# 3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This chapter is divided into the following resource topics:

- Air Resources
- Geology/Paleontology
- Soils
- Groundwater
- Surface Water
- Floodplains
- Land Use and Access
- Grazing Management
- Recreation, Wilderness, and Visual Resources
- Areas of Critical Environmental Concern
- Vegetation
- Wetlands, Riparian Areas, and Waters of the United States
- Fisheries and Wildlife
- Threatened, Endangered, Proposed, and Other Special Status Species
- Cultural Resources
- Socioeconomics and Environmental Justice
- Public Safety and Services
- Noise

The following sections are presented for each resource topic listed above:

***Affected Environment*** – this section succinctly describes the environment of the areas to be affected by the Proposed Action or alternatives. Because resource topics are often interrelated, one section may refer to another. The Affected Environment section includes the following:

***Region of Influence***– is the area that the Proposed Action or alternatives may reasonably affect. Regions of influence are specific to each resource topic. Limits of regions of influence may be natural features (such as an aquifer boundary), political boundaries (such as Mohave County), or industry-accepted norms for the resource (such as 50 kilometers for one aspect of air quality).

***Existing Conditions***– characterizes the resource within the region of influence and provides a framework for understanding the effects described in the Environmental Consequences section; the amount of information presented is commensurate with the importance of the effects.

***Environmental Consequences*** – This section objectively evaluates the Proposed Action and reasonable alternatives. It presents a scientific analysis of the direct and indirect environmental impacts and forms the analytic basis for the summary comparison of impacts presented in Section 2.0. Because resource topics are often interrelated, one section may refer to another. Potential impacts for Phases 1 and 2 of the Proposed Action are considered together. The Environmental Consequences section includes the following:

***Identification of Issues*** – presents the issues analyzed, which were identified during the public scoping period for this environmental impact statement (EIS) (refer to Section 6.0), or

by lead or cooperating agency personnel during preparation of this document.

***Significance Criteria*** – indicate thresholds where adverse impacts become significant.

***Impact Assessment Methods*** – briefly describes the manner or means used to accomplish the analysis of impacts.

***Actions Incorporated Into the Proposed Action to Reduce or Prevent Environmental Impact*** – these are actions that Caithness has committed to implementing. Impacts have been assessed assuming these measures would be implemented if the Big Sandy Energy Project were implemented. Actions presented in this section are more fully described in Section 2.2.8.

***Impact Assessment*** – presents the results of the analysis for various components of the Proposed Action and alternatives.

***Mitigation*** – includes appropriate measures not already included in the Proposed Action. The Council on Environmental Quality (1981) states that mitigation measures must be considered even for impacts that would not be considered significant, and where it is feasible to develop them. Mitigation can include things such as: (1) avoiding an impact altogether by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of an action and its implementation; (3) rectifying an impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of an action; or (5) compensating for an impact by replacing or providing substitute resources or environments.

Significance criteria and impact assessment methods were developed in coordination and consultation with the cooperating agencies (refer to Section 1.3.2 for more information on cooperating agencies. Refer to Section 6.0 for more information on agency consultation and coordination).

Cumulative impacts are discussed in Section 4.0. A description of the Proposed Action and alternatives, including the proposed and alternative gas pipeline corridor segments, is presented in Section 2.0.

***Types of Impacts***

**Direct Impacts**

These are effects that are caused by the action and occur at the same time and place. Examples include the elimination of original land use due to the erection of a structure. Direct impacts may cause indirect impacts, such as ground disturbance resulting in resuspension of dust and decreased visibility.

**Indirect Impacts**

These are effects that are caused by the action but occur later in time or are farther removed in distance, but are still reasonably foreseeable. Indirect impacts may include related impacts to other resources such as air, water, and fish and wildlife.

**Significant Impacts**

Both direct and indirect impacts may be significant. "Significant" requires consideration of both the context and intensity of the impact. This means that an action must be analyzed in several contexts – such as the immediate vicinity, affected interests, and the locality. Both short-term and long-term effects are relevant. Intensity refers to the severity of impact. Direct and indirect impacts may be positive (beneficial) or negative (adverse). Compliance with regulatory standards is not necessarily an indication of the significance or severity of an environmental impact.

## 3.1 AIR RESOURCES

This section describes the affected environment and environmental consequences relative to air resources. The primary factors that determine the air quality of a region are the locations of air pollution sources, the type and magnitude of pollutant emissions, and the local meteorological

conditions. A modeling study has been performed to support the assessment of air quality impacts related to the proposed Big Sandy Energy Project. This study takes into account these factors, and provides a prediction of the air impacts that would occur.

### 3.1.1 Affected Environment

The following sections describe the current environment regarding meteorology and air resources. The description of current conditions represents the baseline for the assessment of impacts and environmental consequences.

***Clean Air Act***

The Clean Air Act of 1970 (CAA) established ambient air quality standards intended to protect public health and welfare. These are referred to as the National Ambient Air Quality Standards (NAAQS). Areas with air quality cleaner than these standards were referred to as "attainment" areas. Areas with Air quality not meeting the NAAQS are referred to as nonattainment areas. Areas where the air quality was not clearly defined as either attainment or nonattainment were designated "unclassified."

In 1977, the CAA was amended, and provisions intended to prevent deterioration of air quality in relatively pristine areas of the country were established. These provisions, referred to as the Prevention of Significant Deterioration (PSD) rule, established Class I areas and Class II areas. This regulation establishes stringent increments to limit the deterioration of air quality. The increments are more stringent in Class I areas.

In 1990 additional amendments to the CAA encouraged EPA to establish particulate standards for fine particulates referred to as $PM_{2.5}$ or particulate matter smaller than 2.5 microns. At this time the standard for $PM_{2.5}$ has not been fully implemented, and is therefore not addressed in this analysis.

**Class I areas**. The CAA of 1977 established as mandatory Class I areas defined as national parks that exceeded 6,000 acres in size and were in existence on the date of enactment of the Clean Air Act Amendments of 1977. Other areas of the country can apply to be designated as Class I areas based on the need to prevent further deterioration of the existing air quality and several other factors.

**Class II areas**. The CAA of 1977 established all other areas of the country as Class II areas unless redesignated. The CAA provides the means for the following areas to be redesignated as Class I:

1. an area that exceeds 10,000 acres in size and is a national monument, a national primitive area, a national preserve, a national recreation area, a national wild and scenic river, national wildlife refuge, a national lakeshore or seashore, or
2. a national park or national wilderness area established after the date of enactment of this Act that exceeds 10,000 acres in size, or
3. lands within the exterior boundaries of reservations of Federally recognized Indian tribes.

#### 3.1.1.1 Region of Influence

The region of influence for the Proposed Action and alternatives was established by simulating the dispersion of emitted pollutants to determine changes in ambient concentrations. The analysis also determined the visibility and soil deposition effects of such concentration changes in designated Class I and Class II areas. These factors were assessed in detail by computer simulations of the dispersion of the pollutants to be emitted from the proposed power plant.

Two region of influence boundaries were established for this Project. For NAAQS and air quality increment analyses, the region of influence boundary was set at 50 kilometers (km) (31 miles) beyond the farthest distance from the source where defined "significant" pollutant concentrations are predicted to occur. For example, if dispersion modeling predicts that particulate concentrations would be above the significant modeling level at 6 km (4 miles)

from the proposed power plant site, then the region of influence for that pollutant would be 56 km (35 miles) in extent. For visibility and related impacts in Class I areas, the region of influence is set by Arizona Department of Environmental Quality (ADEQ) regulation at 100 km (62 miles). However, at the discretion of a Federal land-management agency, additional Class I areas beyond 100 km (62 miles) can be included in the region of influence. Based on precedents in this region, the Grand Canyon National Park and Sycamore Canyon Wilderness are included in the region of influence of this Project, even though both of these Class I areas are more than 100 km (62 miles) distant.

