ES.1 EXECUTIVE SUMMARY

This Task 1A Report for the Powder River Basin (PRB) Coal Review describes the existing air quality in the PRB study area. Existing water resources, social and economic conditions, and other environmental conditions are presented in individual (Task 1) reports. The description of the existing air quality in this report has been based on modeling results for the base year (2002), with input parameters for the past and present actions summarized in the Task 2 Report for the PRB Coal Review.

For purposes of the air quality study, the Wyoming study area comprises all of Campbell County, all of Sheridan and Johnson counties less the Bighorn National Forest lands to the west of the PRB, and the northern portion of Converse County. It includes all of the area administered by the Bureau of Land Management (BLM) Buffalo Field Office, a portion of the area administered by the BLM Casper Field Office, and a portion of the Thunder Basin National Grasslands, which is administered by the U.S. Forest Service. The Montana portion of the PRB study area comprises the area of relevant coal mines including portions of Rosebud, Custer, Powder River, Big Horn, and Treasure counties. It encompasses the area administered by the BLM Miles City Field Office. State and private lands also are included in the study area.

ES.2 TECHNICAL APPROACH

Existing sources in the study area were analyzed for their current (base year, 2002) impacts on air quality. A state-of-the-art, guideline dispersion model was used to evaluate impacts both in the near-field (within the counties in the study area) and at selected regional sensitive receptors peripheral to the study area. The U.S. Environmental Protection Agency (USEPA) guideline CALPUFF model system (Scire et al. 1999a) was used for this study. The modeling domain extends over most of Wyoming, southeastern Montana, southwestern North Dakota, western South Dakota, and western Nebraska.

Impacts were analyzed at several sets of receptors, as a focus of the study. A set of near-field receptors was developed, representative of impacts in the study area. The individual sets of receptors that were analyzed include the following:

- Near-field receptors in Montana
- Near-field receptors in Wyoming
- Far-field receptors at federally designated Class I areas
- Far-field receptors at other sensitive areas (Class II areas)

The air quality analysis for this study focused on determining representative base year air quality-related conditions throughout the PRB study area and the more distant sensitive receptor areas. A group of agency stakeholders participated in developing the modeling protocol that was used for this analysis.

The modeling used actual emissions from existing sources representative of 2002 operations. The emissions data were gathered from a variety of sources, but mainly relied on data collected by the Wyoming Department of Environmental Quality (WDEQ) and the Montana Department of

Environmental Quality. Emissions from permitted minor sources in Wyoming, where no actual data are available, were further adjusted by a factor (0.7) to account for an estimate of actual emissions. Only actual emission sources inside the study area were included in the base year modeling. Key major sources were included, such as the coal-fired power plants, gas-fired power plants, and sources that were included in the Title V (operating permit) program. The Dave Johnston power plant, located in Converse County, is near the edge of the study area and was included in the base year study due to its proximity and contribution to the existing air environment. Some operational adjustments were made to accommodate small sources that were presumed to be operating at less than full capacity. Emissions from other sources, including estimated fugitive dust construction emissions, were computed based on USEPA emission factors and input data from WDEQ. A detailed source listing is provided in a separate technical source document (BLM 2005).

Meteorological data were developed for 1996 for the modeling domain, using the guideline Version V of the CALMET (Scire et al. 1999b) diagnostic model, identical to that used for the PRB Oil and Gas Final EIS (BLM 2003). These data provide a four-dimensional depiction of actual meteorological conditions for that year. The database was enhanced by using data for specific surface stations and precipitation. Terrain and land use data from the U.S. Geological Survey also were used. Modeling data settings generally were set to default values, as provided in the technical report. Base year ozone concentrations also were incorporated into the model using measured concentrations representative of the study area.

ES.3 DESCRIPTION OF CURRENT CONDITIONS

The PRB study area is a naturally windy region with prevailing westerly winds, but with substantial local variability due to local topographic features. Although climatological conditions favor strong atmospheric dispersion in the region, there are occasional periods of stable air and light winds, usually with clear nighttime conditions, that lead to the higher impacts of pollutants. The meteorological wind pattern and the topographic features tend to lead to higher impacts toward the east of the PRB, specifically within the area of the Black Hills. The region has a naturally wide range of daily temperatures, a strong seasonal pattern of temperature and precipitation, and a seasonal pattern of strong storms moving across the area.

The current air quality conditions in the region are very good. Limited data show that the region is in compliance with the ambient air quality standards for nitrogen dioxide (NO_2), and sulfur dioxide (SO_2). Monitoring sites located near active mine areas have occasional exceedances of the ambient air quality standard for particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) (24-hour), based on reported data on the USEPA web site. The location of the exceedances may be very limited to areas near the mining operations.

Visibility data collected around the region indicate that although there are some days with notable impacts at Class I areas, the general trend in the region shows very little change in visibility impacts (at Badlands National Park and at the Jim Bridger Wilderness Area) over the period from 1993 to 1999.

