid may be placed over a Class I area, or a location with sensitive receptors, such as a town, school, or hospital. Spacing of receptor points usually range from 25 meters (m) to 2 km.

4.5.2 Regional Haze Evaluation with CALPUFF

Regional haze impacts may result from the combined effects of multiple sources throughout a widespread geographic area of over 100 km radius. Therefore, regional visibility analysis requires long-range transport dispersion models that include the influence of atmospheric chemical reactions. Primary or secondary emissions of sulfate, nitrate, volatile organic chemicals and elemental carbon all contribute to visual impairment. Analysis of visibility degradation is accomplished by calculation of the change in light extinction due to anthropogenic source emissions, as compared to a naturally occurring background visual range.

To assess air quality impacts on Class I areas and generally over a large region, the CALPUFF model is recommended. The CALPUFF model is a Lagrangian puff model that simulates continuous puffs of pollutants released into the atmosphere (as compared to ISC3, a continuous source Gaussian plume model). As the wind flow changes from hour to hour, the path each puff takes changes to the new wind direction. A Federally sponsored interagency workgroup has concluded that CALPUFF can better simulate long-range impacts (beyond 50 km) compared to ISC3, and also can include the chemical characterization of pollutant species that is not available in ISC3. The guidance for these analyses has been published in the *Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (EPA 1998a), the *Federal Land Manager's Air Quality Related Values Workgroup (FLAG) – Phase I Report* (December 2000).

Section 3 of the IWAQM Phase 2 document outlines the steps required in calculating regional visibility impairment. The primary sources of visibility impairment are fine particulates, sulfates, and nitrates. Ammonium sulfate and ammonium nitrate are generally the sulfate and nitrate compounds found in the highest concentrations in the United States. The CALPUFF model assesses the transport and creation by reactions of sulfate and nitrate species from short-term sulfur dioxide (SO_2) and nitrogen dioxide (NO_2) concentrations predicted from dispersion modeling. The regional haze contributions due to particulate matter of 10 microns or smaller diameter (PM_{10}), condensable particulates (other than water vapor) and sulfuric acid mist, are also considered in the CALPUFF model, based on IWAQM Phase 2 guidance.

To determine the potential regional haze impacts beyond 50 km a suitable CALPUFF modeling analysis would be conducted for each Class I area, or other area of interest. Receptors in such an analysis would typically be arranged in concentric ring pattern (Screening mode) or in an orthogonal grid of different spacing levels (Detail mode). If a screening level analysis is appropriate, the CALPUFF model would be operated using representative meteorological data for a five-year period, and rings of receptors would be placed at the nearest, mid-point, and farthest boundaries of the Class I area being modeled. Results of the analyses at each Class I area then would be compared to location specific threshold values of visual range and deposition.

4.6 LONG-TERM AIR QUALITY RESOURCE PLANNING

Available data indicate that no significant impacts on the quality of air have occurred due to existing emission sources in the Planning Area, and within the wider Study Area. The quality of air should remain good based on current information regarding continuing activities. Impacts that may occur due to earth moving or vehicle movements for typical construction, such as road improvement projects, are minimal, localized, and of short duration. These considerations indicate that a detailed air quality analysis is not necessary solely to ensure compliance with NAAQS.

Should larger, major source projects subject to PSD review be proposed, the BLM or other Federal land managers should ensure that the project proponents act to protect the air quality in the Class I areas from visibility degradation or chemical deposition, in accordance with PSD requirements. Appropriate measures conducted by a project proponent may include pre- and/or post-construction ambient monitoring and simulation to assess regional haze impacts.

A component of planning and executing a program of prescribed burning to reduce the potential for damage from wildfires must be a consideration of air quality impacts. The New Mexico open burning permit process requires detailed plans and impact simulations to reduce impacts from such activities. One aspect of planning an extensive prescribed burning program may be performance of a refined modeling analysis. This would not only provide insight into the potential impacts of different burning scenarios, it may assist in designing the burn procedures to minimize such impacts.