The air quality region of influence consists of low-elevation arid, Sonoran desert surrounded by desert mountain terrain, including portions of Mohave, La Paz, and Yavapai counties in the western portion of central Arizona. The mountain ranges defining the Big Sandy Valley would tend to contain the discernable air quality effects. In this valley, elevations in the vicinity of the Project range from about 1,700 feet above mean sea level (MSL) on the valley floor to peaks of more than 4,500 feet above MSL in the mountains to the east and west.

The proposed power plant would be situated near the eastern side of the Big Sandy Valley. Therefore, the influence on ambient air concentrations is likely to be greatest in the Aquarius Mountains to the east of the valley, and less in the more distant Hualapai Mountains to the west.

#### 3.1.1.2 Existing Conditions

##### *Meteorology*

Temperatures in this region are typical of desert climate, ranging from lows of 30 to 45 degrees Fahrenheit (°F) during the winter, to highs of more than 100°F during the summer. Daily high temperatures of 90°F or greater occur approximately 40 to 50 percent of the year. During the summer months, maximum temperatures of 120°F or greater have been reported.

Precipitation in the area is sparse and occurs primarily during the monsoon season from July through early October. Large amounts of warm, moist air moving from the Gulf of Mexico can create heavy thunderstorms across Arizona. Surface winds during the monsoon season primarily originate from the south-southeast or the south-southwest. During other seasons, the prevailing wind directions are northwest–southeast, in general alignment with the valley itself. After the monsoon season, westerly winds prevail. Meteorological data collected from the proposed power plant site since March 2000 confirm a northerly and southerly wind pattern.

Atmospheric stability is another important factor of meteorology that determines air pollution concentrations. When the atmosphere is stable, emitted pollutants tend to remain within a few hundred feet of the surface (close to the emission sources), and begin to diffuse horizontally across the surface. When the atmosphere is unstable, air pollution is free to mix with the atmosphere, and can vertically rise 1,000 feet or more, and be carried away in the prevailing wind. Therefore, the depth of this “mixing” area is very important when considering the impacts of air pollution on the region of influence.

In the Big Sandy Valley, and nearly all the Arizona desert, atmospheric stability depends on the season. During the summer, the frequency of stable and unstable conditions of the atmosphere is relatively equal. The periods of instability are due to the monsoon rains that occur during the summer months. When temperatures fall as winter approaches, stability in the atmosphere becomes more frequent, as lower mid-latitude high pressure tends to be dominant over southern and central Arizona. These observations, confirmed by the onsite monitoring data, mean that air pollution is less likely to be dispersed during the fall and winter months than during the summer months. This then leads to generally higher ambient concentrations of air pollutants in the winter than during the summer.

| TABLE 3.1-1<br>NATIONAL PRIMARY AMBIENT AIR QUALITY STANDARDS (NAAQS)<br>(40 CFR 50.4 – 50.9) | | |
|---|---|---|
| Pollutant | Averaging Time | Concentration (mg/m³) |
| Nitrogen Dioxide | Annual Average | 100 |
| Carbon Monoxide | 1 hour | 40,000 |
| | 8 hour | 10,000 |
| Suspended Particulate Matter ($PM_{10}$) | 24 hour | 150 |
| | Annual Arithmetic Mean | 50 |
| Sulfur Dioxide | 3 hour | 1300 |
| | 24 hour | 365 |
| | Annual Average | 80 |
| Ozone | 1 hour | 235 |
| | 8 hour | 157 |

### *Existing Ambient Air Quality*

The region of influence has been designated attainment/unclassified with respect to NAAQS. The NAAQS provide limits considered to be protective of public health and the environment. Six pollutants, referred to as criteria pollutants, are addressed by the NAAQS: fine particulates ($PM_{10}$), carbon monoxide (CO), nitrogen dioxide ($NO_2$), sulfur dioxide ($SO_2$), ozone ($O_3$), and lead (Pb). The five NAAQS that would be applicable to the Project are shown and described in greater detail in Table 3.1-1 and in Section 3.1.2.1.

Existing levels of $PM_{10}$ can be expected to be well below the NAAQS, although no monitoring stations exist near the proposed power plant site. The definition of $PM_{10}$ as a criteria pollutant was established by the Clean Air Act as particulates with an aerodynamic diameter less than or equal to 10 microns ($10 \times 10^{-6}$ meter). Sources of $PM_{10}$ include stationary point sources such as fuel combustion and industrial processes, fugitive sources such as roadway dust from paved and unpaved roads, wind erosion from open land, and mobile sources, such as trucks and automobiles.

A substantial portion of particulate emissions from natural gas combustion sources are in the form of very fine particles having diameters below 2.5 microns, termed $PM_{2.5}$. These particles are emitted as soot (carbon) particles, or are formed by condensation of fine aerosols in the exhaust stream. The U.S. Environmental Protection Agency (EPA) has recently promulgated ambient air standards for this pollutant. At this time, states and permitting agencies are collecting information, such as long-term ambient air monitoring data for $PM_{2.5}$, to evaluate attainment status with respect to the new standards. Until such evaluations are complete and, if necessary, new regulations are developed, there is no applicable significance criteria that can be assigned to $PM_{2.5}$ emissions.

Existing levels of $O_3$ can be expected to be well below the NAAQS, although no monitoring stations exist near the proposed power plant site. $O_3$ is not emitted directly into the atmosphere, but rather is produced through a photo-chemical reaction involving volatile organic compounds (VOCs) and nitrogen oxides ($NO_x$), known as precursors. Because $O_3$ formation results from the mixing of precursors, $O_3$ is more of a regional concern than that associated with more localized sources of pollution such as $PM_{10}$. The primary sources of $NO_x$ include motor vehicles, power plants, and industrial boilers. Sources of VOCs include gasoline and solvent use.

Existing levels of $NO_2$ can be expected to be well below the NAAQS, although no monitoring

stations exist near the proposed power plant site. This is because primary sources of $NO_x$ are typically larger stationary sources, such as fossil fuel-fired power plants, and mobile sources such as automobiles and trucks. Nitrogen oxides are emitted predominantly as nitrogen monoxide (NO) and $NO_2$ from fuel-fired sources, but NO is largely oxidized to $NO_2$ soon after entering the atmosphere. Consequently, $NO_2$ is the criteria pollutant for which the NAAQS has been established.

CO is an odorless, invisible gas usually formed as the result of incomplete combustion of organic substances. The primary sources of CO are motor vehicles. Secondary sources include fossil fuel combustion sources, and agricultural and/or forest burning. CO is more of a localized pollutant due to its tendency to oxidize to carbon dioxide ($CO_2$) and disperse under normal conditions. However, during those periods when the air is stagnant, such as with a low-altitude inversion, concentrations of CO can increase. CO concentrations are usually highest during the winter months when inversions are more frequent.

$SO_2$ is formed during the combustion or thermal processing of sulfur-bearing materials, such as coal or sulfur ores. Sources that emit large quantities of sulfur, such as copper smelters, historically have been the largest contributors to ambient concentrations of $SO_2$ in Arizona. The closest smelter operation was formerly located at Bagdad, approximately 22 miles from the proposed power plant site, but it is no longer in operation. There are no large sources of $SO_2$ in the region of influence for the Project, and consequently, the existing ambient concentrations are expected to be very low.

The main sources of Pb emissions are from vehicles fueled with leaded gasoline operating in the area and/or metal smelters. Because no lead smelters and very few vehicles using leaded fuel operate in the Project area, levels of Pb in the region of influence are expected to be well below the NAAQS.

