

## INTRODUCTION

The primary goal of air quality management is to protect air quality within, and outside of, the planning area. The management objectives related to this goal is to:

- ensure that the air quality within the planning area meets State and Federal air quality standards and regulations;
- protect visibility at Class I areas and scenic and important vistas located within the planning area;
- protect all air quality related values in wilderness areas; and
- cooperate with the State of Colorado and other Federal agencies regarding air quality issues.

Under the Federal Land Policy Management Act of 1976 (FLPMA) and the Clean Air Act (see Legal and Administrative Framework), the SJPLC cannot conduct or authorize any activity that does not conform to all applicable local, State, Native American Tribal, and Federal air quality laws, statutes, regulations, standards, policies, and implementation plans. Therefore, an extensive air quality impact assessment, based on atmospheric AERMOD dispersion modeling, was conducted in order to analyze the potential impacts of the action alternatives.

Atmospheric dispersion models, including the one used for this analysis, are computer programs that use mathematical algorithms designed to stimulate how pollutants in the ambient atmosphere disperse and, in some cases, how they react in the atmosphere. The dispersion models are used to estimate or to predict the downwind concentration of air pollutants emitted that can impact ambient air quality. The dispersion models require the input of data that includes:

- meteorological conditions, such as wind speed and direction; the amount of atmospheric turbulence; the ambient air temperature; and the height to the bottom of any inversion aloft that may be present;
- emissions parameters, such as source location and height, source vent stack diameter and exit velocity, exit temperature, and mass-flow rate;
- terrain elevations at the source location and at the receptor location; and
- location, height, and width of any obstructions (such as buildings or other structures) in the path of the emitted gaseous plume.

AERMOD, the EPA-approved atmospheric dispersion model used in this analysis, is an integrated system that includes three modules:

- a steady-state dispersion model designed for short-range (up to 50-kilometers) dispersion of air pollutant emissions from stationary industrial sources;

- a meteorological data preprocessor (AERMET) that accepts surface meteorological data, upper air soundings and, optionally, data from onsite instrument towers (which then calculates atmospheric parameters needed by the dispersion model, such as atmospheric turbulence characteristics, mixing heights, friction velocity, etc.); and
- a terrain preprocessor (AERMAP) whose main purpose is to provide a physical relationship between terrain features and the behavior of air pollution plumes (which generates location height data for each receptor location and provides information that allows the dispersion model to simulate the effects of air flowing over hills or splitting to flow around hills). (Source: [http://www.epa.gov/scram001/dispersion\\_prefrec.htm](http://www.epa.gov/scram001/dispersion_prefrec.htm))

All dispersion models, regardless of their level of complexity, are mathematical approximations of the behavior of the atmosphere. Therefore, especially given the uncertain nature of the number and potential location of sources under the analyzed alternatives, the results need to be appropriately viewed as estimates of possible future concentrations and not as exact predictions in time and space.

Dispersion modeling is generally conducted using assumptions that ensure that the modeled results do not underestimate actual future impacts so that appropriate planning decisions can be made. For example, sources may be assumed to operate for longer periods or emit more pollutants than actual conditions in order to ensure that health-based standards are protected. On the other hand, analyses are not conducted assuming “worst-case” conditions across the board, because this typically leads to results that are unreasonable and unrealistic. Hence, dispersion modeling uses the best available information and methods (EPA-approved models, emission factors, etc.) when possible, combined with the best scientific and professional judgment in an attempt to ensure that projections of future air quality are neither under-predicted nor unrealistically over-predicted.

Potential air quality impacts were analyzed in order to determine maximum “near-field” (local or Class II) ambient air pollutant concentrations and hazardous air pollutant impacts, as well as to determine maximum “far-field” (regional or Class I) impacts on ambient air pollutant concentrations, visibility, and atmospheric deposition of sulfur and nitrogen (“acid rain” constituents).

Near-field and far-field air quality parameters, grouped by Class I and Class II analyses, were inventoried and analyzed and are described below.

#### **Near-Field (Class II)**

- Criteria Pollutant Emissions (National Ambient Air Quality Standard (NAAQS) and PSD increments): NO<sub>x</sub> (including NO<sub>2</sub>), CO, SO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub>
- Hazardous Air Pollutants (HAPs): formaldehyde

#### **Far-Field (Class I)**

- Emissions of Criteria Pollutants (NAAQS and PSD increments): NO<sub>x</sub> (including NO<sub>2</sub>), CO, SO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub>
- Visibility
- Sulfur and nitrogen deposition

## LEGAL AND ADMINISTRATIVE FRAMEWORK

The U.S. Congress recognized the importance of preserving air quality through passage of the Clean Air Act (CAA) of 1963, as amended. One purpose of the CAA is to “preserve, protect, and enhance the air quality in national parks, national wilderness areas, national monuments, national seashores, and other areas of special national or regional natural, recreational, scenic, or historic value” (Clean Air Act, Sec. 160).

In the most outstanding special areas, Congress mandates that Federal land managers (e.g. Forest Supervisors, BLM Field Office Managers) have “an affirmative responsibility to protect the air quality related values within class I areas” (Clean Air Act, Sec. 165(d)(2)(B)) through the Federal New Source Review process.

Class I areas include large Wilderness areas or national parks in existence before August, 1977. Table 1.2 summarizes the Class I areas located within the planning area, and other nearby areas.

**Table 3.1.1 - Class I Areas of the Four Corners Region**

Class I Area	State	Administering Agency
Weminuche Wilderness	Colorado	USFS
Mesa Verde National Park	Colorado	NPS
Canyonlands National Park	Utah	NPS

The State of Colorado has established air quality standards in relation to carbon monoxide, nitrogen dioxide, ozone, lead, particulate matter, and sulfur dioxide. Colorado has also designated special places with outstanding scenic vistas in the Vista Database of Scenic and Important Views. Table 3.1.2 summarizes official vistas on public lands designated through this program. Visibility at these vistas is considered by the State of Colorado when permitting new large emissions sources (PSD permits/New Source Review) or when issuing smoke emission permits associated with prescribed burning.

**Table 3.1.2 - Scenic, Important Views on the San Juan Public Lands**

Scenic, Important Views		
Andrews Lake Overlook	McPhee Overlook	Cimarron Peak, Weminuche Wilderness
Durango Mountain Resort	Cave Basin Ridge	Chalk Mountain, South San Juan Wilderness
Bolam Pass Overlook	San Juan Overlook	Benchmark Lookout
Lizard Head Pass Overlook	Chimney Rock Archaeology Area	Sockrider Peak
Kennebec Pass Overlook	Mt. Wilson, Lizard Head Wilderness	Dolores Canyon Overlook
Animas Overlook	Lookout Peak	
Jersey Jim Fire Tower	Mt. Eolus, Weminuche Wilderness	

CDPHE 2005

## LAWS

The Clean Air Act of 1963, as amended: This is the comprehensive Federal law that regulates air emissions from area, stationary, and mobile sources. This law authorizes the U.S. Environmental Protection Agency to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment. This act, as amended, significantly broadened the authority and responsibility of the USFS and the BLM by requiring:

- compliance with all applicable Federal, State, tribal, or local air control rules, regulations, and directives;
- compliance with substantive and procedural requirements imposed by a Federal, State, Native American tribal, or local administrative authority or court; and
- consultation with each State having delegated authority on all matters concerning the prevention of significant deterioration of air quality, visibility, air quality maintenance plan requirements, and non-attainment requirements.

