SECTION 2:

ADDENDUM AND ERRATA

SECTION 2: ADDENDUM AND ERRATA

2.1 INTRODUCTION

The following sections have been prepared in response to public and agency review comments on the DEIS. The Addendum Section is to provide changes in the analysis described in the DEIS. Since there were no additions to the analysis provided in the DEIS, there will not be an Addendum Section. The Errata Section, Section 2.2 describes changes to the DEIS in response to public comments.

2.2 ERRATA

EXECUTIVE SUMMARY

2.4 Water Resources

Page S-7, Delete sentence starting with "However," in the 1st paragraph.

TABLE OF CONTENTS

Page ii, change "2.5.2.11 Project-Wide Mitigation Measures" to "2.5.2.11 Standard Operating Procedures and Applicant-Committed Measures."

CHAPTER 1: PURPOSE AND NEED

1.4.1.3 Conformance with Great Divide RMP Direction

Page 1-12, replace the text starting at the top of page 1-12 through the beginning of Section 1.4.2 on page 1-14 with the following text:

For the RFO portion of Desolation Flats, a review of the WOGCC database on January 21, 2004 showed a total of 3,046 wells on state, federal and privately held surface in the RFO that are active (this includes dormant wells [44], completed wells [2,723], notices of intent to abandon [71], and spuds [208] within the RFO). The number of spuds are those wells where APDs are approved and notice has been received that drilling has been initiated, but there is no report yet of the wells being completed or plugged and abandoned. The total count of 3,046 wells goes back to the beginning of oil and gas production within the RFO in 1911. From the Great Divide RMP EIS (Assumptions for Analysis, Chapter 4, page 220) the number of wells existing at the time the RMP DEIS (USDI-BLM 1987) was 3,671 wells drilled in the planning area on all ownerships, and of these, 1,896 wells were dry and abandoned. That left 1,775 wells (3,671 minus 1,896) active prior to the RMP. Subtracting this figure from the 3,046 wells currently in the RFO according to the WOGCC (Table 1-4) leaves 1,271 active producing wells since the RMP EIS.

SECTION 2: ADDENDUM AND ERRATA

In Table 1-4, "plugged and abandoned" (P&A) wells are well pads that were drilled and at some point abandoned. To enter into P&A status, the wells must be plugged, abandoned, reclaimed and subsequently inspected and accepted as reclaimed by the BLM. Wells in the status of "notice of intent to abandon" (NOIA) fit into two categories, either plugged, abandoned, and awaiting reclamation or plugged, abandoned, reclaimed and awaiting acceptance by the BLM. For the purposes of this analysis, no NOIA wells are considered reclaimed.

Table 1-4 Well Status Summary – Rawlins Field Office (RFO) as of 01/21/04.

Well Description (number of wells within RFO)	Federal	Fee or State	Total
Plugged and Abandoned	1,337	1,599	2,936
Dormant	22	22	44*
Completed	1,317	1,406	2,723*
Monitoring	0	0	0
Notice of Intent to Abandon	24	47	71*
Number of Spuds	108	100	208*
Number of Expired Permits	620	375	995
Number of Permits to Drill	378	219	597
Waiting on Approval	0	0	0
Totals	3,812	3,768	7,580

* = Counts towards # wells

Analysis of 26 wells drilled under the Desolation Flats interim drilling program as of January, 2004 shows that long-term disturbance has averaged 6.3 acres/well. This includes well pads and roads. This is the most current figure available, and comes from actual experience from the DFPA. This figure contrasts with the simple average of 2.8 acres of long-term disturbance from the 4 natural gas projects listed in Table 1-5.

The coal bed natural gas disturbance figures were not used because they would skew the average figure above toward a smaller value. This is due in part to the smaller reclaimed well pad size for coal bed natural gas wells, and in this case, for the Brown Cow Pod, the fact that the wells would be developed on existing well pads and existing roads from an earlier project. For the purposes of this analysis, the 6.3 acre figure was increased to 6.5 acres/well long-term disturbance. This is a conservative estimate due to future wells within the DFPA benefiting from roads already established by the current wells and is consistent with the BLM's intent not to underestimate disturbance acreages.

To convert the current number of wells (1,271) to current acres disturbed long-term, the well number was multiplied by 6.5 acres disturbed per well. 1,271 wells x 6.5 acres per well = 8,262 acres of long term disturbance to date within the Rawlins Field Office under the Great Divide RMP.

Currently there are 8 oil and gas project development environmental analyses in the RFO where drilling and production activities are authorized but not yet completed. These wells and associated disturbances need to be considered before a determination of the number of wells remaining under the RFD scenario described in the RMP can be made. See Table 1-5 for a summary of the oil and gas development projects with wells authorized but not yet drilled outside of the Desolation Flats Project area.

Table 1-5 shows that approximately 956 wells and 2,505 acres of disturbance remain to be completed under existing authorizations for these projects. The well count for wells remaining to be drilled was taken from the WOGCC on-line database.

Table 1-5. Long Term Disturbance Figures for Existing Oil and Gas Development NEPA Documents.

	Wells* remaining to drill 12/31/2001	Wells* drilled since 01/01/02	Authorized Wells Remaining	***Average Disturbance per Well (Acres)	Authorized Disturbance Remaining (Acres)
Sierra Madre	16	0	16	1.95	31
Hay Reservoir	2	2	0	4.43	0
Continental Divide / Wamsutter II	1031	282	749	2.77	2,075
South Baggs	40	2	38	2.03	77
Creston/Blue Gap	207	66	141	2.23	314
Atlantic Rim (Brown Cow Pod)**	12	37	12	0.63	8
Totals	1,308	389	956	NM	2,505

*: dormant, completed, notice of intent to abandon, and wells spud combined
**: additional Pods have been approved since the DEIS analysis
***: estimate from environmental analysis document

The total disturbance then for existing and authorized (but not yet drilled) wells is 2,505 acres plus 8,262 acres = 10,767 acres of long-term disturbance either existing or authorized. Reasonably foreseeable development for oil and gas activity within the RFO administrative area as described in the Great Divide RMP (BLM 1988a) was projected to include 1440 new wells (16,092 acres of long term disturbance) over a 20-year period (1986-2005). As stated above, 10,767 acres of disturbance are either existing or authorized within the RFO. Long-term disturbance acreage available for future, as yet unauthorized, within the RFO area would be 5,325 acres (16,092 minus 10,767).

The well pad number proposed for each alternative are detailed below. Wells that are drilled but not successful would be short term disturbance that would be completely reclaimed following plugging and abandonment. Successful wells will have short term disturbance during construction and drilling, and long term disturbance over a smaller area during the operational phase of their life.

Table 1-6 Projected Well Pads by Alternative.

Alternative	# Wells Proposed	65 % Successful # Wells	Wells in RFO (13 in RSFO)
Proposed Action	385	250	237
Alternative A	592	385	373

Table 1-7 Summary of Long Term Disturbance Proposed for Desolation Flats Project Area by Alternative.

Alternative	Acres / Well	# wells* projected	Acres Disturbance Proposed	Existing and Authorized Disturbance within RFO	Total Long Term Disturbance
Proposed Action	6.5	237	1,541	10,767	12,308
Alternative A		373	2,425		13,192

*reflects projected 65% success rate, per Table 1-6 above

The DFPA natural gas development Proposed Action and Alternative A are in conformance with management objectives provided for in the ROD and Approved Great Divide RMP (USDI-BLM 1990a), subject to implementation of prescribed mitigation measures proposed by the Operators and BLM required mitigation in Chapter 2, and mitigation measures derived through analysis of impacts in Chapter 4, Environmental Consequences.

Page 1-20, rename "Table 1-6" to "Table 1-8." Add the following to this table after the "Water Quality Division" entry:

WYOMING DEPARTMENT OF ENVIRONMENTAL QUALITY	
Air Quality Division	New Source Review (NSR) Permit: All pollution emission sources, including compressor engines and portable diesel and gas generators.

CHAPTER 2: PROPOSED ACTION AND ALTERNATIVES

2.0 Summary

Page 2-1, change the first sentence to read: "The DFPA currently contains 89 active producing wells, with accompanying production…." In the second sentence, change "63" to read "89."