#### *Ambient Air Monitoring Data*

There has been no ambient air pollution measurement program in the immediately surrounding region. However, ambient air quality is generally assumed to be good, as there are no large air pollutant-emitting sources in this area.

$PM_{10}$ data were collected at the proposed Project area from March 2000 to March 2001. These data show the $PM_{10}$ maximum 24-hour value to be 56.9 micrograms per cubic meter ($\mu g/m^3$), and the annual average is 19.8 $\mu g/m^3$. These values represent the background concentrations for this area.

Since no other pollutant monitoring data are available and since there are no large stationary sources of NAAQS criteria pollutants in the area, ADEQ has followed accepted convention and defined the background concentrations to be used for ambient air impact analyses as equal to 20 percent of the NAAQS. For example, this equates to an annual-average value of 20 $\mu g/m^3$ for $NO_2$, a one-hour average value of 8,000 $\mu g/m^3$ for CO, and an eight-hour average value of 2,000 $\mu g/m^3$ for CO (Luchesse, personal communication, 2001).

### 3.1.2 Environmental Consequences

The majority of the impacts discussed in the following sections are related to the operation of the proposed power plant. Construction impacts are considered as well, including those that are temporary in nature. An important part of determining the environmental consequences of the Proposed Action stems from comparing the predicted emissions and their associated environmental impacts to the applicable Federal and state standards. Information for this section has been compiled from the *Big Sandy Energy 720 MW Natural Gas Fired Combined Cycle Power Plant Class I Permit Application* (Greystone 2001), which includes the *Big Sandy Energy Class I/II Air Quality Related Values CALPUFF Modeling Results Report*.

### 3.1.2.1 Identification of Issues

#### *Ambient Air Quality Standards*

A key issue to be considered is whether the NAAQS would be met. For criteria pollutants, Arizona's ambient air quality standards are equivalent to the NAAQS. Table 3.1-1 presents the primary NAAQS for criteria air pollutants.

#### *Hazardous Air Pollutants and Arizona Ambient Air Quality Guidelines*

An issue raised during scoping was concern about the release of hazardous air pollutants (HAPs). The Arizona Department of Health Services (ADHS) has issued a list of guidelines (ADHS 1999) for ambient air concentrations for several hundred air contaminants. The Federally listed HAP compounds that may be released from the combustion turbines are also included in this Arizona listing. These Arizona Ambient Air Quality Guidelines (AAAQG) represent levels at which long-term exposure should not present a threat to human health.

The AAAQG do not have the regulatory weight of NAAQS. They are used by permitting agencies as indicators of the adequacy of a pollution abatement strategy. An example relative to this study is formaldehyde, which is released due to the incomplete combustion of fossil fuel, and cannot practically be controlled. The AAAQG levels for formaldehyde are as follows:

- 1-hour average = 20 $\mu g/m^3$
- 24-hour average = 12 $\mu g/m^3$
- Annual average = 0.08 $\mu g/m^3$

Other AAAQG-listed compounds would be released by the Project in smaller amounts than formaldehyde. Consequently, the detailed evaluation of formaldehyde impact is considered to be indicative of the maximum impact related to emission of air toxics.

#### *Prevention of Significant Deterioration*

Another issue is the prevention of unacceptable degradation in areas that have good or excellent air quality. Federal and state regulations that address this issue are collectively referred to as the prevention of significant deterioration (PSD) regulations. The proposed power plant, consisting of combined-cycle electric generation units, is termed a "Categorical Source" and the PSD regulations apply to such sources that have the potential to emit more than 100 tons per year of any criteria air pollutant.

The PSD regulations at the Federal and state levels define numerical values for "increments" that are maximum allowable increases in predicted ambient concentrations at any location. The regulations also define the predicted concentrations that trigger an ambient monitoring requirement for a given project.

TABLE 3.1-2
PSD AIR QUALITY SIGNIFICANCE LEVELS AND CLASS II INCREMENTS

| Pollutant | Averaging Time | Class II Increment [a] ($mg/m^3$) |
|---|---|---|
| $NO_2$ | Annual | 25 |
| CO | 1 hour | NA |
| | 8 hour | NA |
| $PM_{10}$ | 24 hour | 30 |
| | Annual | 17 |
| $SO_2$ | 3 hour | 512 |
| | 24 hour | 91 |
| | Annual | 20 |

a – Class II increments were applied as air quality significance criteria for the Project.

For the Project, a refined analysis was performed using one year of onsite meteorological data. Both existing and permitted sources of pollutants within the region of influence were considered to evaluate the PSD Class I and Class II increments consumed by the Project in conjunction with the background pollutant sources. One year of onsite meteorological data were collected at the proposed power plant site and were used to conduct these analyses .

### *Sensitive Species, Soils, Flora and Fauna (Air Quality Related Values)*

A critical issue to be considered for the Proposed Action is the potential effect of air pollutants on sensitive areas and ecological resources. This involves an assessment of Air Quality Related Values (AQRV) and cumulative effects (addressed in Section 4.0) in potentially affected Class I and Class II Areas, Wild and Scenic Rivers, and Hualapai tribal lands. In general, the assessment of these impacts is based on dispersion simulations that cover both short-range and long-range transport of $NO_x$, $SO_2$ and $PM_{10}$. Potential effects on terrestrial and aquatic ecosystems from acid deposition and visibility impairment are analyzed. The AQRV analysis required for PSD permitting of new major sources includes consideration of potential impacts on sensitive species, soils, flora, and fauna that are associated with the air emissions of a Proposed Action.

The Clean Air Act established Class I areas throughout the nation that are pristine resources to be afforded the greatest degree of air quality protection due to their special natural, scenic, recreational, or historic interest to the public. The Federal PSD regulations codified at 40 Code of Federal Regulations (CFR) Parts 52.21 address the protection of Class I areas. Federal and ADEQ permitting regulations require that an air quality analysis (including visibility analysis) be performed for each Class I area located within 100 km (62 miles) of a facility undergoing an installation or modification that exceeds PSD modeling significant ground-level concentrations. Additional Class I areas further than 100 km from a given project may be included in the AQRV analysis, at the discretion of the Federal land-management agencies in the region. Two Class I areas, the Grand Canyon National Park and the Sycamore Canyon Wilderness, were considered in the analysis presented here. These areas are more than 100 km (62 miles) distant from the proposed power plant site (Figure 3.1-1).

In addition to the Federal protection of Class I areas, it is the responsibility of the Federal land-management agencies to protect values of Class II wilderness areas that may be affected by changes in air quality. Federal land-management representatives have requested an AQRV-type assessment of Bureau of Land Management (BLM) wilderness areas within the region of influence, each of which has been designated as a Class II air quality area. These areas are shown on Figure 3.1-1. The Class I, Class II wilderness areas, and the Hualapai Reservation (Peach Springs) that potentially would be affected by the Proposed Action are listed in Table 3.1-3.