The CAA (through the New Source Review Process) also gives Federal land managers an affirmative responsibility to:

- protect the air quality related values on any lands managed by them within a Class I Area; and
- consider, in consultation with the Administrator of the EPA, whether a proposed major emitting facility will have an adverse impact on air quality related values.

This act states that Wilderness Areas are to be managed in order to retain their primeval character, protected and managed so as to preserve natural conditions.

Section 102 provides that: "... the public lands will be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmosphere, and archaeological values..." and "...in managing the public lands the Secretary shall by regulation or otherwise take any action required to prevent unnecessary or undue degradation of the lands and their resources or to afford environmental protection. This act states that USFS programs must protect and/or improve the quality of soil, water, and air resources.

## REGULATIONS AND POLICIES

- **FSM 2500, Chapter 2580:** This outlines USFS regulation, policy and direction regarding air resource management.
- **EPA Interim Air Quality Policy on Wildland and Prescribed Fires, 1998:** This provides guidance on mitigating air pollution impacts caused by wildland and prescribed burns while, at the same time, recognizing the current role of fire in wildland management.

## AFFECTED ENVIRONMENT

### AIR QUALITY

The mountain and desert country within the planning area offer world class scenery, viewed by millions of people annually. Residents and tourists visiting the area expect, and anticipate, clean air. The Four Corners region, and the planning area, are rich in energy resources. Large oil and gas production fields and many coal-fired power plants are located in the Four Corners region. These industries produce air pollution emissions that are recognized as major contributors to degraded air quality impacting the planning area. Specific concerns include maintaining air quality sufficient to comply with National Ambient Air Quality Standards (NAAQS), the Colorado Ambient Air Quality Standards, and the Prevention of Significant Deterioration (PSD) increment requirements; as well as those related to compliance, degradation of visibility, and increased deposition.

Air pollutants of specific concern are sulfur dioxide, oxides of nitrogen, mercury, ozone, and particulate matter. Although many of the documented air quality impacts are associated with external sources (those outside public land boundaries and jurisdictions), some management activities within the planning area have the potential to impact air quality. These activities include prescribed burns, oil and gas development, mining, developed recreation, and use of travelways.

#### **Atmospheric Deposition and Surface Water Quality Impacts**

Over the last decade, the SJPLC has monitored lakes for atmospheric deposition. Monitoring has demonstrated that certain high elevation lakes in the Weminuche Wilderness Area are sensitive to changes in chemistry, and, therefore, are good indicators of changes in atmospheric deposition. These pure water Wilderness lakes should be very limited in nutrients and other chemicals, but data suggests they are becoming seasonally saturated with nitrogen (Musselman and Slausen, 2004).

Elevated levels of oxides of sulfur and nitrogen are of significant concern because they also lead to the acidification of precipitation and surface waters. These chemicals may result in significant changes in Wilderness ecosystems. The source of nitrogen is largely atmospheric. Atmospheric (wet) deposition monitoring at Molas Pass shows that since the 1990's there has been an increasing trend in nitrate concentration. There has also been a decreasing trend of sulfate concentration in precipitation for the same time period (National Atmospheric Deposition Program, 2007; National Park Service, 2005).

Mercury levels on, and near, the planning area are also elevated in places. McPhee Reservoir, and nearby Narraguinnep, Puett, and Totten Reservoirs, as well as Vallecito Reservoir adjacent to the Weminuche Wilderness (CDPHE, 2007) have fish consumption restrictions due to mercury contamination. Total Maximum Daily Loads (TMDL) have been developed by the State of Colorado to address water mercury contamination issues in McPhee and Narraguinnep reservoirs (CDPHE 2003). Although the source of mercury has not been identified conclusively, mercury in the atmosphere, as well as subsequent deposition in the aquatic environment, is commonly associated with coal-fired power plants (EPA 2005).

## **Air Pollution**

Ground-level ozone has been an increasing concern in the Four Corners region. Mesa Verde National Park, located adjacent to the planning area, has been monitoring ozone since 1993. A significant trend of increasing ozone has been observed within the Park. (National Park Service 2004). Ozone levels approaching the new EPA 8-hour standard have also been measured near the Colorado/New Mexico border. The high ozone levels in the Four Corners region are similar to those found in large metropolitan areas, and are considered unusual for a rural area (New Mexico Environment Department 2007). In 2005, in response to local concerns about ozone, the SJPLC began monitoring ozone near Bayfield, Colorado. The highest 1-hour ozone averages for this site were 99, 89 and 85 ppb in 2006. The Colorado Ambient Air Quality Standard for ozone (1-hour averaging time) is 80 ppb, although limited exceedances are allowed.

The protection of visibility is a requirement of the Clean Air Act in mandatory Federal Class I areas, such as the Weminuche Wilderness Area and Mesa Verde National Park. Data collected locally show that visibility is degrading (haziness is increasing) at Mesa Verde National Park. At Mesa Verde National Park, organic carbon, fine soil particles, and sulfates are the largest contributors to degraded visibility. In the Weminuche Wilderness Area, there is an increasing trend for nitrates, but no trend for sulfates, organics or fine soil (Sisler et al., 1993; Malm et al., 2000)

## **Coalbed Methane Development**

Large-scale coalbed methane (CBM) development is a relatively new large local source of air pollutants. CBM development began approximately 18 years ago. However, as a result of the current energy boom, well development has accelerated rapidly within the San Juan Basin, which is one of the largest CBM reserves in the nation. A portion of the planning area is in the northern San Juan Basin (approximately 60,000 acres). The majority of the Basin is located downwind, within the bounds of the Southern Ute Reservation and northwestern New Mexico. There are approximately 23,000 CBM wells in the San Juan Basin, and development of 11,000 more wells is projected over the next 20 years. CBM wells, and the associated infrastructure, are cumulatively large sources of NO<sub>x</sub>, SO<sub>2</sub>, and VOCs. Construction and traffic on unpaved well roads are sources of dust and fine particulates.

## **Power Plants**

Coal-fired power plants are the largest point sources of air pollution emissions in the Four Corners region. There are several coal-fired power plants in the region, including the San Juan Generating Station in New Mexico (1850 megawatts), the Four Corners Power Plant in New Mexico (2270 megawatts), and the Navajo Generating Station in Arizona (2250 megawatts). There are proposals for two new coal-fired power plants in New Mexico, both are currently going through the PSD permit process. The proposed Desert Rock facility (1500 megawatt) would be located on the Navajo Nation in northwestern New Mexico. The proposed Mustang Power Plant (300 megawatt) facility would also be located in northwestern New Mexico. Air quality and visibility protection would be issues of concern with respect to the permitting of these new facilities. Coal-fired power plants are sources of NO<sub>x</sub>, SO<sub>2</sub>, VOCs, carbon dioxide (CO<sub>2</sub>), mercury, and other emissions.