2.5.2.11 Project-Wide Mitigation Measures

Page 2-32, rename "Project-Wide Mitigation Measures" to "Standard Operating Procedures and Applicant-Committed Measures."

CHAPTER 3: AFFECTED ENVIRONMENT

3.2 CLIMATE AND AIR QUALITY

Page 3-11, Replace entire Section 3.2 in DEIS with the following text:

3.2.1 Climate

The climatic conditions for the DFPA are classified as a semiarid mid-continental regime. The climate is typified by dry, windy conditions with limited precipitation and long cold winters. The nearest meteorological measurements were recorded at Baggs, Wyoming for the dates September 1979 through July 2000. The Baggs meteorological station is located approximately 14 miles east of the project area at an elevation of 6,239 feet. Due to the wide variation in elevation and topography within the project area, site specific climatic conditions may vary considerably from the conditions recorded at the Baggs station.

The recorded temperatures at the Baggs station are typically cool, with average daily temperatures ranging between 7EF and 34EF in midwinter and 45EF to 83EF during midsummer. Extreme temperatures have ranged from -50EF (January 14, 1984) to 100EF (August 18, 1984).

The annual average total precipitation is slightly greater than 11 inches. Over 68% of the average annual precipitation occurs between May and October. The annual average snowfall totals 40.5 inches, with December and January being the snowiest months at 9.6 and 8.4 inches respectively. Table 3-5 presents the average temperature range, average total precipitation and average total snowfall by month, while figures 3-2 through 3-4 show the average climatic conditions graphically.

The project area is subject to strong gusty winds, often accompanied by snow during the winter months, producing blizzard conditions and drifting snow. The nearest comprehensive wind data were collected at the Rawlins, Wyoming airport, approximately 60 miles from the project area. However, hourly wind data for the period December 1994 through November 1995 were collected near Baggs, Wyoming as part of the Mount Zirkel Wilderness Area Visibility Study. The close proximity of the Baggs station to the project area suggests that these data, rather than the more distant Rawlins data, best represents the wind conditions occurring within the project area. Figure 3-5 presents a wind rose generated from the Baggs data for the period December 1, 1994 through November 30, 1995. The wind rose depicts the relative directional frequency of the winds and the speed class. As indicated, the winds are predominately from the south to southwest approximately 37 percent of the time. The annual mean wind speed is 10.4 miles per hour (4.64 meters/second). Note that the meteorological data set used to generate the wind rose was processed with calm wind measurements set to a speed of one meter per hour. Therefore, the wind rose shows essentially no calms.

The direction and strength of the wind directly affects the dispersion and transport of pollutants emitted to the atmosphere. The strong winds typically present within the project area enhance the potential for the mixing and transport of the pollutants. Table 3-6 presents the wind speed frequency distribution while Table 3-7 summarizes the wind direction frequency.

The Proposed Action and alternatives are not expected to have any measurable adverse effect on the local or regional climate. Therefore, climate is not further discussed in this document.

Table 3-5. Mean Monthly Temperature Range, Total Precipitation and Snowfall.

Month	Average Temperature Range (EFahrenheit)	Average Total Precipitation (inches)	Average Total Snowfall (inches)
January	5.1 - 32.9	0.49	8.4
February	8.6 - 36.6	0.45	5.7
March	19.9 - 47.3	0.44	5.2
April	27.4 - 58.3	0.88	2.5
May	34.2 - 67.7	1.64	0.2
June	41.2 - 79.0	0.98	0.0
July	47.6 - 85.6	1.46	0.0
August	46.1 - 83.7	0.97	0.0
September	37.7 - 74.2	1.15	0.0
October	26.8 - 61.0	1.46	2.0
November	16.6 - 43.5	0.71	6.9
December	6.5 - 33.8	0.55	9.6
Annual Average	26.5 - 58.6	11.19	40.5

Table 3-6. Wind Speed Frequency Distribution.

Wind Speed (miles per hour)	Percentage of Occurrence
0.0 to 4.0	6.6
4.0 to 7.5	33.2
7.5 to 12.1	29.6
12.1 to 19.0	21.8
19.0 to 24.7	5.8
Greater than 24.7	3.1

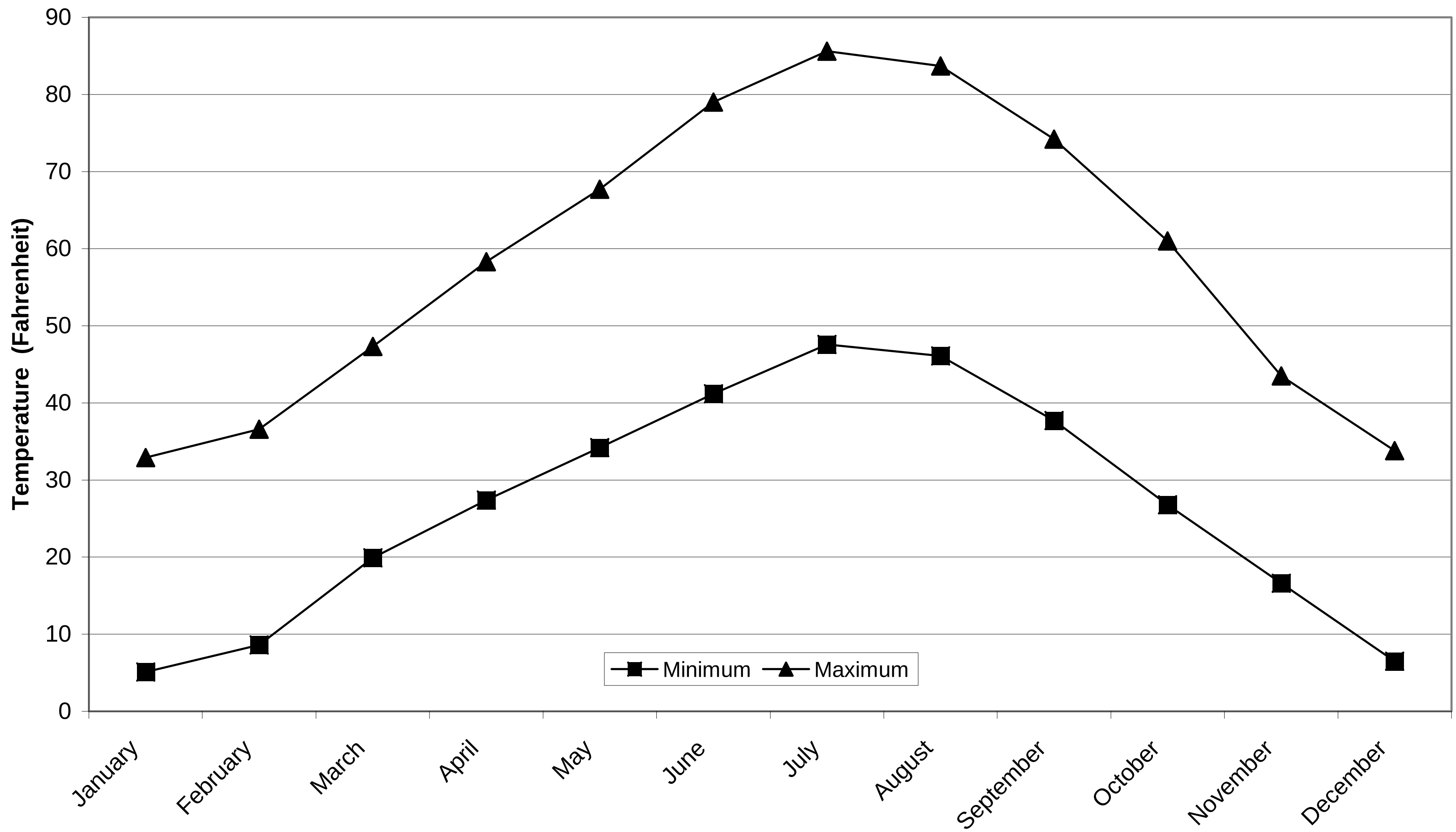


Figure 3-2 Monthly Average Temperatures at Baggs, Wyoming (1979 - 2000)