The Hualapai Tribe has requested that EPA consider redesignating its reservation lands as Class I. Because of this potential redesignation, this Draft EIS considers the potential air quality impacts at Peach Springs, which is located at the southern end of the reservation, nearest the proposed power plant site. In addition, three parcels of Hualapai tribal lands lie in the northern end of the Big Sandy Valley. These parcels, located near the confluence of Knight Creek and Trout Creek that forms the Big Sandy River, are approximately 18 miles north of the proposed power plant site and are categorized as Class II areas. Results from the visibility impact and deposition analyses were used to interpolate the potential effects on these lands.

| TABLE 3.1-3<br>CLASS I AND II AREAS POTENTIALLY AFFECTED BY THE BIG SANDY ENERGY PROJECT | | |
|---|---|---|
| Area | Designation and Federal Agency | Closest Distance from Big Sandy Energy Project (km) |
| Grand Canyon | Class I National Park – National Park Service | 120 |
| Sycamore Canyon | Class I Wilderness – U.S. Forest Service | 140 |
| Peach Springs | Class II | 90 |
| Mount Nutt | Class II Wilderness – BLM | 85 |
| Warm Springs | Class II Wilderness – BLM | 60 |
| Wabayuma Peak | Class II Wilderness – BLM | 45 |
| Aubrey Peak | Class II Wilderness – BLM | 35 |
| Arrastra Mountain | Class II Wilderness – BLM | 20 |
| Swansea | Class II Wilderness – BLM | 50 |
| Rawhide Mountain | Class II Wilderness – BLM | 50 |
| Tres Alamos | Class II Wilderness – BLM | 55 |
| Upper Burro Creek | Class II Wilderness – BLM | 15 |

### Best Available Control Technology

In addition to the PSD requirements for modeling of impacts on ambient air quality and adherence to allowable increments, new major sources must apply best available control technology (BACT) for each pollutant for which the source is a major source (i.e., having greater than 100 tons per year of emissions). The combustion turbines, duct burners, and cooling towers for the Proposed Action are subject to BACT for $NO_2$, CO, and $PM_{10}$.

During the subsequent air permitting process, administered by ADEQ, the appropriate BACT for these Project sources would be determined by a formalized analysis. BACT determinations are conducted by ranking available technologies in descending order of control effectiveness, and then evaluating technical considerations, energy, environmental, and economic impacts associated with implementation.

Stationary gas turbines also are subject to Federal emission standards for $NO_x$ and $SO_2$, known as New Source Performance Standards (NSPS) at 40 CFR 60, Subpart GG, that would apply to the Project. These standards also are adopted by reference by the state of Arizona. The NSPS emission rate standards are meant to reflect the least stringent level of acceptable BACT for PSD sources.

Section 2.0 of this Draft EIS and the *Big Sandy Energy 720 MW Natural Gas Fired Combined Cycle Power Plant Class I Permit Application* (Greystone 2001) provide a discussion of the specific technologies and emission levels that are expected to represent BACT for the Proposed Action. Implementation of these technologies is assumed in the impact analysis performed for this study. Consequently, the BACT requirements themselves are an issue of concern, but were not used to develop significance criteria for the impact analysis.

### Global Warming

The use of combustion turbines to produce electricity results in emission of $CO_2$. Experts in the scientific community believe that the increased emissions of $CO_2$ are leading to a global temperature increase and could have an adverse effect on life on earth.

### Construction Activities

The Proposed Action would involve two distinct construction activities that have potential for discernable impacts on air quality. The first is the construction of the pipeline that would

supply natural gas to the facility, and the second would be the construction of the power plant itself, including associated facilities such as the access road and substation. During construction, temporary and localized increases in atmospheric concentrations of $NO_x$, CO, $SO_2$, VOCs, and $PM_{10}$ would result from exhaust emissions of workers' vehicles, heavy construction vehicles, diesel generators, and other machinery and tools.

In addition, fugitive dust would result from excavation and earthwork.

#### 3.1.2.2 Significance Criteria

Based on the issues discussed above, significance criteria were developed for use in the impact assessment. Impacts on air quality would be considered to be significant if the following were to occur:

- predicted emissions would result in an exceedance of any NAAQS, as listed in Table 3.1-1
- predicted emissions would result in an exceedance of an AAAQG
- predicted emissions would result in an exceedance of maximum allowable PSD increments for $PM_{10}$, $NO_2$, or $SO_2$, as listed in Table 3.1-2
- predicted air pollutant emissions would cause a change in visibility greater than 5 percent for any 24-hour period in a Class I area or Class II wilderness area within the region of influence
- CALPUFF model results indicated unacceptable levels of nitrogen or sulfur deposition in areas subject to AQRV

#### 3.1.2.3 Impact Assessment Methods

In general, potential impacts of the Proposed Action on ambient air quality were assessed by first quantifying emissions from the primary sources (combustion turbines, duct burners, and cooling towers), using agency-accepted emission factors and vendor information as needed. These emission rates were then input to dispersion models, along with meteorological (met) data sets and topographic data, to predict ambient concentrations of pollutants. Models also were used to assess related visibility and depositional effects on sensitive areas. Results were compared to air quality standards or other guidelines, and impacts were assessed in accordance with the significance criteria.

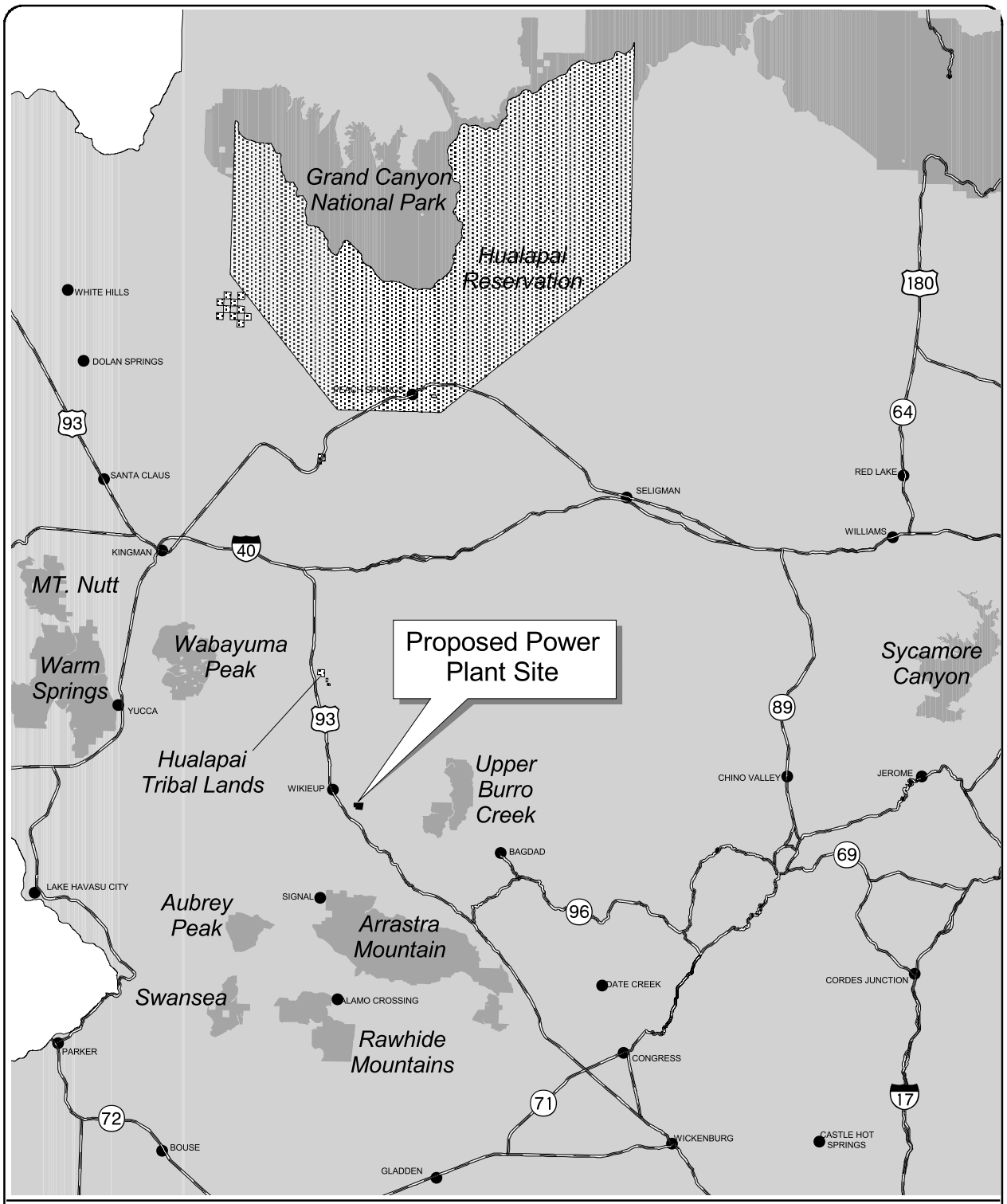
The following sections describe the methods used to assess impacts in more detail. First, the methods used to estimate emissions are described, including emissions from the proposed power plant and construction at the proposed power plant site. Next, the modeling analyses used for the impact assessment related to NAAQS, AAAQGs, PSD increments, and AQRVs are described. Because the impact analysis for $SO_2$ showed concentrations below the significance threshold for further modeling analysis, the only required modeling for $SO_2$ was related to the visibility issues.