ES.4 MODELED BASE YEAR IMPACTS

Emission estimates were developed for the base year (2002), for a range of source groupings, including:

- All sources
- CBNG sources (all natural gas producing sources [conventional and coal bed])
- Coal-related sources (from both states, includes mines, power plants, and conversion facilities)
- Coal mines (in both states)
- Montana sources (all sources located in Montana including coal mines, CBNG, and power plants)
- Non-coal sources (roads, railroads, urban areas, miscellaneous sources, Montana oil and gas, non-coal power plants excluding CBNG sources)
- Power plants (includes coal- and gas-fired power plants in Wyoming and Montana)
- Wyoming sources (all sources located in Wyoming)

Some sources (such as coal-fired power plants) may be included in more than one group (e.g., coal-related sources and power plants).

Emissions from transportation activities as well as urban areas also were developed and included in the model. A summary of the modeled maximum air quality impacts is presented in **Table ES.4-1**.

Based on the modeling results for NO_2, SO_2, and PM_{10}, the base year (2002) impacts on ambient air quality were well below the ambient air quality standards, with an exception for PM_{10} emissions on receptors near the PRB sources (**Table ES.4-1**). The results indicate that some receptors in the PRB study area may be adversely impacted by PM_{10} emissions from the identified sources in the PRB study area. Results show that the exceedances tend to occur at receptors that are located near the active mine areas or near other active PM_{10} sources in the study area's near-field receptors.

Under the Clean Air Act, visibility has been established as a critical resource for identified Class I areas. Modeled impacts on visibility at the identified Class I areas and sensitive Class II areas were well above the 10 percent threshold (a 10 percent increase in extinction over a 24-hour period) that established detectability for at least several days at all surrounding Class I and Class II areas (**Table ES.4-1**). The frequency of impact greater than 10 percent extended over 200 days per year at several Class I locations, mostly to the east of the PRB study area. Impacts on visibility in the surrounding Class I areas are above the detectable levels at many receptor areas.

This study does not directly evaluate Prevention of Significant Deterioration (PSD) increment consumption, because it does not separate PSD increment-consuming sources from non-increment-consuming sources. The results are provided for comparison only and show impacts of PM_{10} that are at or above the PSD increment levels for Class I areas.

Emissions of SO_2 and nitrogen oxides can lead to increasing acidification of sensitive soils and lakes. The modeled acid deposition impacts at the identified Class I and Class II areas for both nitrogen and sulfur compounds were well below the guideline significance threshold (**Table ES.4-1**). Impacts of acid deposition on the acid neutralizing capacity of high altitude lakes also were

analyzed by a screening method. Results showed that impacts on all lakes except one were below the level of acceptable change under the U.S. Forest Service (2002) guideline thresholds.

Table ES.4-1
Summary of Air Quality Impacts

Air Quality Component		Receptor Group	Base Year 2002[1]
Concentrations	Criteria	Montana near-field	**PM_{10} > NAAQS**
			NO_2 < NAAQS
			SO_2 < NAAQS
		Wyoming near-field	**PM_{10} > NAAQS**
			NO_2 < NAAQS
			SO_2 < NAAQS
		Class I areas	PM_{10} < NAAQS
			NO_2 < NAAQS
			SO_2 < NAAQS
		Class II sensitive areas	PM_{10} < NAAQS
			NO_2 < NAAQS
			SO_2 < NAAQS
	PSD	Class I areas	**PM_{10} > increment**
			NO_2 > increment
			SO_2 > increment
		Class II sensitive areas	**PM_{10} > increment**
			NO_2 < increment
			SO_2 < increment
	HAPs	Montana near-field	**Benzene > REL, RfC**
			Other HAPs < REL, RfC
		Wyoming near-field	All HAPs < REL, RfC
Visibility		Mandatory Class I areas	**Wind Cave National Park: 261 days > 1 deciview**
		Tribal Class I areas	**Northern Cheyenne Reservation: 305 days > 1 deciview**
		Class II sensitive areas	**Crow Reservation: 286 days > 1 deciview**
Atmospheric Deposition	Nitrogen deposition LOC	Class I areas	Nitrogen < LOC
		Class II sensitive areas	Nitrogen < LOC
	Sulfur deposition LOC	Class I areas	Sulfur < LOC
		Class II sensitive areas	Sulfur < LOC
	Lake chemistry ANC	Sensitive lakes	**Upper Frozen Lake > LAC** Others < LAC

Note: ANC = acid neutralizing capacity
HAPs = hazardous air pollutants
LAC = limits of acceptable change
LOC = level of concern
NAAQS = National Ambient Air Quality Standards
PM_{10} = particulate matter with an aerodynamic diameter of 10 microns or less

[1]Predicted exceedances of standards or guideline thresholds are in bold.

The study also modeled the impacts of selected HAP emissions (benzene, ethyl benzene, formaldehyde, n-hexane, toluene, and xylene), and compared those impacts to the range of acceptable ambient concentrations, as provided by other state and local air agencies. (Montana and Wyoming do not have state HAP acceptable ambient concentrations.) Due to the localized nature of these impacts, only the near-field receptors were analyzed. Similar to the PM_{10} impacts, the peak impacts were located near to the existing sources in the near-field receptors.