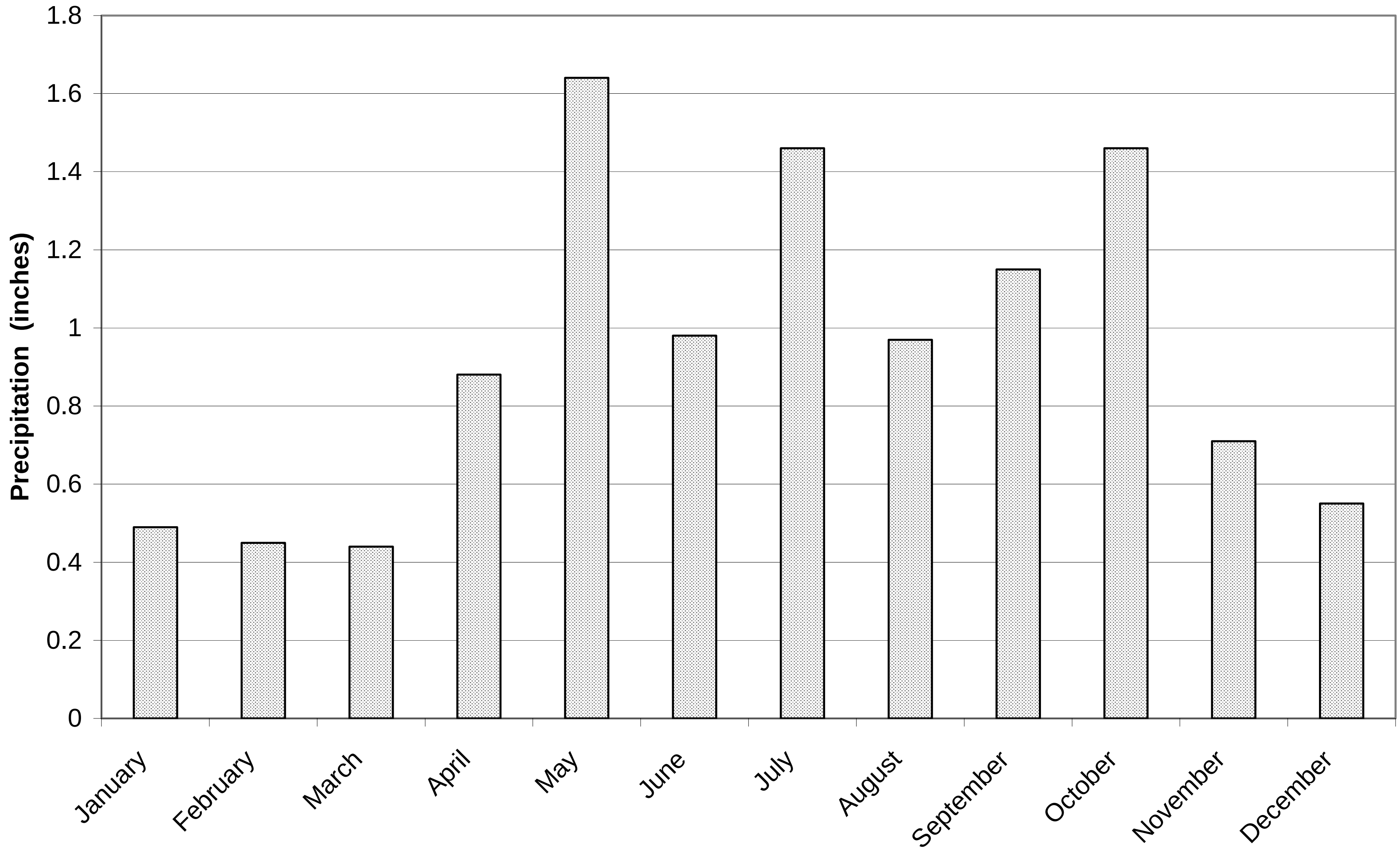


Figure 3-3 Monthly Average Precipitation at Baggs, Wyoming (1979 - 2000)

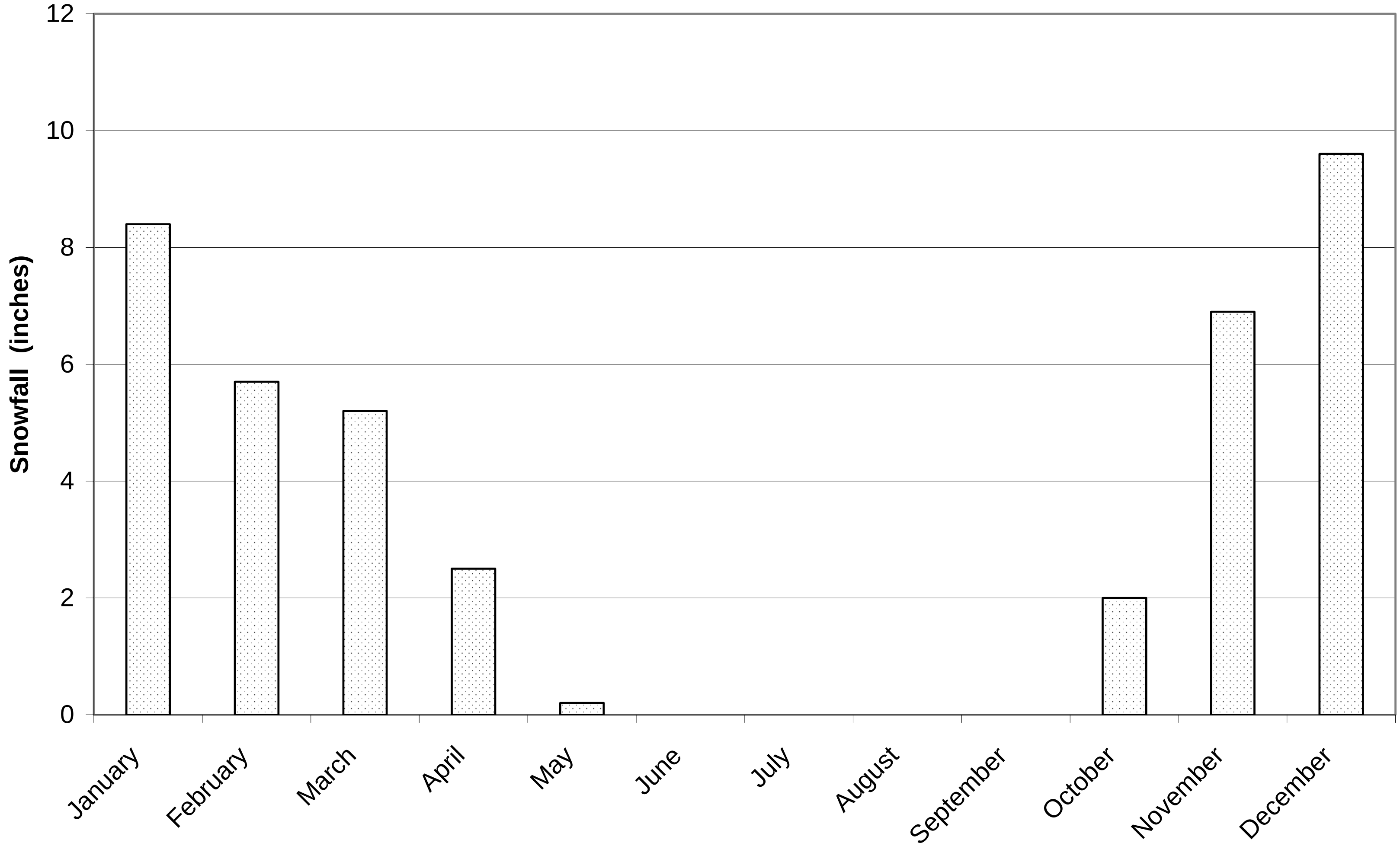


Figure 3-4 Mean Monthly Average Snowfall at Baggs, Wyoming (1979 - 2000)