Additional technical details of these methods can be found in the *Big Sandy Energy 720 MW Natural Gas-Fired Combined Cycle Power Plant Class I Permit Application* (Greystone 2001).

##### *Emission Estimates*

Unit Emission Estimates (Power Plant)

Emissions were quantified for the combustion turbines, duct burners supplementing the heat input to the heat recovery steam generator (HRSG) units, and cooling tower using accepted methods such as emission factors from EPA Document AP-42 (EPA 1995, 5$^{th}$ edition, with updates) and vendor information. It was assumed that the combustion turbines would operate at normal full load (between 75 and 100 percent of capacity) when not in startup or shutdown mode. Duct firing would be in operation only when the combustion turbine was




Legend

- Class I and Class II Areas
- Hualapai Reservation/Indian Allotments
- State Routes

# Class I and Class II Areas Potentially Affected by the Big Sandy Energy Project

Big Sandy Energy Project EIS

10 0 10

Scale in Miles

Universal Transverse Mercator Projection
1927 North American Datum
Zone 12

N

Figure 3.1-1

x:/bigsandy/projects/air.apr

operating at 100 percent load. The total annual emissions and maximum hourly emissions were based on different emission rates for startup/shutdown, combustion turbine operation only, and operation of the combustion turbine and duct burners simultaneously. Table 3.1-4 provides an estimate of the number of occurrences for each startup and shutdown parameter, along with the expected duration for each parameter, which would result in the maximum anticipated emissions. The resulting anticipated emission rate estimates for criteria pollutants are summarized in Tables 3.1-5 and 3.1-6.

TABLE 3.1-4
OPERATIONAL PARAMETERS FOR THE AIR QUALITY ANALYSIS

| Parameter | Events Per Year | | Hours per Event[1] | | Annual Hours per Unit |
|---|---|---|---|---|---|
| Cold Starts | 10 | x | 3.68 | = | 37 |
| Warm Starts | 15 | x | 2.02 | = | 101 |
| Hot Starts | 100 | x | 1.23 | = | 123 |
| Shutdowns | 160 | x | 0.5 | = | 80 |
| 100% Load | N/A | | 2,468 | | |
| 100% Load with Duct Burners | N/A | | 3,890 | | |

[1] – Per turbine

TABLE 3.1-5
MAXIMUM POTENTIAL HOURLY EMISSIONS FOR CRITERIA POLLUTANTS PER COMBUSTION TURBINE

| Operational Parameter | $NO_X$ | CO | VOC | $SO_2$ | $PM_{10}$ | |
|---|---|---|---|---|---|---|
| | | | | | Stack | Cooling Towers (11 Cells)[1] |
| | lbs/hour | lbs/hour | lbs/hour | lbs/hour | lbs/hour | lbs/hour |
| **Startups and Shutdowns** | | | | | | |
| Cold Start | 106.4 | 62.2 | 6.9 | 2.0 | 5.7 | 0.0 |
| Warm Start | 130.0 | 84.0 | 5.8 | 1.8 | 5.3 | 0.0 |
| Hot Start | 194.0 | 103.3 | 6.0 | 2.2 | 5.4 | 0.0 |
| Shutdown | 422.0 | 96.0 | 10.0 | 2.0 | 6.0 | 0.0 |
| **Operations** | | | | | | |
| 100% Load | 17.0 | 19.0 | 4.6 | 3.1 | 19.5 | 10.7 |
| 100% Load with Duct Firing | 17.0 | 31.0 | 6.9 | 3.1 | 24.0 | 10.7 |

[1] Total cooling tower emissions based on combined-cycle configuration.

| TABLE 3.1-6<br>ANNUAL FACILITY EMISSIONS FOR CRITERIA POLLUTANTS FROM THREE COMBUSTION TURBINE UNITS | | | | | | |
|---|---|---|---|---|---|---|
| | $NO_X$ | CO | VOC | $SO_2$ | $PM_{10}$ | |
| | | | | | Stacks | Cooling Towers (11 Cells) |
| | tons/year | tons/year | tons/year | Tons/year | tons/year | tons/year |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| 100% Load with Duct Firing | 223.4 | 319.7 | 70.9 | 39.3 | 282.5 | 47.0 |
| | | | | | | |
| **Startup/Shutdown Scenario** | **270.4** | **298.0** | **59.4** | **29.3** | **215.1** | **34.0** |
| **Maximum** | **270.4** | **319.7** | **70.9** | **39.3** | **282.5** | **47.0** |

The cooling tower emission rate for $PM_{10}$ was estimated using the accepted method provided in EPA Document AP-42, Section 13.4 (EPA 1995). Drift aerosols are created from the circulation of water over the cooling tower internals, while mechanical draft air is drawn through the water cascade. The aerosols themselves can be $PM_{10}$ emissions. Long-range transport analyses consider the solid particle formed when the water aerosol droplets evaporate. For this study, emissions of total aerosols were quantified and the potential $PM_{10}$ fraction was characterized according to typical size distribution. The entrained droplets were estimated to have 8,000 parts per million by weight (ppmw) of dissolved solids, which then could be related to the mass $PM_{10}$ emissions remaining after the water portion of the aerosol would evaporate.

Emissions of air toxics that are Federally listed HAPs or AAAQG compounds were calculated using gas-fired turbine emission factors. Of the range of values contained in the database, the maximum values were used in this analysis to provide conservative emission estimates. Table 3.1-7 summarizes the air toxics emission estimates.

## Power Plant Construction Emission Estimates

Construction-phase air emissions are expected to be very small compared to regulatory thresholds typically used to determine whether further air quality impact analysis is necessary. During the 20-month construction period for the proposed power plant, gaseous emissions ($NO_x$, CO, $SO_2$, and $PM_{10}$) would be generated from heavy construction equipment such as graders, excavators, bulldozers, scrapers, tractors, water trucks, tractors, and air compressors. Additionally, fugitive $PM_{10}$ would be generated from earth clearing and grading, and vehicular traffic on the site. Construction-related emissions would be short term, and would not be subject to air quality permitting.