5.0 REFERENCES

Arizona Department of Environmental Quality. 2002. Simple Approach Smoke Estimation Model (SASEM), Version 4.1. Website: http://www.adeq.state.az.us/comm/download/air.html.

Auer, A.H. 1978. Correlation of Land Use and Cover with Meteorological Anomalies*, Journal of Applied Meteorology*.

Celaya, D. 2002. Electronic mail with attachment from Darlene Celaya, Air Quality Compliance Section, Arizona Department of Environmental Quality to Susan Lohr, URS Corp. Attachment: 2001 Emission Summary for Apache County from EHS II – Emission Inventory. November 26.

Federal Land Manager Air Quality Workgroup (FLAG). 2000. *Federal Land Manager's Air Quality Related Values Workgroup (FLAG) – Phase I Report*. December.

Interagency Monitoring of Protected Visual Environments (IMPROVE). 2002. http://vista.cira.colostate.edu/improve.

_____. 2003. *Spatial and Seasonal Patterns and Temporal Variability of Haze and its Constituents in the United States: Report III*. Website: http://vista.cira.colostate.edu/improve/Publications/Reports/2000/2000.htm.

New Mexico Energy, Minerals & Natural Resources Department. 2003. Mining Reclamation Program. Website: http://www.emnrd.state.nm.us/Mining/cmrp/sql/CRPsql.asp.

New Mexico Environmental Department/Air Quality Bureau. 1995. *New Mexico Smoke Management Plan.* Sante Fe.

_____. 1997. New Mexico Smoke Management Memorandum of Understanding. Sante Fe.

_____. 2001. *Annual Air Quality Report*. 2001. Website: http://www.nmenv.state.nm.us/oots/2001_NMED_Report-Air_Quality.pdf.

_____. 2002. Meteorological Data. Website: http://www.nmenv.state.nm.us/abq/met_data.html.

_____. 2002. PM10 Monitoring Site Locations. Website: http://www.nmenv.state.nm.us/abq/site_loc.html.

_____. 2002. *Permit Application for Open Burning of Prescribed Natural Fire Areas.* Website: http://www.nmenv.state.nm.us/aqb/enforce.html.

_____. 2002. Public Notice Announcements. Website: http://www.nmenv.state.nm.us/abq/ABQ-Public-Notice.html.New Mexico Environmental Improvement Board. 1995. *Open Burning 20NMAC2.60.* Sante Fe.

New Mexico State University. 2003. Climate Data. Website: http://weather.nmsu.edu/cgi-shl/cns/uberpage.pl.

New Mexico State Highway and Transportation Department. 2002. Road Segments by Traffic (AADT) Info. Consolidated Highway Data Base report.

U.S. Department of the Interior, Bureau of Land Management. 1989. *Socorro Resource Management Plan.* Las Cruces District, Socorro Resource Area.

_____. 2002. *Draft Farmington Resource Management Plan and Environmental Impact Statement*. Farmington Field Office.

U.S. Environmental Protection Agency (EPA). 2002. EPA Air Data – NET Facility Emissions and Moniot PSI Reports. Website: http://oaspub.epa.gov/airsdata.