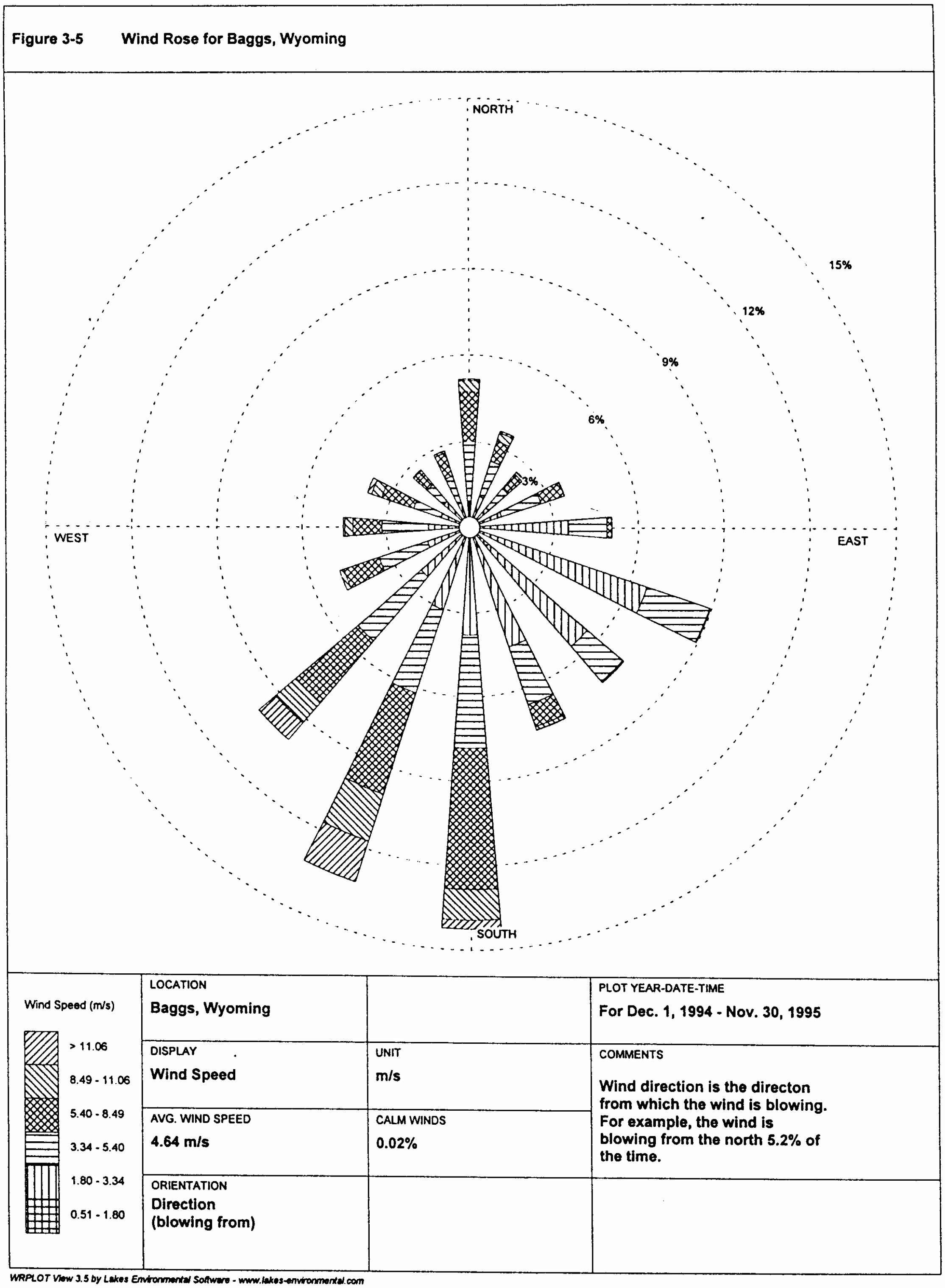


Figure 3-5. Baggs, Wyoming Wind Rose for December 1, 1994 to November 30, 1995.

Table 3-7. Wind Direction Frequency.

Direction From Which Wind Is Blowing	Percentage of Occurrence
North	5.2
North Northeast	3.6
Northeast	2.6
East Northeast	3.6
East	5.0
East Southeast	9.0
Southeast	7.2
South Southeast	7.5
South	14.2
South Southwest	13.2
Southwest	10.0
West Southwest	4.9
West	4.5
West Northwest	3.9
Northwest	2.7
North Northwest	2.8

3.2.2 Air Quality

National and state ambient air quality standards set acceptable limits for criteria air pollutant concentrations. Although specific air quality monitoring has not been conducted within the project area, criteria pollutant background concentrations measured in the region are in attainment with the National, Wyoming and Colorado ambient air quality standards, indicating that the local air quality is good. Table 3-8 presents the measured background concentrations and the ambient air quality standards.

Incremental increases in the ambient concentration of criteria pollutants are regulated under the Prevention of Significant Deterioration (PSD) program. The project and the majority of the surrounding region are classified as PSD Class II. However, five PSD Class I areas identified as sensitive receptors were analyzed for this study: Bridger Wilderness, Fitzpatrick Wilderness, Savage Run Wilderness, Mount Zirkel Wilderness, and Rawah Wilderness. In addition, three PSD Class II sensitive receptor areas were analyzed: Wind River Roadless Area, Popo Agie Wilderness Area and Dinosaur National Monument. Several PSD Class I areas were not considered in the analysis due to their great distance from the project area. The excluded areas include Yellowstone, Grand Teton, and Rocky Mountain National Parks, Washakie Wilderness, Teton Wilderness and North Absaroka Wilderness. As shown in Table 3-8, the limitations on the incremental increases in pollutant concentrations are very restrictive for PSD Class I areas as compared to Class II areas. Figure 3-6 presents a map of the air quality study area and indicates the location of the DFPA and the identified sensitive PSD Class I and Class II areas.

It should be noted that any comparisons made to the PSD Class I and II increments for this analysis are intended to evaluate an “impact threshold” and do not represent a regulatory PSD increment consumption analysis. The determination of PSD increment consumption is a state air quality regulatory agency responsibility with oversight from the Environmental Protection Agency (EPA). A PSD increment consumption analysis is part of the major New Source Review process and may also be performed by a state regulatory agency or EPA in order to determine minor source increment consumption.

In addition to ambient air quality standards and PSD increments, Air Quality Related Values (AQRVs), which include the potential air pollution effects on visibility and the acidification of surface water bodies, is a concern for the sensitive PSD Class I and Class II receptors. Visibility is often referred to in terms of atmospheric light extinction or visual range, the furthest distance a person can see a landscape feature. Visibility also involves how well scenic landscapes can be seen and appreciated. When visibility is impaired by air pollution, people perceive a loss of color, contrast and detail.

Visibility impairment is frequently expressed in terms of deciview (dv). The deciview index was developed as a linear perceived visual change. A change in visibility of 1.0 dv represents a “just noticeable change” by the average person under most circumstances. Increasing deciview values represent proportionately larger perceived visibility impairments. The Forest Service (FS) has identified specific “Level of Acceptable Change” (LAC) values which they use to evaluate potential air quality impacts within their wilderness areas (USDA-FS 1993). For visibility impacts, the FS utilizes a LAC of 0.5 deciview, or “one-half of a just noticeable change.”

Continuous visibility related background data collected as part of the Interagency Monitoring of PROtected Visual Environments (IMPROVE) program are available for two sensitive receptors within the study area: Bridger Wilderness and Mt. Zirkel. The Bridger data best represent existing conditions at the Bridger, Fitzpatrick, and Popo Agie wilderness areas and the Wind River Roadless Area, while the Mt. Zirkel data best represent existing conditions for Dinosaur National Monument and the Mt. Zirkel, Savage Run, and Rawah wilderness areas.

Five year rolling averages of the 20% cleanest, 20% haziest and the mid-range 40% to 60% visibility conditions (reconstructed from aerosol measurements) as monitored at Bridger Wilderness and Mount Zirkel Wilderness (IMPROVE 2003) are presented in Figures 3-7 and 3-8. As shown, monitored visibility conditions at Bridger and Mount Zirkel Wilderness Areas have been stable, neither improving nor degrading over the monitoring period.