Several agency-accepted particulate emission estimation models are available for facility construction activities. For this study, a very conservative estimate was obtained using a general emission factor from the EPA document AP-42, Volume I, Stationary Sources, Section 13.2.3. Uncontrolled emissions based on this factor are 1.2 tons/active acre/month of TSP. More detailed consideration of the construction emissions suggests that actual emissions must be far lower than indicated by the general factor.

| TABLE 3.1-7<br>MAXIMUM POTENTIAL EMISSIONS OF HAPs AND AAAQG COMPOUNDS | | | | | | |
|---|---|---|---|---|---|---|
| Substance | CAS | CT Emissions Factor (lb/MMcf) | CT Emissions[1] (lb/hr) | Duct Burner Emission Factor (lb/MMcf) | Duct Burner Emissions[2] (lb/hr) | Annual Emissions (tons) |
| 1,3-Butadiene[3] | 106-99-0 | 1.33e-04 | 0.0018 | | | 0.01 |
| Acetaldehyde[3] | 75-07-0 | 2.909e-01 | 0.1716 | 1.468e-02 | 0.0041 | 0.77 |
| Acrolein[3] | 107-02-8 | 6.926e-02 | 0.0273 | | | 0.12 |
| Benzene[3] | 71-43-2 | 4.716e-02 | 0.0513 | 8.698e-03 | 0.0024 | 0.24 |
| Formaldehyde[4] | 50-00-0 | 4.479e-01 | 0.99 | 6.723e-01 | 0.1862 | 5.15 |
| Naphthalene[3] | 91-20-3 | 7.879e-03 | 0.0057 | | | 0.02 |
| Propylene Oxide[3] | 75-56-9 | 5.869e-02 | 0.1242 | | | 0.54 |
| Toluene[3] | 108-88-3 | 1.684e-01 | 0.5574 | | | 2.44 |
| Xylene (Total)[3] | 1330-20-7 | 6.262e-02 | 0.2745 | | | 1.2 |
| Total HAPs | | | | | | 10.49 |

[1] – 3 turbines at 100% load
[2] – 3 duct burners
[3] - California Air Toxics Emission Factors (CATEF) database emission factors
[4] – turbine vendor emission factor

The proposed power plant and substation would involve disturbance of an approximately 38-acre area. The two evaporation ponds would be constructed on an additional 18 acres. Well construction would involve the disturbance of an approximate 10-acre area. The access road would involve the disturbance of an approximate 21-acre area. Combined, the total construction area to be disturbed was estimated to be 87 acres.

The $PM_{10}$ emission rate that pertains to the impact assessment considers the actual level of activity at the site, the portion of TSP that is $PM_{10}$, and the effect of controls. For general construction emissions in desert soils, an accepted estimate is that about 36 percent of total particulate is sufficiently small in size to be $PM_{10}$. Furthermore, it was assumed that a maximum of 50 percent of the total facility area would be disturbed by activities on any given day. The application of water or chemical dust suppressants on exposed areas would reduce emissions by at least another 50 percent.

The resultant $PM_{10}$ emissions considering these factors would be 11.25 pounds per hour (lbs/hr) from the power plant area, 5.33 lbs/hr from the evaporation ponds, 5.92 lbs/hr from the wells and 12.44 lbs/hr from the access road. During construction, off-road vehicles would generate gaseous exhaust emissions. Table 3.1-8 summarizes the total anticipated CO, $NO_x$, $PM_{10}$, $SO_2$, and $PM_{10}$ emissions that would be generated during construction. Emission factors were obtained from EPA document AP-42, Volume II, Emission Factors for Mobile Sources (EPA 1995, 5th edition and updates). The total vehicle emissions per month were based on hourly use. Construction vehicles were assumed to operate 21 days per month and 10 hours per day or 210 hours per month. Trucks were assumed to operate at either 100 or 150 hours per month. The total annual emissions of 24.66 tons per year would be about 5 percent of annual Project emissions during operation.

| TABLE 3.1-8<br>EXHAUST EMISSIONS FROM CONSTRUCTION VEHICLES* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Criteria Pollutant Emissions | | | | | | | | |
| | Operation | Carbon Monoxide | | Nitrogen Oxides | | Sulfur Dioxide | | Particulates $PM_{10}$ | |
| Vehicle Type | (hrs/mo) | lb/hr | tons/mo | lb/hr | tons/mo | lb/hr | tons/mo | lb/hr | tons/mo |
| Light and Medium Truck (gasoline)[a,b] | 150 | 0.331 | 0.025 | 0.056 | 0.004 | 0.025 | 0.002 | 0.058 | 0.004 |
| Heavy Truck (gasoline)[a,c] | 100 | 0.730 | 0.037 | 0.098 | 0.005 | 0.005 | 0.0003 | 0.128 | 0.006 |
| Heavy Truck (off highway) | 210 | 1.794 | 0.188 | 4.166 | 0.438 | 0.454 | 0.048 | 0.256 | 0.027 |
| Light Tractor (track type) | 210 | 0.346 | 0.036 | 1.26 | 0.132 | 0.137 | 0.014 | 0.112 | 0.012 |
| Heavy Tractor (wheel type) | 210 | 3.59 | 0.377 | 1.269 | 0.133 | 0.090 | 0.009 | 0.136 | 0.014 |
| Cranes | 210 | 0.675 | 0.071 | 1.691 | 0.178 | 0.143 | 0.015 | 0.139 | 0.015 |
| Heavy Equipment (miscellaneous)[d] | 210 | 0.675 | 0.071 | 1.691 | 0.178 | 0.143 | 0.015 | 0.139 | 0.015 |
| **TOTAL** | **1,300** | **8.141** | **0.805** | **10.231** | **1.068** | **0.992** | **0.089** | **0.782** | **0.093** |
| Total Emissions: 2.055 Tons Per Month; 24.66 Tons Per Year | | | | | | | | | |

[*] All vehicles are diesel-powered, except as noted.
[a] For gasoline-powered vehicles, emission rate (lbs/hr) is based on a gram per mile EPA emission factor and the speed shown under footnote [b] or [c].
[b] Assumes an average vehicle speed of 15 miles per hour.
[c] Assumes an average vehicle speed of 10 miles per hour.
[d] Includes trenches, pavers, and compact loaders.

### Communication Facilities

Emissions were not quantified or modeled for microwave dish installations or the ground disturbance at pulling sites for the optical ground wire (OPGW) installation. This is because gaseous emissions from vehicles and equipment would be short term and small in magnitude for the short-term activities for the OPGW installation. Also, construction vehicles and machinery would be equipped with standard pollution-control devices to minimize emissions. Any one location would be affected for only three to five days for the OPGW, each of the 15 pulling sites would be about 3 miles apart and ground disturbance activities would last only 1 or 2 day(s) at each site. The slightly elevated $NO_x$ and CO ambient levels associated with construction vehicles would cease after construction or installation activities cease. $PM_{10}$ emissions, as fugitive dust, would result from soil disturbance during OPGW. However, dust would be controlled by watering or applying chemical stabilizers to the disturbed areas. After construction is complete, the disturbed areas would be revegetated to minimize long-term fugitive dust emissions.

### Pipeline Emissions

Emissions from operation of the natural gas pipeline would be negligible. Construction of the natural gas pipeline would occur within one of three possible corridors. As described in Section 2.2, the three actions consist of a combination of several corridor segments of varying lengths using different rights-of-way. Table 3.1-9 lists each possible corridor segment along with the length of that corridor segment in miles. Table 3.1-9 further details the particulate emissions from pipeline construction activities of each individual corridor segment in tons of particulate per mile of construction.

| TABLE 3.1-9<br>$PM_{10}$EMISSIONS PER PIPELINE CORRIDOR SEGMENT[a] | | |
|---|---|---|
| Corridor segment Number | Corridor segment Length (miles) | Total Particulate Per Segment[1] (tons) |
| R1 | 3.9 | 1.7 |
| R2 | 0.8 | 0.2 |
| R3 | 9.3 | 4.0 |
| R4 | 13.7 | 5.9 |
| R5 | 8.5 | 3.4 |
| T1 | 3.7 | 1.6 |
| T2 | 2.1 | 1.0 |
| T3 | 8.5 | 3.7 |
| T4 | 4.0 | 1.7 |
| T5 | 7.8 | 3.4 |
| C1 | 2.8 | 1.2 |
| C2 | 2.3 | 1.0 |
| C3 | 1.9 | 0.8 |

[1] Emission rates based on EPA AP-42, Volume I, Fifth Edition, Stationary Sources 13.2.3 Heavy Construction Operations
[a] Corridor segment length in miles times an approximate width of 90 feet was used to calculate the total acreage of each of the proposed segments.