## **Fire and Fuels Management**

Since the late 1990's, the USFS and the BLM have increased their emphasis on reducing the threat of catastrophic wildfire on public lands. As a result, prescribed burning and other hazardous fuel-reducing techniques have increased (see Wildfire and Fuels Management). Similarly, wildfire, even from distant locations, can significantly impact local air quality, especially visibility. Reducing fuels across the western states on public lands may help reduce this source of air quality degradation. When conducting prescribed burns, the agencies must obtain permits from the State of Colorado ensuring the protection of public health, safety and visibility related to the impacts of smoke.

### Regional Growth and Development

The population of the Four Corners region is continuing to increase at a rapid rate. The population of Archuleta County is predicted to increase from 10,028 to 27,048 (a 170% increase) by 2030. La Plata County population is projected to increase from 44,500 to 80,600 (an 81% increase) during the same time period. Montezuma County is projected to increase from 23,900 to 40,200 (a 68% increase) (Davis et al., 2004). Large communities are developing adjacent to the Weminuche Wilderness Class I Area. The Durango Mountain Resort community development project proposes 1,650 new residences, and additional commercial development, within 1 mile of the Weminuche Wilderness Class I Area. The Durango Mountain Resort has started a visibility monitoring program to ensure the protection of scenic views from the ski area. The Wolf Creek Village proposal is for 2,100 new residences (accommodating up 10,500 people), and associated commercial development, within 1 mile of the Weminuche Wilderness class I Area. All of the activities have the potential to impact air quality within the planning area.

**Table 3.1.3 – Air Quality Standards, Increments, Significant Impact Levels, and AQRV Criteria**

Pollutant/ AQRV	Averaging Interval	EPA Class II SILs (µg/m <sup>3</sup> )	NAAQS (µg/m <sup>3</sup> )	Class II PSD Increment (µg/m <sup>3</sup> )	EPA Proposed Class I SILs (µg/m <sup>3</sup> )	Class I PSD Increment (µg/m <sup>3</sup> )	AQRV Thresholds
NO <sub>2</sub>	Annual	1	100	25	0.1	2.5	--
SO <sub>2</sub>	3-Hour	25	1300	512	1.0	25	--
	24-Hour	5	365	91	0.2	5	--
	Annual	1	80	20	0.1	2	--
PM <sub>10</sub>	24-Hour	5	150	30	0.3	10	--
	Annual	1	50	17	0.2	5	--
PM <sub>2.5</sub>	24-Hour	--	35	--	--	--	--
	Annual	--	15	--	--	--	--
CO	1-Hour	2,000	40,000	--	--	--	--
	8-Hour	500	10,000	--	--	--	--
Ozone	8-Hour	100 tpy VOC	0.08 ppm	--	--	--	--
Lead	Quarterly	0.1	1.5	--	--	--	--
Visibility (deciviews)	24-Hour	--	--	--	--	--	1.0
Nitrogen Deposition (kg/ha-yr)	Annual	--	--	--	--	--	3.0
Sulfur Deposition (kg/ha-yr)	Annual	--	--	--	--	--	5.0

The State of Colorado has also established an annual PM10 ambient air quality standard of 50 µg/m<sup>3</sup>, a 1-hour ozone ambient air quality standard of 0.12 ppm, a 3-hour SO<sub>2</sub> ambient air quality standard of 700 µg/m<sup>3</sup>, as well as a program similar to the Federal PSD increments limiting additional amounts of SO<sub>2</sub> above baseline conditions. The Federal Land Managers Air Quality Related Value Workgroup Guideline (FLAG) Guideline (FLAG 2000) has established visibility AQRV thresholds. The FLAG “just noticeable change” 1.0 deciview threshold is used to assess the significance of potential visibility impacts. The USFS has established cumulative deposition impacts thresholds of concern (Fox et al., 1989).

**Table 3.1.4 – Background Air Quality and AQRV Data**

Pollutant/AQRV	Averaging Interval	Background Level (µg/m <sup>3</sup> )	Monitoring Station
NO <sub>2</sub>	Annual	16.9	La Plata, Colorado
SO <sub>2</sub>	3-Hour <sup>a</sup> 24-Hour <sup>a</sup> Annual	68 21 5	Farmington, New Mexico
PM <sub>10</sub>	24-Hour Annual	64 21	La Plata, Colorado
PM <sub>2.5</sub>	24-Hour Annual	22.5 6.9	Mesa Verde National Park, Colorado Farmington, New Mexico
CO	1-Hour <sup>a</sup> 8-Hour <sup>a</sup>	2,288 1,831	Ignacio, Colorado
Ozone	1-Hour <sup>a</sup> 8-Hour <sup>a</sup>	0.077 ppm 0.071 ppm	Mesa Verde National Park, Colorado
Visibility (deciviews)	Annual	23.6	Mesa Verde National Park, Colorado
Nitrogen Deposition (kg/ha-yr)	Annual	2.3	Mesa Verde National Park, Colorado
Sulfur Deposition (kg/ha-yr)	Annual	1.2	Mesa Verde National Park, Colorado

Source: Ecology & Environment, 2006

<sup>a</sup> Maximum 2nd - Highest Value

Recent regional modeling efforts have concluded that the cumulative impacts related to activities such as those described above, could lead to significant visibility and other air quality impacts (BLM and USFS 2006). In response, Colorado and New Mexico (including Federal, Native American tribal, and local interested parties) formed the Four Corners Air Quality Task Force in 2005. The goal of the Task Force is to develop strategies designed to reduce emissions and improve air quality in the Four Corners region. Ultimately, air quality regulators, as well as Federal land managers, would consider these emissions reduction strategies as part of their overall responsibilities to protect and improve regional air quality.

## ENVIRONMENTAL CONSEQUENCES

### **Class I Areas (Weminuche Wilderness Area)**

Maintaining pristine Class I Area air quality conditions within the Weminuche Wilderness Area is a high priority, in addition to managing air quality across the planning area. Pristine conditions are measured directly through air quality monitoring, and indirectly through air quality related values (AQRVs). AQRVs for the Weminuche Wilderness Class I Area include lake chemistry, soil chemistry, flora and fauna assemblages, atmospheric deposition and chemistry, snow and snowmelt chemistry, and visibility. Under all of the alternatives, monitoring commitments would continue long-term as stated in the Weminuche Wilderness Monitoring Plan (USFS 1991), and through agreements made with the EPA and the State of Colorado.

### **Class II Areas**

Within the planning area, several air pollutants have become major concerns (including mercury, nitrogen, sulfur, and ozone). Most of these pollutants originate from outside the planning area. The SJPLC would pursue appropriate actions in order to reduce the impacts of pollutants from sources both within and outside of the public lands. These measures would include active membership in the Four Corners Air Quality Task Force, PSD Permit Review, and monitoring commitments.

### **Global Climate Change**

On-going scientific research has identified the potential impacts of so-called “greenhouse gas” (GHG) emissions (including carbon dioxide, CO<sub>2</sub>; methane; nitrous oxide; water vapor; and several trace gasses) on global climate. Through complex interactions on a regional and global scale, these GHG emissions cause a net warming effect of the atmosphere (making surface temperatures suitable for life on Earth), primarily by decreasing the amount of heat energy radiated by the Earth back into space. Although GHG levels have varied for millennia (along with corresponding variations in climatic conditions), recent industrialization and burning of fossil carbon sources have caused CO<sub>2</sub> concentrations to increase dramatically, and are likely to contribute to overall climatic changes, typically referred to as global warming. Increasing CO<sub>2</sub> concentrations also lead to preferential fertilization and growth of specific plant species.