Table 3-9 summarizes the seasonal 20% best visibility conditions as reconstructed from aerosol measurements recorded at Bridger and Mount Zirkel Wilderness areas. The standard visual ranges for the two areas are charted in figure 3.9. As shown, visibility conditions for the areas are very good, with the best conditions (greatest SVR) occurring at Bridger Wilderness. The best visibility conditions typically occur during the fall and winter months when aerosol concentrations are at a minimum.

For assessing visual impacts, background conditions consistent with the 1995 emission inventory date were utilized. Details concerning these data are presented in the Near- and Far-Field Ambient Air Quality Technical Report (BLM 2004).

Table 3-8. Background Concentrations and Ambient Air Quality Standards (:g/m^3).

Pollutant and Averaging Time	Measured Background Concentration	Wyoming Ambient Air Quality Standards	Colorado Ambient Air Quality Standards	National Ambient Air Quality Standards	PSD Class I Increment	PSD Class II Increment
Carbon Monoxide (CO)						
CO 1-hr	2,299 [a]	40,000	40,000	40,000	None	None
CO 8-hr	1,148 [a]	10,000	10,000	10,000	None	None
Nitrogen Dioxide (NO_2)						
NO_2 Annual	3.4 [b]	100	100	100	2.5	25
Ozone (O_3)						
O_3 1-hr	169 [c]	235	235	235	None	None
O_3 8-hr *	147 [c]	157	157	157	None	None
Particulate Matter less than 10 microns (PM_{10})						
PM_{10} 24-hr	47 [d]	150	150	150	8	30
PM_{10} Annual	16 [d]	50	50	50	4	17
Particulate Matter less than 2.5 microns ($PM_{2.5}$)						
$PM_{2.5}$ 24-hr *	15 [d]	None	None	65	None	None
$PM_{2.5}$ Annual*	5 [d]	None	None	15	None	None
Sulfur Dioxide (SO_2)						
SO_2 3-hr	29 [e]	1,300	700	1,300	25	512
SO_2 24-hr	18 [e]	260	365	365	5	91
SO_2 Annual	5 [e]	60	80	80	2	20

Note: ***** Effective February 27, 2001 the U.S. Supreme Court upheld the EPA's position on the proposed national 8-hr ozone and PM2.5 standards. The WDEQ-AQD will not enforce these standards until EPA issues an implementation rule. Therefore no demonstration of compliance with these standards is required at this time.

Sources:

a. CDPHE, 1996 - Data collected at Rifle and Mack, Colorado in conjunction with proposed oil shale development during early 1980s.

b. ARS, 2002 - Data collected at Green River Basin Visibility Study site, Green River, WY during the period January - December 2001.

c. WDEQ-AQD - Data collected at Green River Basin Visibility Study site, Green River, Wyoming during the period June 10, 1998 through December 31, 2001.

d. WDEQ-AQD, 2002 - Data collected by WDEQ at Emerson Building, Cheyenne, WY, Year 2002.

e. CDPHE-APCD, 1996 - Data collected at the Craig Power Plant site and at Colorado Oil Shale areas from 1980 to 1984.

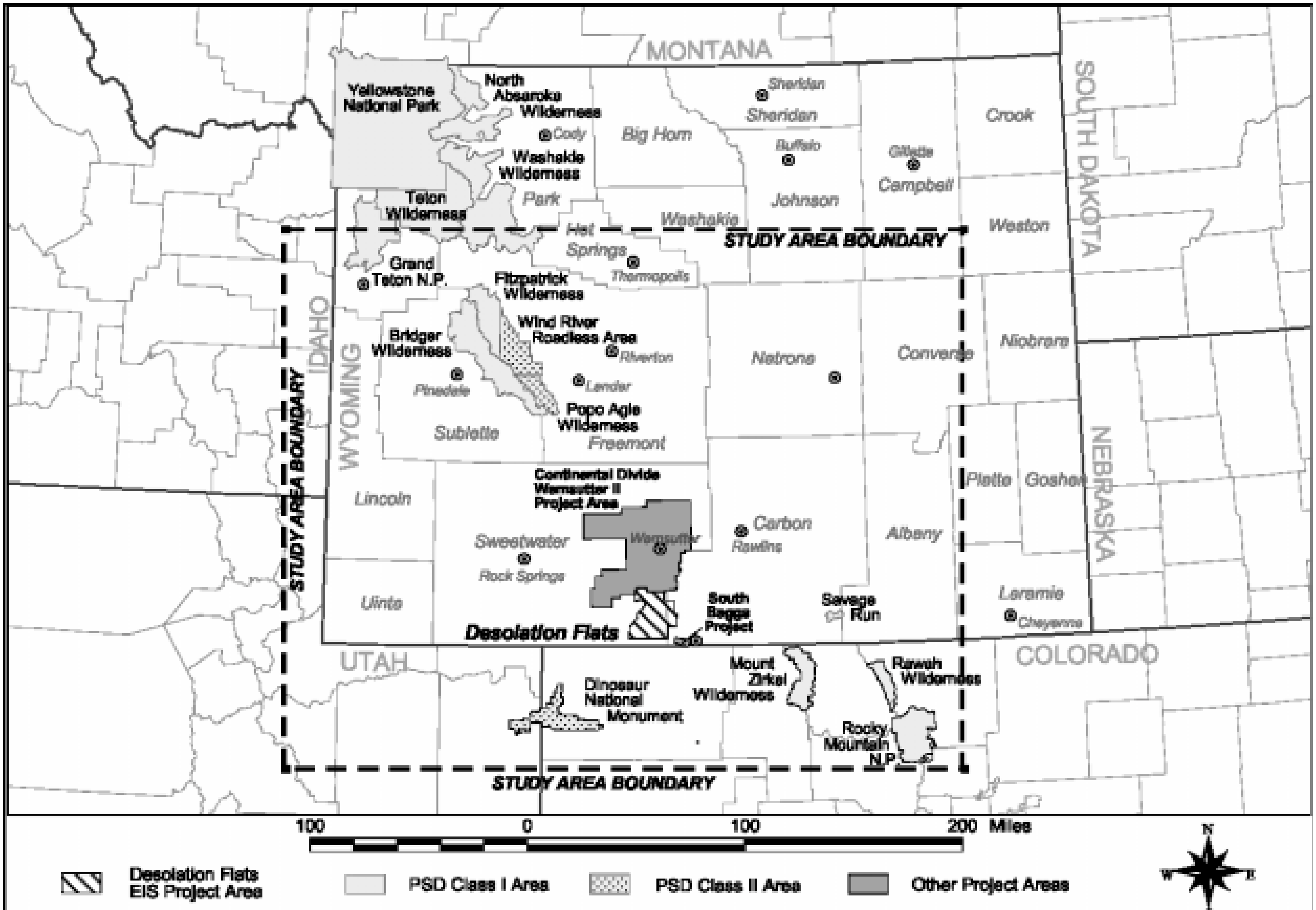


Figure 3-6. Air Quality Assessment Area

Table 3-9. Bridger Wilderness and Mount Zirkel Wilderness 20% Best Visibility Conditions.

Wilderness Area	Month	Standard Visual Range (kilometers)	Deciview (Unitless)
Bridger Wilderness	January	284	3.2
	February	287	3.1
	March	287	3.1
	April	224	5.6
	May	224	5.6
	June	231	5.3
	July	211	6.1
	August	211	6.1
	September	205	6.5
	October	282	3.3
	November	273	3.6
	December	275	3.5
Mount Zirkel Wilderness	January	254	4.3
	February	254	4.3
	March	258	4.1
	April	212	6.1
	May	210	6.2
	June	217	5.9
	July	204	6.5
	August	199	6.7
	September	197	6.9
	October	278	3.4
	November	274	3.6
	December	274	3.6

Note: Standard Visual Range and Deciview values were reconstructed utilizing quarterly aerosol concentrations representative of the 20% best visibility conditions in conjunction with monthly f(Rh) values as published in appendix A-2 of Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule. Aerosol concentrations provided by Scot Copeland, USFS, October 2003. Bridger Wilderness aerosol concentrations based upon monitored conditions for the period 1988 through 2002. Mount Zirkel concentrations based upon monitored conditions for the period 1995 through 2002.