_____. 2002. EPA Air Data – Emissions Summary Map and Facility Releases Report. Website: http://www.epa.gov/.

_____. 2002. EPA Air Data – PM10 Nonattainment Map. Website: http://www.epa.gov/air/data/rtv/rvnonpm1.html.

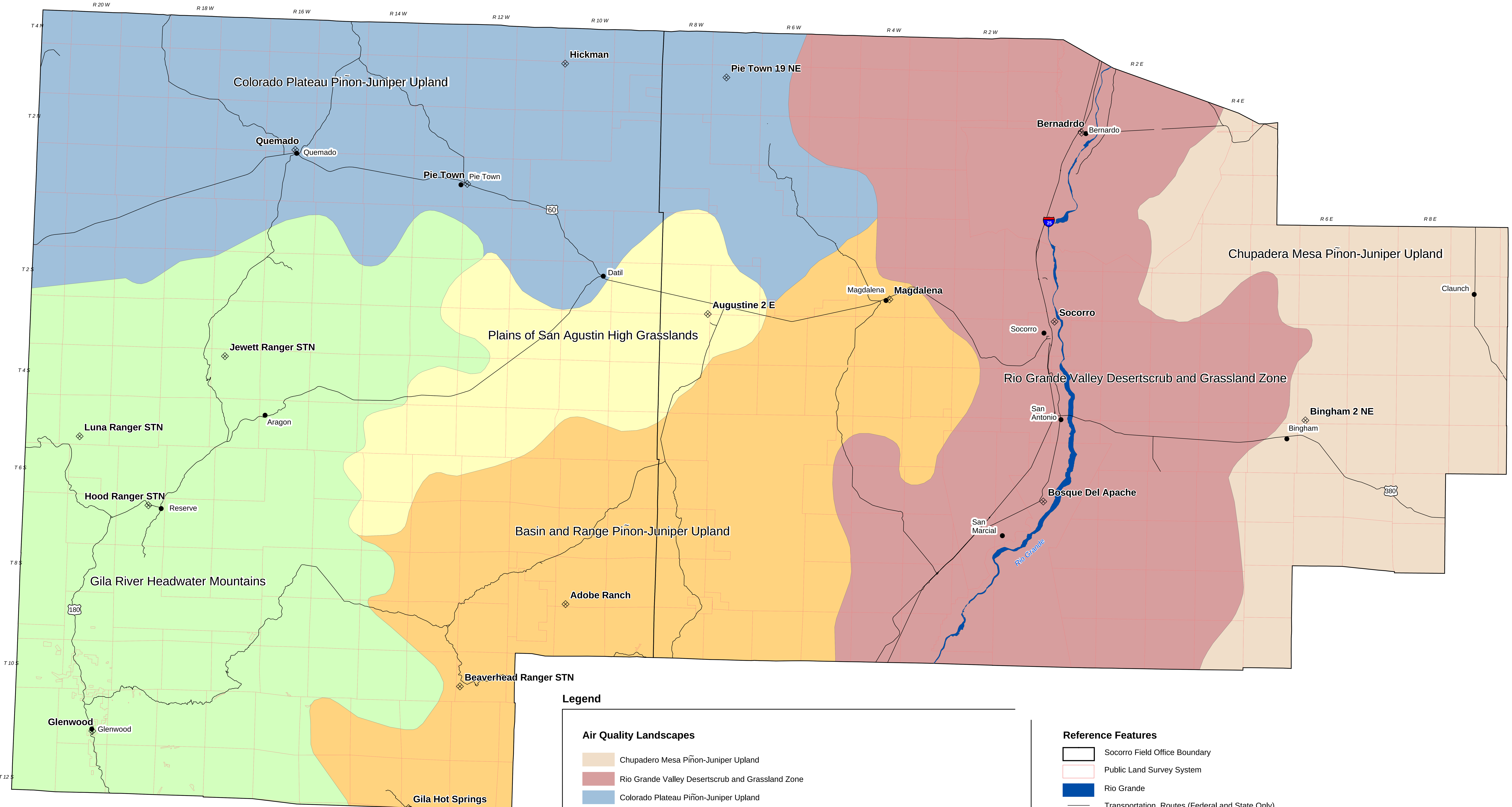
_____. 1998. Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts.

_____. 1989. Quality Assurance Handbook for Air Pollution Measurement Systems, Volume IV: Meteorological Measurements. *EPA Document* 600/R-94/038d, Revised August 1989.