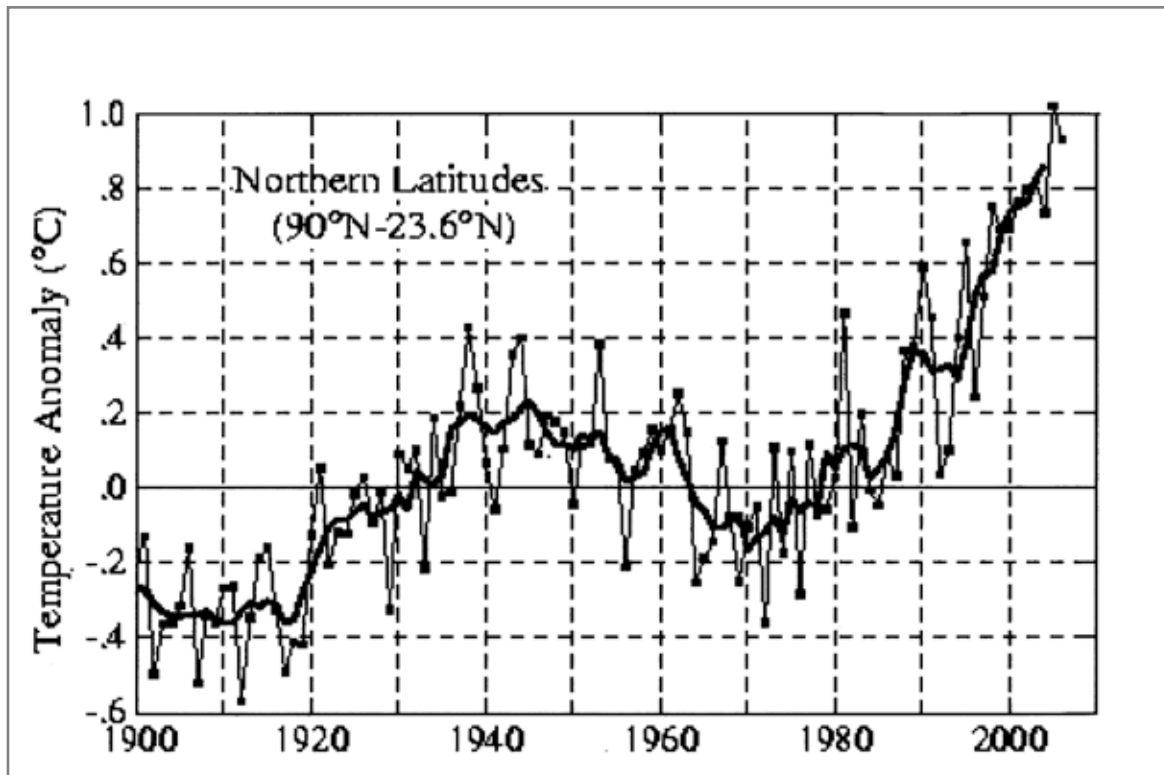
The assessment of GHG emissions and climate change is in its formative phase. It is not yet possible to know with confidence the net impact to climate. Observed climatic changes may be caused by GHG emissions, or they may reflect natural fluctuations. However, the Intergovernmental Panel on Climate Change (IPCC 2007) recently concluded that “warming of the climate system is unequivocal” and that “most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic [man-made] greenhouse gas concentrations.”

Global mean surface temperatures have increased nearly 1.0°C (1.8°F) from 1890 to 2006 (Goddard Institute for Space Studies, 2007). However, observations and predictive models indicate that average temperature changes are likely to be greater in the Northern Hemisphere. Figure 3.1.1 demonstrates that northern latitudes (above 24° N) have exhibited temperature increases of nearly 1.2°C (2.1°F) since 1900, with nearly a 1.0°C (1.8°F) increase since 1970 alone. Without additional meteorological monitoring systems, it is difficult to determine the spatial and temporal variability and change of climatic conditions, but increasing concentrations of GHG are likely to accelerate the rate of climate change.

In 2001, the IPCC indicated that by the year 2100, global average surface temperatures would increase 1.4 to 5.8°C (2.5 to 10.4°F) above 1990 levels. The National Academy of Sciences (2006) has confirmed these findings, but also indicated that there are uncertainties regarding how climate change may affect different regions. Computer model predictions indicate that increases in temperature will not be equally distributed, but are likely to be accentuated at higher latitudes. Warming during the winter months is expected to be higher than during the summer.

Several activities occur within the planning area that may generate GHG emissions. Oil and gas development, large fires, and recreation using combustion engines, can potentially generate CO<sub>2</sub> methane and water vapors.

**Figure 3.1.1 – Annual Mean Temperature Change for Northern Latitudes (24 - 90° N)**



Source: Goddard Institute for Space Studies (2007)

State agencies, the USFS, the BLM, and the National Park Service have installed several monitoring stations to track existing conditions and trends for local and regional air quality. These stations track several pollutants of concern. Table 3.1.4 presents both the applicable significance thresholds (ambient air quality standards, etc.) and monitored background concentrations.

The Western Regional Air Partnership (WRAP) has compiled comprehensive inventories of regional pollutant emissions. This inventory also forecasts the likely emissions for the year 2018. The WRAP study projects that emissions of oxides of nitrogen (NO<sub>x</sub>), sulfur dioxide (SO<sub>2</sub>), volatile organic compounds (VOCs), carbon monoxide (CO), and Particulate Matter less than 10 and 2.5 microns in diameter, respectively (PM<sub>10</sub> and PM<sub>2.5</sub>) will increase across the Four Corners States over the next 12 years (Western Regional Air Partnership, 2002).

## DIRECT AND INDIRECT IMPACTS

### Impacts Related to Oil and Gas Development

There are several pollutants of concern associated with large-scale fluid-minerals development on, and adjacent to, the planning area. Table 3.1.5 summarizes potential issues associated with each pollutant.

**Table 3.1.5 - Pollutants Common to Oil and Gas Development Emissions**

POLLUTANT	Nitrogen Oxide	Sulfur Dioxide	Carbon Monoxide	Particulates	VOC, HAP, Ozone	Greenhouse Gases
<b>AIR QUALITY ISSUE</b>	Human health, visibility, atmospheric deposition	Human health, visibility, atmospheric deposition	Human health	Human health, visibility	Human health, visibility	Climate change

Modified from Four Corners Air Quality Task Force, 2006

In terms of fluid-minerals development, wellhead engines, compressor stations, gas plants, and refineries are primary sources of these pollutants. Emissions are also associated with fluid-minerals exploration and production activities (including drilling, flaring, and transportation).

Within the planning area, oil and gas development potential varies from moderate to high. The reasonably foreseeable development (RFD) scenario would be the same under all of the alternatives. The projection over the next 15 years is for 750 new and infill CBM wells in the northern San Juan Basin, 375 new wells in the Paradox Basin, and 30 exploration wells in the San Juan Sag area. Of that total, 1,015 new wells would be on existing leases not impacted by the leasing decisions in the final approved LMP, and 170 wells could be on unleased lands directly impacted by decisions in the final approved LMP.