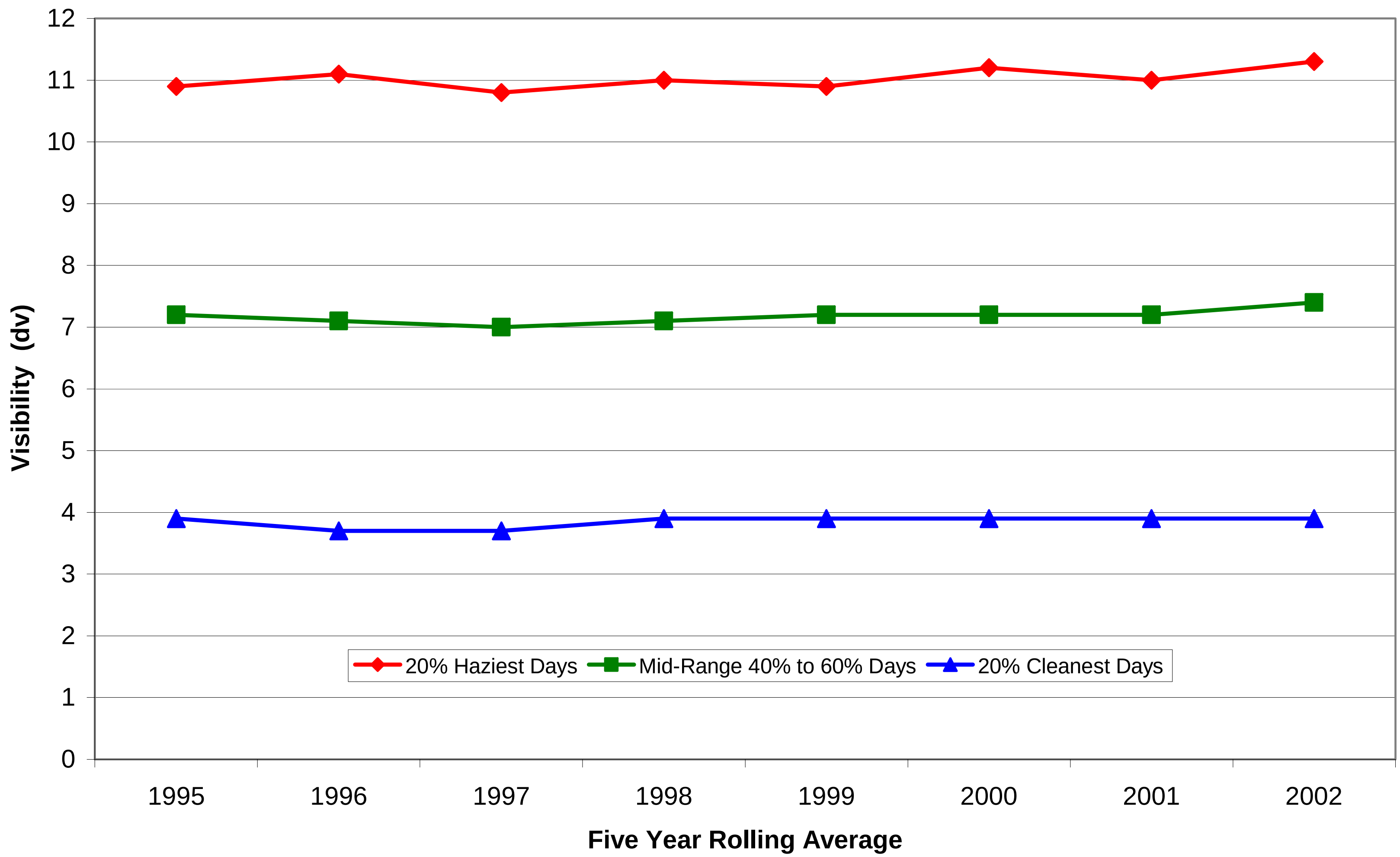


Figure 3-7. 5 Year Average Visibility Conditions At Bridger Wilderness.

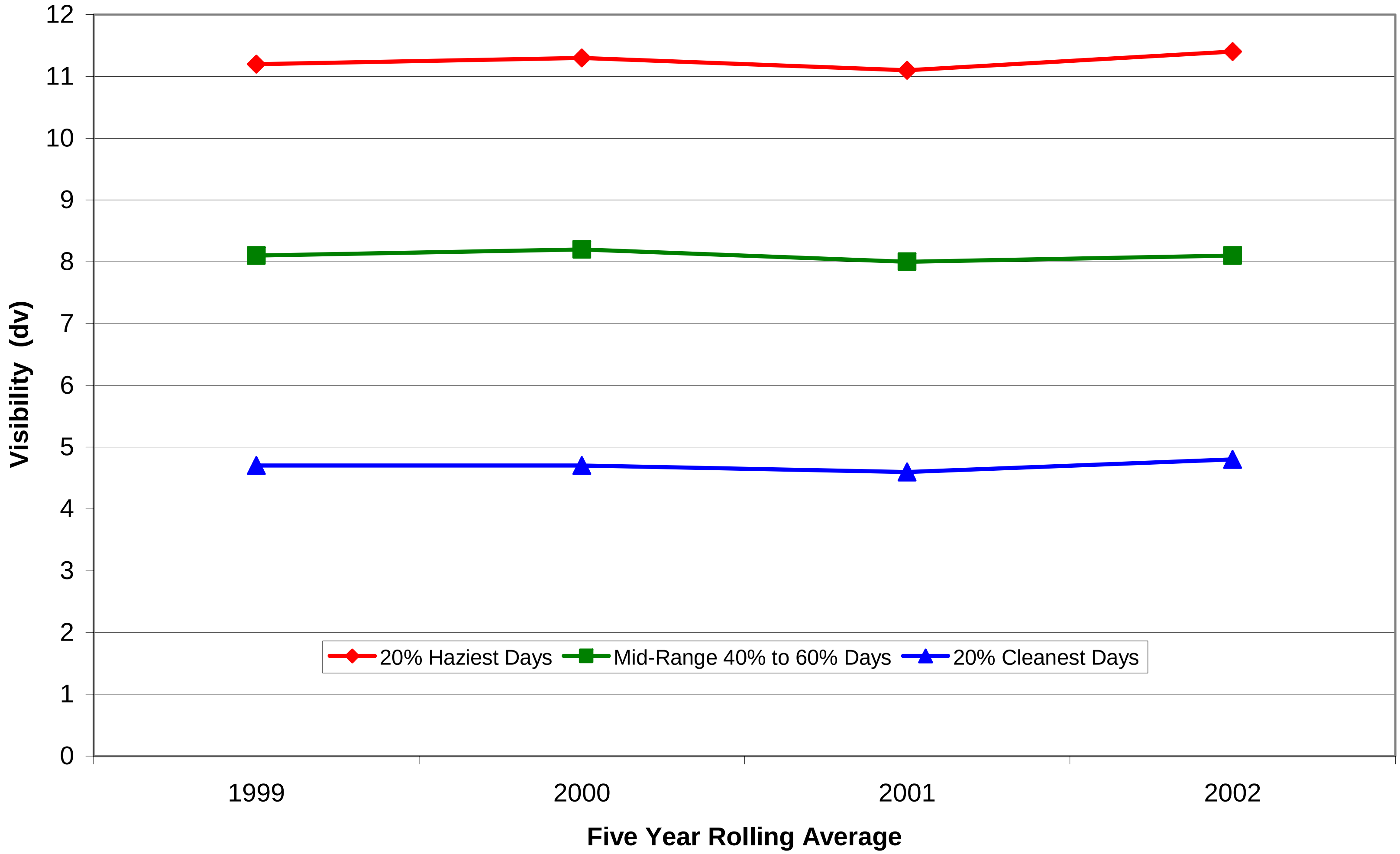


Figure 3-8. 5 Year Average Visibility Conditions At Mount Zirkel Wilderness.