Table 3.1-10 lists the total $PM_{10}$ emissions in tons for construction of each of the three gas pipeline corridors. Total $PM_{10}$ emissions would be 14.0 tons for the proposed gas pipeline corridor, 18.1 tons for the Alternative R gas pipeline corridor, and 13.3 tons for the Alternative T gas pipeline corridor.

| TABLE 3.1-10<br>TOTAL $PM_{10}$EMISSIONS PER GAS PIPELINE CORRIDOR | |
|---|---|
| Pipeline Construction Corridor (segments) | Total $PM_{10}$Per Action (tons) |
| Proposed Gas Pipeline Corridor (R1+C1+T3+C3+T4+R5) | 14.0 |
| Alternative R Gas Pipeline Corridor (R1+R2+R3+C3+R4+R5) | 18.1 |
| Alternative T Gas Pipeline Corridor (T1+T2+T3+C3+T4+T5) | 13.3 |
| Additional workspace disturbance | 0.37 |

For the purposes of evaluating particulate emissions from the construction of the proposed pipeline, it is assumed that the pipeline would travel one of three possible routes with the overall length of each possible action being nearly identical. It also is assumed that the soil along each of the three routes is of the same consistency. These assumptions are consistent with applying the emission factor listed in EPA AP-42 for particulate emissions from heavy construction. This emission factor, 1.2 tons per acre per month of activity, are conservatively high estimates that take into account several types of soils with varying moisture, silt, and particle size distributions within a given soil type.

The emission factor used to calculate particulate emissions is based on total suspended particulate (TSP). As is further discussed in this section an assumption was made that, of the 1.2 tons per acre/month of activity emission factor, 36 percent of the TSP is in the form of $PM_{10}$.

Emission rates were determined by calculating the number of acres in a mile and applying the emission factor above to yield a particulate emission per corridor segment mile.

### *Modeling Analyses*

#### Ambient Impact Modeling Analysis for NAAQS and PSD Criteria Pollutants and AAAQG Pollutants

This section provides an overview of the procedures used in the NAAQS, PSD Increment, and AAAQG modeling analyses. For these assessments, the simulation model was used to determine maximum ground-level concentrations predicted for a grid of discrete receptors surrounding the proposed power plant site. There are two levels of modeling analysis typically used for PSD permitting and AQRV analyses: screening and refined dispersion modeling. A refined dispersion model requires more detailed source and meteorology data than a screening model, but is capable of providing more realistic estimates of a source impact. In

this analysis, the findings are based on refined dispersion modeling using either the Industrial Source Complex 3rd Version Short-Term (ISC3) Gaussian-plume model, the ISC plume rise model enhancements (ISC Prime) model or the CALPUFF long-range transport model. Technical details of the air quality impact assessment are provided in the *Big Sandy Energy 720 MW Natural Gas Fired Combined Cycle Power Plant Class I Permit Application* (Greystone 2001), which includes the *Big Sandy Energy Class I/II Air Quality Related Values CALPUFF Modeling Results Report* (Caithness 2000).

The ISC3 (EPA Version 00101) and ISC Prime (Version dated 99020) models were used for refined dispersion analysis for the criteria and HAP impacts. The ISC3 model is a steady-state Gaussian plume model that allows for simulation of pollutant emission contributions 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 operating conditions such as those at the proposed power plant site (i.e., multiple sources, rural area, possible building downwash, and one-hour to annual averaging times). ISC Prime has updated physics routines to improve the representation of expected air concentrations.

Initially, a "screening" meteorology data set composed of combinations of wind speed, temperature, and stability class that represent worst-case dispersion conditions was used. This data set most conservatively estimates the ambient impact due to a source. Meteorological data collected on site in 2000 and 2001 were used in the final air impact analysis.

Individual point sources representing the generating unit combustion turbine and duct burner stacks, and the cooling tower, were input to the models. Receptors were placed beyond the Project boundary every 100 meters out to 3 km, then every 200 meters out to 10 km and every 1,000 meters out to 50 km.

## Ambient Impact Modeling for AQRV Analysis

Visibility and acid deposition effects of the Proposed Action were evaluated on a regional basis. Changes in regional haze are caused by emissions of $NO_x$, $SO_2$, and particulates. These pollutants can be precursors of light-obscuring or refracting particles, such as sulfate and nitrate aerosols, throughout a given region. Regional visibility analyses use long-range transport dispersion models that can calculate sulfate and nitrate concentrations (or allow such concentrations to be derived from $SO_2$ and $NO_x$ values). The predicted parameter corresponding to changes in visibility is the extinction coefficient, and this can be related to a quantitative relative change in visibility that could occur on the worst-case day.

The pollutants of primary concern for acid deposition impacts on terrestrial ecosystems are sulfur and nitrogen compounds and $O_3$. Because the Proposed Action would not be a major source of VOCs, the primary precursor of $O_3$, $O_3$ would not be expected cause discernable impacts.

The sensitivity of terrestrial ecosystems to sulfur and nitrogen compounds is expressed in their maximum allowable pollutant loading. Pollutant loading is expressed in kilograms of pollutant per hectare per year.

Potential effects on visibility and deposition in the Class I and Class II areas listed in Table 3.1-3 were assessed using the CALPUFF dispersion modeling system. The Interagency Workshop on Air Quality Modeling (IWAQM), in the *IWAQM Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts* (EPA 1998) has recommended that CALPUFF be adopted as the only acceptable model assessing pollutant impacts in distant Class I areas. The IWAQM Phase 2 document outlines the steps required in calculating regional visibility impairment. For this assessment, the CALPUFF model was used in screening mode, which allows a conservative evaluation of long-range transport effects using a single

meteorological data set. Technical details of this air quality impact assessment are provided in the *Big Sandy Energy 720 MW Natural Gas Fired Combined Cycle Power Plant Class I Permit Application* (Greystone 2001), which includes the *Big Sandy Energy Class I/II Air Quality Related Values CALPUFF Modeling Results Report* (Caithness 2000).

#### 3.1.2.4 Actions Incorporated into the Proposed Action to Reduce or Prevent Impacts

The Proposed Action includes the following measures to reduce or prevent potential adverse impacts on air resources.

***Construction***

Dust control measures would be implemented as described in Section 2.2.8.1.

The use of water and possibly surfactants to control fugitive dust on unpaved roads and during earthmoving operations would be implemented to control construction emissions by about 50 percent. Emissions also would be controlled by minimizing the number of vehicles operating at one time. Limiting vehicle speed on unpaved roads is another method that would be adopted to reduce particulate emissions.

***Power Plant Operations***

The sources of criteria pollutant emissions during proposed power plant operations include the combustion turbine exhaust stacks and wet cooling towers for both the steam turbine and inlet air cooling system condenser cooling water. BACT for these sources are required as part of the air permitting process. These measures include selective catalytic reduction to reduce $NO_x$ emissions, and best combustion control practices to minimize emissions of VOCs, $PM_{10}$, and CO. $PM_{10}$ emissions from the cooling towers would be minimized through the installation of high-efficiency drift eliminators with an efficiency of 0.005 percent of the circulating water rate.

***Substation Operations***

$SF_6$ gas in substation circuit breakers would be contained within the sealed units. Equipment as delivered from the manufacturer would be required to be factory tested and certified to not leak. After installation, the equipment would be scanned for detection of leaks, and repairs made as appropriate. During use, the equipment would be monitored by periodic substation inspections for indications of leakage. During servicing, $SF_6$ gas would be evacuated using sealed gas containment equipment.