Oil and gas well development would also require infrastructure construction. All alternatives for oil and gas leasing may result in up to 70 miles of new road construction, increased traffic on existing unpaved roads, and the construction of new compressor stations, pipelines, and well pads. Dust (particulate matter) would be the primary pollutant associated with road construction and road traffic. All alternatives would result in the same amount of road and well pad construction; therefore, impacts to air quality from dust would not vary. Road construction in the Paradox Basin would have the potential to produce periodic high levels of dust due to road construction materials and the dry weather conditions. Impacts related to Dust would be dependent upon the amount of road traffic, as well as on weather conditions. Air quality impacts related to dust would tend to be periodic; however, they would be chronic unless dust abatement measures were applied to the road surface and the roads were properly maintained. Implementing LMP guidelines that require dust abatement during construction and drilling periods would reduce fugitive dust pollution. If dust abatement measures were not used, fugitive dust pollution may be chronic and short-term (ranging from 1 to 4 months during active construction and drilling periods), and, at a reduced level, long-term (as service trucks access well sites).

The San Juan Sag area has moderate potential for oil and gas development. Within the Sag area, 2 exploratory wells are predicted to be drilled per year. Chronic and short-duration air impacts from road and construction dust, and drilling rig emissions are expected. The exploratory wells are not anticipated to become long-term production wells, therefore, long-term air quality impacts may be low, or may not occur in the San Juan Sag. The air quality impact assessment was based on the best available engineering data and assumptions,

meteorology data, and EPA dispersion modeling procedures, as well as professional engineering and scientific judgment. However, where specific data or procedures were not available, “reasonable but conservative” assumptions were incorporated. For example, the air quality impact assessment assumed that all potential oil and gas wells would go into production without any decline in production (no dry holes), then operate at full production levels (no “shut ins”) throughout the implementation-life of the final approved LMP. Therefore, this NEPA analysis assumes a development scenario that is not likely to actually occur.

The air pollutant dispersion modeling was based on 3-years of meteorological data collected at Mesa Verde National Park. These data were determined to be representative of the study area. This was based on 10 m wind speed and direction, solar radiation, and delta temperature measurements (at 2 and 10m heights), while achieving a 90% data capture rate for the period of 2001 through 2003 (Ecology & Environment Inc., 2006).

The criteria for determining the significance of potential air quality impacts include the Colorado Ambient Air Quality Standards (AAQS) and the NAAQS, which set maximum limits for several air pollutant concentrations, as well as PSD increments that limit the incremental increase of specific air pollutants (including NO<sub>2</sub>, PM<sub>10</sub>, and SO<sub>2</sub>) above legally defined baseline concentration levels. Where legal limits have not been established, the appropriate scientific information was used in order to identify thresholds of potential significant adverse impacts. Thresholds have been identified for potential atmospheric deposition impacts to terrestrial ecosystems and sensitive lake water chemistry, and a “just noticeable change” in potential visibility impacts.

When reviewing the predicted near-, mid-, and far-field impacts, it is important to understand the conservative assumptions made regarding potential oil and gas activities, such as the uncertainty regarding ultimate development practices (i.e., number of wells, equipment to be used, specific locations, etc.). The analysis was also based on a reasonably foreseeable development (RFD) scenario, including some conservative assumptions:

- Measured 2nd maximum 24-hour background air pollutant concentrations were assumed to occur at all locations in the region throughout the life of the LMP. In addition, the maximum predicted air quality impacts may occur only in the vicinity of the anticipated emission sources. Actual impacts may be beyond the predicted points of maximum impact.
- All emission sources were assumed to operate at their reasonably foreseeable maximum emission rates simultaneously throughout the life of the LMP. Given the number of sources occurring throughout the study area, the likelihood of this happening over an entire year (or even 24-hours) is small. This assumption is typically used in modeling analyses; however, the resulting predicted impacts may be overstated.
- Maximum predicted air quality impacts are based on the potential activity that would occur towards the end of the implementation life of the LMP. Since actual development would be phased in gradually, actual operational air quality impacts may also begin low, but increase throughout the life of the LMP.
- All potential oil and gas wells were assumed to be fully operational (no dry holes), at their maximum production rates. They would remain operating (no “shut ins”) throughout the life of the LMP. This also includes an assumed centralized 1,200 HP compression station. In reality, well-development equipment would be added or removed incrementally, as actual development requirements changed.
- Total predicted short-term air pollutant impact concentrations were assumed to be the sum of the 2nd highest measured background concentration, plus the applicable maximum cumulative modeled concentrations. This would actually occur under very different meteorological conditions and are not likely to coincide.

- Potential near-field PM10 and PM2.5 impacts were modeled for 8 different orientations (at 22.5 degree intervals), to ensure that impacts from all directional layouts and meteorological conditions were assessed. However, actual orientation of future development activities is not known.

Given the conservative analysis assumptions described above, which may actually compound one another, the predicted impacts represent an upper estimate of potential air quality impacts that are, in reality, unlikely to actually be reached. Before any actual development could occur, additional project-specific NEPA analyses would be performed, and the applicable air quality regulatory agencies (including CDPHE-APCD and EPA) would review specific preconstruction permit applications (which examine potential project-wide air quality impacts). As part of these permits (depending upon source size), the air quality regulatory agencies may require additional air quality impacts analyses or mitigation measures. Thus, before development occurs, additional site-specific air quality analyses, based on actual facility engineering data, would be performed to ensure the protection of air quality. Air quality impacts may occur during construction (due to surface disturbance by earth-moving equipment, vehicle traffic fugitive dust, well testing, and drilling rig and vehicle engine exhaust) and production (including natural gas separation and dehydration heaters, and small well-head engine exhaust).

As stated above, the criteria air pollutants CO, NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, and SO<sub>2</sub> were analyzed using the EPA approved air dispersion model AERMOD (Nicholls 2007). Due to the complex nature of photochemical ozone formation, ozone impacts cannot be predicted using standard atmospheric dispersion models. However, given the limited nature of potential reactive VOC emissions, it is not anticipated that ozone formation would be significant. Three different modeling scenarios were analyzed: 1) near-field maximum impacts, which was based on a generic scenario of construction vehicle traffic, two wells under construction, two wells in production, a central processing facility, and wind erosion emissions from pads, access roads, and pipeline ground disturbance (corresponding to 7 acres of total disturbance per well), as analyzed by Ecology & Environment, Inc. (2006); 2) mid-field maximum impacts based on cumulative site-specific well development of up to 375 oil and gas wells (each including well head heaters and engines, and fugitive PM emissions from exposed well pads and servicing traffic) plus a centralized 1,200 HP compression station. Additional authorized, but not operational facilities identified by the CDPHE-APCD were also included in the cumulative analyses. This scenario was designed to compare the maximum cumulative impacts to ambient air quality standards and the PSD Class II increments; and 3) far-field maximum impacts based on the same assumed development, but to determine potential impacts to PSD Class I increments, as well as potential visibility at sensitive distant receptors.