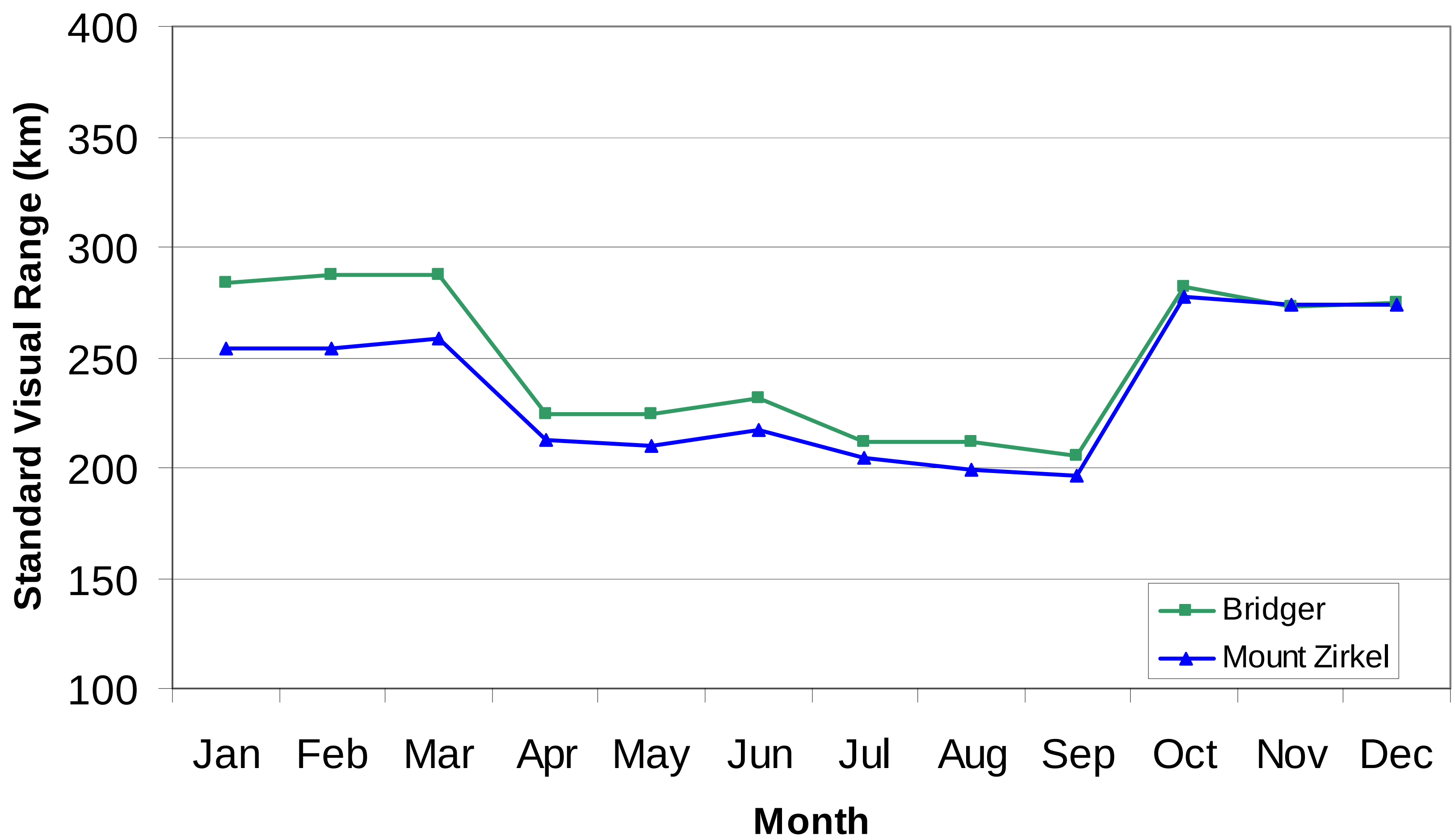


Figure 3-9. Seasonal Reconstructed 20% Best Visibility Conditions (with Rayleigh Scattering)

Atmospheric deposition and the acidification of surface water bodies is a concern for sensitive lakes located within wilderness areas. Atmospheric deposition is monitored as part of the National Acid Deposition Program / National Trends Network near Pinedale, Wyoming. Although the monitored deposition values are well below those considered to damage vegetation (USDI-BLM 1996b), even low levels of atmospheric deposition may exceed the acid neutralizing capacity (ANC) of sensitive high mountain lakes (USDI-BLM 1996b). Background ANC levels for monitored mountain lakes within the study area are provided in Table 3-10.

To evaluate potential atmospheric deposition impacts, the FS utilizes an LAC of no greater than 1 microequivalent/liter (:eq/l) change in ANC for sensitive water bodies with existing ANC levels less than 25 :eq/l. A 10 percent change in ANC is considered significant for lakes with existing ANC levels over 25 :eq/l.

Table 3-10. Background Acid Neutralizing Capacity (ANC) for Monitored Lakes.

Wilderness Area	Water Body	Background ANC (µeq/l)
Bridger	Black Joe Lake	69.0 [a]
	Deep Lake	61.0 [a]
	Hobbs Lake	68.0 [a]
	Upper Frozen Lake	5.7 [b]
Fitzpatrick	Ross Lake	61.4 [a]
Popo Agie	Lower Saddlebag Lake	55.5 [a]
Mount Zirkel	Pothole A-8	16.0 [d]
	Seven Lakes	35.5 [d]
	Upper Slide Lake	24.7 [d]
Medicine Bow	West Glacier	26.1 [c]
Rawah	Island Lake	64.6 [a]
	Rawah #4 Lake	41.2 [a]

Note: The basis for ANC data is the 10th percentile of measurements at the lake outlet when greater than 5 years of data exist. When 5 or less years of data are available, average values are used.

Sources:
a. D. Haddow, USDA-FS, 2001.
a. T. Svalberg, USDA-FS, 2000.
b. R. Musselman, USDA-FS, 2001.
c. A. Mast, USGS, 2001.

3.5.1 General Vegetation

Page 3-49, first paragraph, third line. Change “22 species” to “24 species.”

Page 3-49. Replace Table 3-17 with the following Table 3-17.

Table 3-17. Designated Noxious Weeds and Prohibited Noxious Weeds (Wyoming Weed & Pest Control Act).

Scientific Name	Common Name
Agropyron repens	Quackgrass
Arctium minus	Common burdock
Cardaria draba, C. pubescens	Hoary cress, whitetop
Carduus acanthoides	Plumeless thistle
Carduus nutant	Musk thistle
Centaurea diffusa	Diffuse knapweed
Centaurea maculosa	Spotted knapweed
Centaurea repens	Russian knapweed
Chrysanthemum leucanthemum	Ox-eye daisy
Cirsium arvense	Canada thistle
Convolvulus arvensis	Field bindweed
Cynoglossum officinale	Houndstongue
Euphorbia esula	Leafy spurge
Franseria discolor	Skeletonleaf bursage
Hypericum perforatum	Common St. Johnswort
Isatis tinctoria	Dyers woad
Lepidium latifolium	Perennial pepperweed
Linaria dalmatica	Dalmatian toadflax
Linaria vulgaris	Yellow toadflax
Lythrum salicaria	Purple loosestrife
Onopordum acanthium	Scotch thistle
Sonchus arvensis	Perennial sowthistle
Tamarisk spp.	Salt cedar
Tanacetum vulgare	Common Tansy

Page 3-49, add the following text after Table 3-17:

A component of Wyoming's semiarid rangelands, especially in the Wyoming big sagebrush cover type, are the biological soil crusts that occupy most of the open space not occupied by vascular plants. Biological soil crusts predominantly are composed of cyanobacteria (formerly blue-green algae), green and brown algae, mosses, and lichens. Liverworts, fungi, and bacteria can also be important components. Because they are concentrated in the top 1-4 mm of soil, they primarily affect processes that occur at the soil surface or soil-air interface, including soil stability, decreased erosion potential, atmospheric N-fixation, nutrient contributions to plants, soil-plant-water relations, infiltration, seeding germination, and plant growth. Crusts are well adapted to severe growing conditions, but poorly adapted to compressional disturbances such as trampling by humans and livestock, wild horses, wildlife, or vehicles driving off roads. Disruption of the crusts decreases organism diversity, soil nutrients, stability, and organic matter (Belnap *et al*. 2001).