#### 3.1.2.5 Impact Assessment

***Proposed Action***

NAAQS and PSD Increment Significance Criteria for Plant Operations

This section presents a discussion of the predicted impacts associated with the Proposed Action, and how these impacts compare to significance criteria related to NAAQS and PSD increments. Predicted impacts are expressed as the maximum predicted ground-level concentrations derived from the modeling exercises described in the previous section. Note that the impacts were simulated using either screening meteorological conditions, or meteorological data for a full year collected at the proposed power plant site.

Table 3.1-11 compares the predicted maximum impacts to the PSD air quality increment concentrations and, when added to the applicable background concentration, the NAAQS and AAAQG. The results for CO indicate that the ambient CO impacts are well below all the NAAQS for 1-hour and 8-hour averaging times. Similarly, ambient air impacts for $NO_x$ emissions are shown to be below annual-average NAAQS and increment criteria. Maximum ambient impacts for $PM_{10}$, are below 24-hour and annual averaging periods for NAAQS and PSD increments. Thus, there would be no significant impact for the criteria air pollutants.

| TABLE 3.1-11<br>COMPARISON OF PREDICTED MAXIMUM AIR QUALITY IMPACTS WITH SIGNIFICANCE CRITERIA FOR NAAQS, PSD INCREMENT, AND AAAQG[d] | | | | | | |
|---|---|---|---|---|---|---|
| Pollutant | Averaging Period | Maximum Impact (mg/m[c]) | Background Concentration (mg/m[c]) | Percent of NAAQS or AAAQG (%) | Percent of Class II Increment (%) | Exceeds Project Significance Criteria? |
| $NO_2$ | Annual [(b)] | 2.78 | 20.0 | 22.8 | 17.8 | No |
| CO | 1 hour[(b)] | 1,454 | 8,000 | 23.6 | NA | No |
| | 8 hour[(b)] | 189.1 | 2,000 | 21.9 | NA | No |
| $PM_{10}$ | 24 hour[(b)] | 26.04 | 56.9 | 55.3 | 76.0 | No |
| | Annual[(b)] | 3.80 | 19.8 | 47.2 | 15.3 | No |
| Formaldehyde[a] | 1 hour[(c)] | 5.5 | NA | 27.6 [(a)] | NA | No |
| | 24 hour[(c)] | 0.6 | NA | 5.0 [(a)] | NA | No |
| | Annual[(c)] | 0.05 | NA | 64.2 [(a)] | NA | No |

[a] – Formaldehyde values are AAAQG.
[b] – Quantified using refined (ISC3 Prime) model.
[c] – Quantified using refined (ISC3 Prime) model

The potential to emit calculations included in Table 3.1-6 show that the Proposed Action would not be a major source of $SO_2$ emissions. This is a typical finding for units using high-quality, low-sulfur natural gas. Although modeling of $SO_2$ would not be required for air permitting, it is included in this Draft EIS. Modeling for $O_3$ was not conducted. $O_3$ is not a pollutant that would be emitted from this facility and is typically considered an urban pollutant. $O_3$ is formed through a complex series of atmospheric reactions involving $NO_X$, ammonia, and VOCs combined with intense sunlight (ultraviolet light). Although the proposed power plant would emit $NO_X$, the emissions would be minimized, and the emissions of VOCs would be very small. Also, there are not a large amount of these pollutants emitted in the area. All of these facts indicate the potential for formation of a significant amount of $O_3$ is very unlikely.

## NAAQS Significance Criteria for Construction

Due to the measures planned to prevent fugitive dust and the expected low vehicle emissions, the potential impacts resulting from construction activities at the Project site would occur only over a limited geographic area and only for a limited time. After the site preparation is complete, foundations have been constructed, and mitigation measures such as covering of traffic routes by gravel have been implemented, the actual impact of fugitive particulate emissions will be very low. Since these temporary emissions are not likely to exceed (applicable NAAQS), no significant impact is expected.

## AAAQG Significance Criteria for Formaldehyde and other HAPS

For formaldehyde, the ambient impact analysis using the onsite meteorological data indicated that the maximum ground-level concentrations of formaldehyde would be below the AAAQGs, as shown in Table 3.1-7.

The impact of other air toxics can be evaluated by prorating the predicted impact for formaldehyde in proportion to the relative emission rates for these other compounds. The annual emission rate shown in Table 3.1-7 for each air toxic was used to estimate predicted impacts. The results of this calculation indicate the maximum impact for toxics other than formaldehyde are at least a factor of 10 less than the AAAQG thresholds. In most cases, the predicted impacts are several orders of

magnitude below the AAAQG, and therefore, no significant impacts would occur.

### NAAQS Significance Criteria for Pipeline Construction

Although pipeline construction total suspended particulate (TSP) emissions were calculated using conservative emission factors for each of the three alternative pipeline routes, modeling impact analysis was not conducted. Based on the calculated TSP emission rates for the pipeline construction, on average, emissions would be approximately 600 to 700 pounds of TSP over a two- or three-day period for 1 mile of construction. It is also assumed that 36 percent of TSP emissions are in the form of $PM_{10}$ resulting in approximately 216 to 252 pounds of $PM_{10}$. These TSP and $PM_{10}$ emissions would be further reduced by at least 50 percent through the application of a control method such as watering or other dust suppressing materials.

Because the pipeline construction TSP and $PM_{10}$ emissions are transient and short term, and $PM_{10}$ emissions would be reduced using the dust control measures discussed in Section 2.2.8.1, these emissions would not lead to a significant impact.

### AQRV Analysis for Visibility and Acid Deposition

Potential visibility impacts and effects on AQRVs in the designated Class I and Class II wilderness areas within the region of influence were evaluated using methods recommended by the IWAQM in its *Phase 2 Summary Report* (IWAQM 1998), and those in the Draft Federal Land Manager's Air Quality Related Values Workgroup (FLAG) Draft Phase I October 1999 Report (FLAG 1999). The closest Class I area (Grand Canyon National Park) is 120 km from the proposed power plant site. Due to the distance from the region of influence to the Class I areas, the primary effect on visibility is due to potential increases in regional haze. Therefore, a regional haze analysis, using the IWAQM-recommended procedures, was conducted for each of the areas. In addition to the regional haze analysis, the increased potential for acid deposition of nitrogen and sulfur species was evaluated for each area. The effects on Hualapai tribal lands were derived by comparison with the modeled Class I and Class II areas surrounding the Big Sandy Valley.

According to the FLAG guidance document cited above, regional visibility impacts, as measured as change in the light extinction coefficient for an area, of less than 5 percent are deemed acceptable for purposes of air quality permitting.

Analyses using the CALPUFF model provided estimates of the visibility and acid deposition impacts in Class I areas, Class II wilderness areas, and Hualapai tribal lands. These results are summarized in Tables 3.1-12 through 3.1-15. Modeling was performed for a set of five years, to best assess the maximum impairment that could occur. As shown in the visibility results for Grand Canyon National Park and Sycamore Canyon Wilderness, the highest predicted visibility impairment is less than 5 percent. Within the accuracy of the model, this corresponds to no discernable change in visibility impact on the worst-case days, and would not be significant.

The BLM Class II wilderness areas and Hualapai tribal lands also would experience a maximum predicted change in the extinction coefficient visibility impairment of less than 5 percent. The highest value is 4.78 percent for 1994 simulated conditions at a ring of wilderness areas that lie between 45 to 60 km (30 to 42 miles) distant from the proposed power plant site (Warm Springs, Wabayuma Peak, Swansea, and Rawhide Mountains). Within the accuracy of the model, this corresponds to no discernable change in visibility impact on the worst-case days, and would not be significant.

The nature of deposition impacts are not readily translated from the predicted magnitude of nitrogen and sulfur deposition in a given area. Typically, the increased deposition due to a project is compared to baseline loading values that reflect the amount of naturally occurring soil and water deposition in an area. The underlying data on soil conditions (i.e., metallic