Maximum predicted near-field air quality impacts are presented in Table 3.1.6. All total cumulative impacts were predicted to be below the applicable ambient air quality standards, except the 24-hour PM<sub>2.5</sub> maximum total concentration. Since the analysis scenario combined construction and production activities, as well as a conservative modeling approach, it is likely that actual development could take place without violating the 24-hour PM<sub>2.5</sub> standard (taking into account a less conservative, more refined modeling method, potential fugitive dust mitigation strategies, as well as accounting for allowable exceedances of short-term ambient air quality standards). The maximum predicted “near-field” air pollutant concentrations occur close to, and between, well locations (so close to each other that adding additional wells in other field locations would not increase the maximum predicted “near-field” concentration). Finally, since construction activities are not subject to PSD regulations, no comparison to PSD Class II increments should be made.

As recommended by the EPA, the AERMOD modeling system is appropriate for a “screening” analysis. If no significant impacts are predicted to occur using this screening approach, then the decision maker can be confident that no significant impacts would actually occur at the time of development. However, if significant impacts are predicted, a less conservative, refined modeling analysis should be performed to provide more confidence in the predicted impacts. The screening-level air analysis does show potential significant impacts to visibility, exceedence of maximum nitrogen deposition for Class I areas, and potential violations of the recently revised 24-hour average PM<sub>2.5</sub> National Ambient Air Quality Standard. In following the screening analysis approach, the next step will be to refine the air quality analysis using a more sensitive long-range transport model. The refined air analysis will be conducted between the Draft and Final EIS, and should give more accurate, less conservative estimates of air quality impacts. The analysis should also include potential mitigation methods to better predict potential visibility impacts.

**Table 3.1.6 - Near-Field Comparison of Direct Impacts to Ambient Air Quality Standards (µg/m<sup>3</sup>)**

POLLUTANT/AVERAGING TIME	Direct Maximum	Background Concentration	Total Concentration	AAQS	Percentage (%) of AAQS
CO - 1-hr	357	2288	2645	40000	7%
CO - 8-hr	184	1831	2015	10000	20%
NO <sub>2</sub> - Annual	20.5	16.9	37.4	100	37%
PM <sub>10</sub> - 24-hr	70.6	64.0	134.6	150	90%
PM <sub>10</sub> - Annual	12.6	21.0	33.6	50 <sup>a</sup>	67%
PM <sub>2.5</sub> - 24-hr	29.7	22.5	52.2	35	<b>149%</b>
PM <sub>2.5</sub> - Annual	4.3	6.9	11.2	15	75%
SO <sub>2</sub> - 3-hr	94.5	68	162.5	700 <sup>a</sup>	23%
SO <sub>2</sub> - 24-hr	26.9	21	47.9	365	13%
SO <sub>2</sub> - Annual	3.6	5	8.6	80	11%

Source: Ecology & Environment, 2006

<sup>a</sup> State of Colorado Ambient Air Quality Standard is more stringent than the NAAQS.

Maximum predicted mid-field air quality impacts are presented in Table 3.1.7. All direct impacts were predicted to be below the applicable PSD Class II increments. Total cumulative impacts were predicted to be below the applicable ambient air quality standards. Cumulative impacts include the direct impacts, plus impacts from the assumed CDPHE cumulative inventory and Monticello NEPA sources. However, all NEPA analysis comparisons to the PSD Class II increments are intended to evaluate a threshold of concern, and do not represent a regulatory PSD Increment Consumption Analysis.

**Table 3.1.7 - Mid-Field Comparison of Direct and Cumulative Impacts to PSD Class II Increments and Ambient Air Quality Standards ( $\mu\text{g}/\text{m}^3$ )**

POLLUTANT/ AVERAGING TIME	Direct Maximum	Cumulative Maximum	PSD Class II Increment	Background Concentration	Total Cumulative Concentration	AAQS	% of AAQS
CO - 1-hr	2291	2291	---	2288	4579	40000	11%
CO - 8-hr	452	452	---	1831	2283	10000	23%
NO <sub>2</sub> - Annual	4.7	5.4	25	16.9	37.4	100	37%
PM <sub>10</sub> - 24-hr	10.7	12.6	30	64.0	76.6	150	51%
PM <sub>10</sub> - Annual	0.4	0.8	17	21.0	21.8	50 <sup>a</sup>	44%
PM <sub>2.5</sub> - 24-hr	1.1	2.0	---	22.5	24.5	35	70%
PM <sub>2.5</sub> - Annual	0.2	0.4	---	6.9	7.3	15	49%
SO <sub>2</sub> - 3-hr	49	49	512	68	117	700 <sup>a</sup>	17%
SO <sub>2</sub> - 24-hr	14.1	14.1	91	21	47.9	365	13%
SO <sub>2</sub> - Annual	1.4	1.4	20	5	8.6	80	11%

Source: Nicholls, 2007

<sup>a</sup> State of Colorado Ambient Air Quality Standard is more stringent than the NAAQS.

Maximum predicted far-field air quality impacts are presented in Table 3.1.8. All direct impacts were predicted to be below the applicable PSD Class I increments, and total cumulative impacts were predicted to be below the applicable ambient air quality standards. As stated previously, all NEPA analysis comparisons to the PSD Class II increments are intended to evaluate a threshold of concern, and do not represent a regulatory PSD Increment Consumption Analysis.

**Table 3.1.8 - Far-Field Comparison of Direct and Cumulative Impacts to PSD Class I Increments and Ambient Air Quality Standards ( $\mu\text{g}/\text{m}^3$ )**

POLLUTANT/ AVERAGING TIME	Mesa Verde Maximum	Weminuche Maximum	PSD Class I Increment	Background Concentration	Mesa Verde Total Concentration	Weminuche Total Concentration
NO <sub>2</sub> - Annual	0.3	<0.1	2.5	16.9	17.2	17.0
PM <sub>10</sub> - 24-hr	0.5	0.1	10	64.0	64.5	64.1
PM <sub>10</sub> - Annual	<0.1	0.1	5	21.0	21.0	21.1
SO <sub>2</sub> - 3-hr	0.8	0.1	25	68	68.8	68.1
SO <sub>2</sub> - 24-hr	0.1	<0.1	5	21	21.1	21.0
SO <sub>2</sub> - Annual	<0.1	<0.1	2	5	5.0	5.0

Source: Nicholls, 2007

Potential cumulative atmospheric deposition (acid rain) and visibility impacts to the Mesa Verde National Park and Weminuche Wilderness PSD Class I Area were also calculated. As shown in Table 3.1.9, the maximum direct and total nitrogen deposition within these areas were predicted to be well above the 3 kg/ha-year threshold (Fox et al., 1989), although the maximum total sulfur deposition values were below the significance threshold. In addition, significant changes in Acid Neutralizing Capacity (ANC) at 4 lakes within the Weminuche Wilderness Area were predicted to occur (primarily due to these high total nitrogen deposition levels) (USFS 2000). No sensitive lakes were identified within Mesa Verde National Park.