_____. 1987. Ambient Monitoring Guidelines for PSD, May 1987. *EPA Document* No. 450/4-87-007.

Western Regional Climate Center. 2003. New Mexico Climate Summaries. Website: http://www.wrcc.dri.edu/summary/mapnm.html.

MAPS



Air Quality Landscapes

Socorro Field Office RMPR/EIS

June 2003

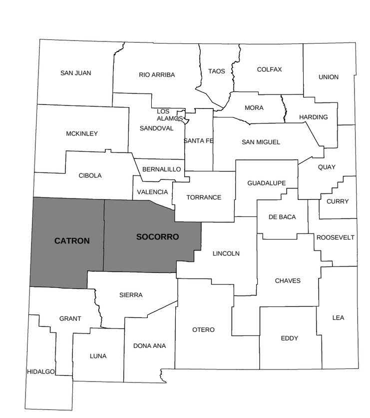
Universal Transverse Mercator
Zone 13, Units Meters
GRS 1980 Spheroid
NAD83 Datum

Miles: 0 2.5 5 10 15 20

Kilometers: 0 2.5 5 10 15 20

P:\BLM\Socorro RMPR_EIS\GIS\mxds\Air-Report\Air_Landscape.mxd

Location in New Mexico



Legend

Air Quality Landscapes

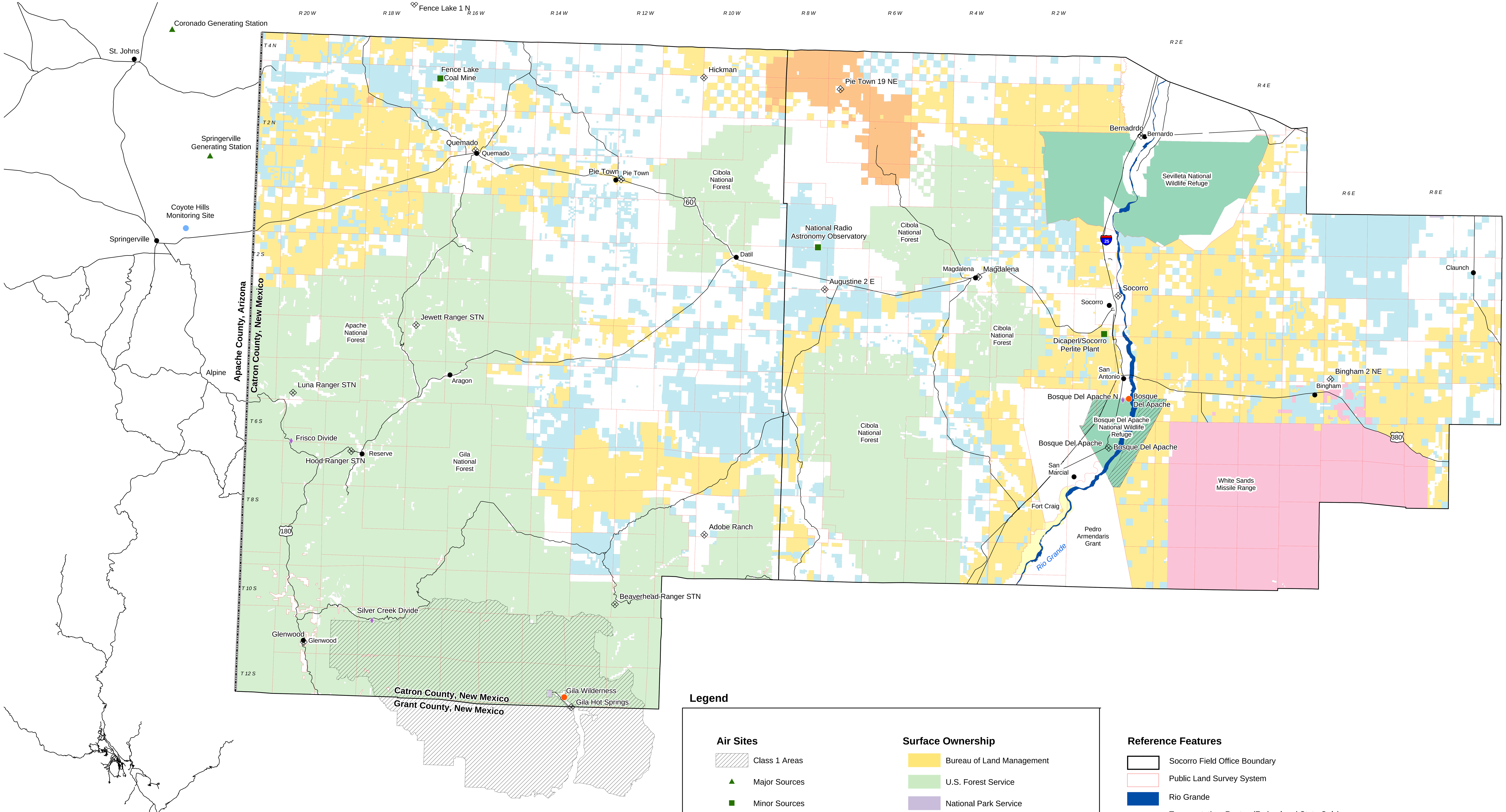
- Chupadero Mesa Piñon-Juniper Upland
- Rio Grande Valley Desertscrub and Grassland Zone
- Colorado Plateau Piñon-Juniper Upland
- Basin and Range Piñon-Juniper Upland
- Plains of San Agustin High Grasslands
- Gila River Headwater Mountains
- National Weather Service Meteorological Stations