**Table 3.1.9 - Far-Field Atmospheric Deposition Analysis (kg/ha-yr)**

POLLUTANT (WET & DRY)	Mesa Verde Maximum	Weminuche Maximum	Background Concentration	Mesa Verde Total Concentration	Weminuche Total Concentration	Significance Threshold
nitrogen	22.0	4.4	2.3	24.3	6.7	3.0
sulfur	0.1	<0.1	1.2	1.3	1.2	5.0

Source: Nicholls, 2007

Potential cumulative visibility impacts to the Mesa Verde National Park and Weminuche Wilderness PSD Class I Area were calculated based on Daily Refined Visibility Analyses (Archer 2007a and 2007b). The Federal Land Managers’ Air Quality Related Values Workgroup (FLAG) published method were used in order to evaluate potential visibility impacts at mandatory Federal PSD Class I areas (FR 66:2, pp 382-383; Wednesday, January 3, 2001), observed hourly relative humidity, as well as speciated aerosol concentrations measured between 1988 and 2005. If the predicted air quality impacts had occurred during the observed visibility measurement period, a 1.0 deciview “just noticeable change” would have been exceeded between 2 and 7 days per year at the Weminuche Wilderness Area. However, given the conservative assumptions incorporated into the analysis, these direct impacts are not likely to occur. Significant adverse visibility impacts were predicted to occur within the mandatory Federal Mesa Verde PSD Class I area – ranging from 56 to 146 days per year. Again, based on the conservative nature of this analysis, the actual extent (numbers of days) of these perceptible visibility impacts is likely to be less. However, a more refined modeling method, including specific potential mitigation methods, should be applied in order to better predict potential visibility impacts.

In order to mitigate potential short-term PM2.5 impacts, roads and well locations constructed on soils susceptible to wind erosion would be appropriately surfaced in order to reduce the amount of fugitive dust generated by traffic or other activities. Dust inhibitors (including surfacing materials, non-saline dust suppressants, and water) would be used, as necessary, on unpaved collector, local and resource roads that presented fugitive dust problems. To further reduce fugitive dust, Operators may establish and enforce speed limits (15 to 30 miles per hour) on all project-required roads in, and adjacent to, the planning area.

The SJPLC would continue to participating with the Colorado and New Mexico air quality regulatory agencies, Native American tribal, industry, and environmental organizations, as well as with the general public, through the Four Corners Air Quality Task Force. The goal would be to further identify potential air pollutant emission control methods and procedures that could then be used to lower potential air quality impacts throughout the region. For example, the Oil and Gas Workgroup (Four Corners Air Quality Task Force, 2006) has identified a wide range of control measures that would limit emissions (including installing electric compression;

optimizing/centralizing facilities; using Non-Selective Catalytic Reduction, three-way catalysts, and/or air/fuel ratio controllers engines; installing lean-burn engines; adding oxidation catalysts and air/fuel ratio controllers to existing lean burn engines; using natural gas-fired rig engines; and using flare less (green) well completion methods). The work of the Task Force and its final report would be seriously considered by the SJPLC, and would result in positive air quality impacts.

In addition, the SJPLC would could continue to cooperate with existing atmospheric deposition and visibility impact monitoring programs. The need for, and the design of, additional monitoring would include the involvement of the CDPHE-APCD and EPA Region 8 staff. Based upon future recommendations, Operators may also be required to cooperate in the implementation of a coordinated air quality monitoring program. Oil and gas lease terms (Section 6) require the lessee, within the lease rights granted, to take measures deemed necessary by the lessor for the conduct of operations in a manner that minimizes adverse impacts to air quality, as well as other resources.

A more refined modeling analysis should be performed, based on less conservative techniques, as well as on comments received from the public and agencies (including with regard to potential mitigation measures) for disclosure in the Final EIS/LMP Record of Decision (ROD).

If additional mitigation processes and measures are ultimately required by the SJPLC in the ROD, they must ensure that implementing these measures is monitored and enforced. For example, if Operators are required to use dust suppressants to reduce fugitive dust, the SJPLC would verify the proper materials are actually used. In addition, if the SJPLC has reason to believe that required mitigation measures are not being met, then additional monitoring (such as continuous PM<sub>2.5</sub> monitors) and/or enforcement action (such as stopping operations) may be necessary.

Both the Clean Air Act and the FLPMA require all Federal activities (whether conducted directly, or approved through use authorizations) to comply with all applicable local, State, Native American tribal, and Federal air quality law, statutes, regulations, standards and implementation plans. Potential oil and gas development under all of the alternatives would conform to these requirements.

Some decrease in air quality may occur under all of the alternatives; however, based upon the conservative modeling assumptions, these impacts are expected to be below applicable significance thresholds except nitrogen deposition and visibility impacts within the Mesa Verde and Weminuche mandatory Federal PSD Class I Areas.

When oil and gas activities stop, and disturbed lands are revegetated, potential air quality impacts from oil and gas development would cease. Therefore, there may be no irreversible or irretrievable impacts on air quality.

**DLMP/DEIS Alternatives:** No significant, adverse impacts to climate are anticipated from implementation of the proposed action or alternatives. Potential impacts to air quality were analyzed as described. Potential air quality impacts from oil and gas development (proposed action and alternatives) were analyzed and reported solely under the requirements of NEPA, in order to assess and disclose reasonably foreseeable impacts to both the public and Federal decision-makers before the LMPs are finalized. Due to the preliminary nature of this NEPA analysis, it should be considered a conservative upper estimate of predicted impacts. Actual impacts at the time of development (subject to air pollutant emission source permitting by CDPHE-APCD) may be lower than those predicted in this analysis.

For the No Lease alternative, none of the air quality impacts associated with 170 potential new wells and associated infrastructure would occur. Specifically, the short range impacts associated with dust from road, pad, and pipeline construction and long-term road use would not occur. The short-range impacts within the proposed leasing area from drilling activities and long-term production would also not occur and there would be no production of SO<sub>2</sub>, NO<sub>x</sub>, or VOC's to affect short-range air quality.

## **Impacts Related to Fire and Fuels Management**

### ***Smoke Management***

Prescribed burns and wildland fire use (WFU) have the potential to produce smoke that may impact the public. Receptors such as nursing homes, hospitals, and other populations that are sensitive to temporary air pollution would be important considerations for smoke management. The impacts of smoke on the highly valued scenic vistas within the planning area would also be a concern. Smoke would be managed in conjunction with the State of Colorado (through burning permits) and would address local concerns, visibility, and safety.

Periodic prescribed burns are a necessary tool designed to prevent heavy fuel accumulation -- accumulations that may send larger amounts of smoke into the air should an uncontrolled wildfire occur. Wildfires and prescribed burns within the planning area may produce temporary, but major, amounts of particulates, carbon monoxide, NO<sub>x</sub>, organics, and hydrocarbons. These pollutants may be a threat to human health and may reduce visibility.

***DLMP/DEIS Alternatives:*** All of the alternatives would propose the same amount of prescribed burns, and may, therefore, all result in the same direct and indirect impacts to air quality. Although producing smoke is an unavoidable part of prescribed burns, strategies to limit smoke would be an important part of every burn plan. For each burning project within the planning area, a burn prescription would be written. The burn would be conducted in a manner that minimized emissions as well as smoke-related impacts to visibility and human health. The burn prescription would show the measures that would be used in order to mitigate the adverse impacts of smoke, and would carefully consider smoke-sensitive individuals or populations. Permits for prescribed burns are required by the Colorado Air Pollution Control Division. The permitting process may require smoke risk ratings and burning alternatives, as well as the use of the Simple Approach Smoke Estimation Model (SASEM; Sestak and Riebau 1988) and mitigation and smoke contingency plans. High smoke risk burns may require a public comment period. Although prescribed burns would increase short-term air pollution emissions, these burns may help to decrease the very large emissions from catastrophic wildfires by reducing fuel loading over the long term. Smoke-related impacts from prescribed burns may range from minor to moderate, depending upon proximity to smoke-sensitive individuals or population centers. It may also be short term, lasting from a few hours to a week.

The impacts to air quality from WFU may be highly variable, but are not expected to vary between alternatives. All of the alternatives estimate between 0 and 30,000 acres of WFU annually. Smoke management would be a primary consideration for go/no-go decisions (allowing wildland fires to burn or to be suppressed). Smoke impacts to sensitive individuals, population centers, and/or to visibility would be highly dependant upon the location of the fire and the burning conditions. Smoke management for these types of burns would include daily assessment of fire behavior and smoke. Public notice/education and public input, as well as the input from the State of Colorado, regarding smoke would be used in fire management decisions. Although unlikely, if conditions were favorable, a fire could start early in the season and burn for much of the fire season. However, if there are smoke issues, overall fire management strategies would be adjusted in order to mitigate smoke impacts to sensitive individuals, communities, and to visibility in important areas. Mitigation may include fire suppression.

## Impacts Related to Transportation System

Dust generated from general use of the transportation system within the planning area may also impact air quality. The primary uses of the transportation network include recreation, administrative use, hunting during the fall, and administrative/land use activities (including timber harvesting, grazing, and fuels and fire management). The amount of dust generated would be largely dependent upon the season of use, the amount of traffic, rainfall patterns, and materials selected for road construction. Dust issues would tend to be greatest where conditions are typically dry, and/or where roads are constructed from fine-grained materials and do not have a paved or gravel surface. (These conditions exist on many of the low elevation areas of the planning area.)

Recreation use of the transportation system can occur at varying levels of intensity throughout the drier summer and fall months, when dust can be problematic. Recreational use can occur on any open road. Dust abatement measures are not applied on most system roads due to budget priorities, and would not occur on any non-system road. Dust generated from recreation activities may vary from low to high in the long-term, but would not vary by alternative. Impacts would likely not be mitigated, except on roads with the highest traffic and/or safety issues.

Road use associated with mineral development, timber harvesting, and, in some instances, fire and fuels management may require dust-abatement measures. Implementation of dust-abatement measures would reduce or eliminate impacts to air quality. Dust generated from timber harvesting would be greatest for Alternatives A and D, which propose the highest amount of harvesting and associated road construction and road use.

## CUMULATIVE IMPACTS

### Global Climate Change

The assessment of so-called “greenhouse gas” emissions and climate change is in its formative phase; therefore, it is not yet possible to know with confidence the net impact to climate. However, the Intergovernmental Panel on Climate Change (IPCC 2007) recently concluded that “warming of the climate system is unequivocal” and “most of the observed increase in globally average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic [man-made] greenhouse gas concentrations.”

The lack of scientific tools designed to predict climate change on regional or local scales limits the ability to quantify potential future impacts. However, potential impacts to air quality due to climate change are likely to be varied. For example, if global climate change results in a warmer and drier climate, increased particulate matter impacts would occur (due to increased wind blown dust from drier and less stable soils). Cool season plant species’ ranges are predicted to move north and to higher elevations, and extinction of endemic threatened/endangered plants may be accelerated. Due to loss of habitat, or to competition from other species whose ranges may shift northward, the population of some animal species may be reduced. Less snow at lower elevations would be likely to impact the timing and quantity of snowmelt, which, in turn, would impact aquatic species.

## **Power Plants**

No coal-fired power plants exist within the planning area; however, there are several power plants that exist, or are planned for construction, in the Four Corners region. Coal-burning power plants are major long-term sources of NO<sub>x</sub>, SO<sub>2</sub>, mercury, particulates, greenhouse gases, and other pollutants that impact air quality. These pollutants would impact air quality related values (including visibility, water quality, and high elevation flora and fauna ecosystems). The SJPLC is an active participant in the permitting process for large emission sources, including power plant projects. Through this process, mitigation strategies designed to prevent air quality impacts to the Weminuche Wilderness Class I Area would be developed.

The cumulative impacts related to existing power plants were addressed in the air quality impact dispersion modeling. The USFS has recently concluded that the potential is high for the proposed Desert Rock Coal Energy Facility to result in significant air quality impacts to the Weminuche Wilderness Class I Area. This facility would produce additional large amounts of SO<sub>2</sub> and NO<sub>x</sub> within 80 miles of the Weminuche Wilderness Area. Impacts to visibility within this Class I Area, therefore, expected. There would also be the potential for increased mercury deposition because the proposed PSD permit does not require mercury control measures. Mercury deposition resulting from this facility may accelerate the current trend of increasing contamination of water and fish within the planning area.

## **Oil and Gas Development**

With regard to cumulative impacts, further development of existing leases, as well as the development of currently un-leased lands is considered. In total, 1,185 new wells are projected on Federal, State, and private lands within the planning area. There are also over 2,000 additional new wells that would be drilled immediately south of the planning area (within the bounds the Southern Ute Reservation). The cumulative impacts of existing emission sources were evaluated through air quality modeling.

For the No Lease alternative, none of the air quality impacts associated with 170 potential new wells and associated infrastructure would occur. However, compared to the ongoing and projected cumulative effects of oil and gas development on currently leased lands, or private and tribal lands, a reduction of 170 wells would likely result in a small, but potentially measurable improvement to regional air quality.

## **Regional Development and Population Growth**

The Four Corners region is currently experiencing large and rapid growth. This is especially true for Archuleta and La Plata Counties, where growth is expected to increase by 81% and 170%, respectively, by 2030 (Davis, 2004). Air quality protection issues continue to challenge management of air quality within the planning area. This is especially true in areas where large new resort towns are constructed within a few miles of the Class I areas. Wood and coal-heating emissions, road dust, and vehicle emissions, as well as other mobile and stationary sources, are all common pollution sources that may potentially impact air quality within the planning area. Regional development would not be impacted by the implementation of the LMP, and would not vary by alternative.

The Four Corners Air Quality Task Force has recognized that air quality is being degraded in the Four Corners region. The Task Force is in the process of developing and considering a number of mitigation options for regional sources of air pollution (including coal power plants, oil and gas activities, and other large and small pollution sources). The objective would be to provide air quality regulatory agencies and Federal land managers in the Four Corners area with many options, as well as with a possible strategy designed to improve regional air quality. SJPLC management are Air Quality Task Force members, and would, therefore, participate in developing effective air quality mitigation measures that would apply to the planning area.

### **Effectiveness of Alternatives in Meeting Desired Conditions**

With respect to air quality, there would not be significant differences between the alternatives. The desired condition is to maintain and/or improve air quality conditions within the planning area (including in the Weminuche Wilderness Area). Strategies and design criteria implemented under any of the alternatives would reduce the amount of air pollution emissions generated from activities such as oil and gas development. Cumulatively, permitted and currently leased fluid-minerals development within the planning area, combined with large sources of air pollution close to, but outside of the planning area, may result in overall air quality degradation.