Reference Features

- Socorro Field Office Boundary
- Public Land Survey System
- Rio Grande
- Transportation Routes (Federal and State Only)
- 500-Meter Topographic Contours
- City, Town, or Village

URS

Map 2



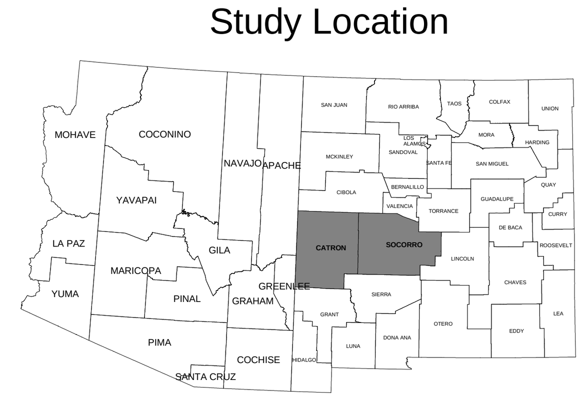
Air Quality Study Area

Socorro Field Office RMPR/EIS

June 2003

Universal Transverse Mercator
Zone 13, Units Meters
GRS 1980 Spheroid
NAD83 Datum

Study Location



Legend

Air Sites

- Class 1 Areas
- Major Sources
- Minor Sources
- IMPROVE Stations
- Criteria Pollutant Station
- MET Stations
- National Weather Service Meteorological Stations

Surface Ownership

- Bureau of Land Management
- U.S. Forest Service
- National Park Service
- U.S. Fish and Wildlife Service
- Bureau of Reclamation
- Department of Defense
- Tribal Lands
- State Trust Lands
- Private

Reference Features

- Socorro Field Office Boundary
- Public Land Survey System
- Rio Grande
- Transportation Routes (Federal and State Only)
- City, Town, or Village

No warranty is made by the Bureau of Land Management as to the accuracy, reliability, or completeness of these data for individual use or aggregate use with other data, or for purposes not intended by BLM. Spatial information may not meet National Map Accuracy Standards. This information may be updated without notification.

URS

Map 1

P:\BLM\Socorro RMPR_EIS\GIS\mxds\Air-Report\AirSites.mxd