3.5.2 Waters of the United States, Including Wetlands

Page 3-50, Delete the 4th paragraph on page 3-50 starting with "Wyoming General …"/

3.8.1 Threatened, Endangered or Proposed for Listing Species of Plants, Wildlife, and Fish

Page 3-65, Table 3-21, delete the Mountain Plover entry from the table.

3.8.1.1 Wildlife Species

Page 3-67/68, move the text regarding the Mountain Plover into section 3.8.2 at the end of the **Birds** discussion on page 3-71.

3.8.2 Sensitive Plant, Wildlife, and Fish Species

Page 3-73, Table 3-22, add the following entry into the table under "Birds":

Mountain Plover	Charadrius montanus	G2/S2B, SZN	Present

3.9 Recreation

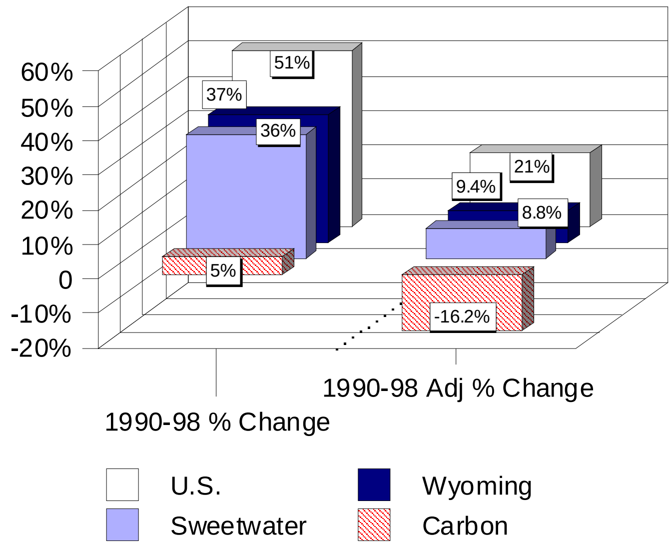
Page 3-75, first paragraph, change both "small" (fourth sentence) and "limited" (fifth sentence) to "moderate."

3.12.2.3 Earnings (replace entire section, page 3-89 and 3-90)

Sweetwater County earnings by place of work increased from $633 million in 1990 to $858 million in 1998, a 36 percent increase over the 8 year period (WDAI 2000b). Carbon County earnings increased from $202 million to $211 million during this period, a 5 percent increase. These increases compare to a 37 percent increase in earnings for the State of Wyoming during this period, and a 51 percent increase for the United States as a whole (Figure 3-17). However, when adjusted for inflation, Sweetwater County earnings increased by 8.7 percent from 1990 to 1998, and Carbon County earnings decreased by16.2 percent from their 1990 level. These inflation-adjusted earnings compare to increases of 9.4 percent for the State of Wyoming and 21 percent for the U.S. during this period.

Oil and gas earnings increased 81 percent in Sweetwater County between 1990 and 1998, from $63.7 million to $115 million. When adjusted for inflation, Sweetwater County oil and gas earnings increased 45 percent. Recent Carbon County oil and gas earnings are not disclosed because of the small number of companies in the industry.

Figure 3-21. Change in Total Earnings 1990 - 1998: Carbon County, Sweetwater County, Wyoming and the U.S. (Current and Inflation Adjusted Dollars)



CHAPTER 4: ENVIRONMENTAL CONSEQUENCES

4.2 AIR QUALITY

Page 4-7, Replace entire Section 4.2 in DEIS with the following text:

4.2.1 Introduction

4.2.1.1 Scoping Issues

In recent years, the development of mineral resources throughout Wyoming has heightened the public's awareness of air quality. A number of public comments concerning air quality issues were received during the scoping process and are summarized below.

1. Operators should obtain permits and apply Best Available Control Technology (BACT) to all sources of volatile organic compounds (VOC) and hazardous air pollutants (HAP), including sources with emissions below the control thresholds currently set by Wyoming Department of Environmental Quality - Air Quality Division (WDEQ-AQD) policy.

2. Additional air quality monitoring stations should be installed near major sources within the project area to ensure compliance with state and National Ambient Air Quality Standards (NAAQS). This monitoring should include both criteria and hazardous air pollutants.

3. Concerns that prescribed burns may affect air quality monitoring results should be addressed.

4. The public and operator employees should be informed of the risks associated with potential exposure to HAP.

5. Concerns with potential cumulative impacts of atmospheric pollution on Class I wilderness areas should be addressed.

6. Options for off-site mitigation to improve overall air quality in southwest Wyoming should be investigated.

7. The Desolation Flats air quality impact analysis should be tiered off of the previous Continental Divide/Wamsutter II, South Baggs and Pinedale Anticline analyses.

4.2.1.2 Assessment Protocol

An Air Quality Assessment Protocol was developed which proposed the methodologies for quantifying potential air quality impacts from the proposed project and surrounding developments. The criteria for evaluating the significance of the potential air quality impacts were also addressed in the protocol. The protocol was prepared with input from the BLM, State of Wyoming, US Forest Service, and United States EPA Region VIII in conjunction with the project proponents, thereby ensuring that the assessment methodology was technically sound.

In determining the protocol for this assessment, the consensus was to perform a single impact analysis for Alternative A. As proposed, Alternative A provides for an increased well density and production capacity beyond that described in the Proposed Action. Under Alternative A, 592 gas wells would be developed at 555 locations, with a forecasted success rate of 65 percent resulting in 385 producing wells. The producing wells would be supported with six compressor stations and two gas processing plants. Compression and processing requirements for Alternative A are estimated at 32,000 horsepower. The analysis of Alternative A represents an estimate of the maximum impacts that may occur. Potential air quality impacts resulting from the implementation of the Proposed Action and the No Action alternatives would be less than the impacts that may result from the implementation of Alternative A.

4.2.2 Impact Significance Criteria

In order to evaluate potential air quality impacts, a scale of measurement or significance criteria must be defined. For this analysis, potential impacts to air quality are considered to be significant if project related emissions cause:

$ A violation of Wyoming (WAAQS), Colorado (CAAQS) or national ambient air quality standards (NAAQS); or

$ An Exceedance of the PSD increments for Class I or Class II areas; or

$ Toxic pollutant concentrations that exceed the acute (1-hour) Reference Exposure Levels (REL) or chronic (annual) Reference Concentrations (RfC); or

$ A lifetime incremental increase in cancer risk of one additional incident per million exposures; or

- Visibility impacts to sensitive areas above the 1.0) dv (change in deciview) threshold; or

- Changes in sensitive lake ANC greater than the designated LAC. For sensitive water bodies with existing ANC levels less than 25 :eq/l, the LAC is no greater than 1 :eq/l. A 10 percent change in ANC is considered significant for lakes with existing ANC levels greater than 25 :eq/l.

4.2.3 Direct and Indirect Impacts

Three primary levels of modeling (sub-grid, near-field, and far-field) were used to characterize air quality impacts. Sub-grid modeling was conducted to predict impacts in the immediate vicinity of individual sources (i.e., individual wells and compressor stations) for comparison to state and federal ambient air quality standards and PSD Class II increments. Sub-grid modeling was also utilized to predict hazardous air pollutant concentrations and incremental cancer risks resulting from project related sources. Near-field modeling was conducted to predict impacts within the Desolation Flats project area and 30 miles (50 kilometers) beyond its boundaries. The results of the near-field modeling were compared to state and federal air quality standards and PSD Class II increments. Far-field modeling was used to predict impacts to ambient air quality, PSD Class I increments and Air Quality Related Values (visibility and atmospheric deposition) at eight sensitive areas. Table 4-3 lists the analyzed sensitive areas, the agency responsible for their management, and the average distance from the project area. It should be noted that all comparisons with PSD increments are intended only to evaluate a level of concern and do not represent a regulatory PSD increment consumption analysis. PSD increment consumption analyses are applied to large industrial sources and are solely the responsibility of the State and the Environmental Protection Agency.

Sub-grid modeling was performed using the Industrial Source Complex (ISCST3) model to assess impacts of individual wells and multiple wells in combination with compression stations at distances of up to 4 kilometers (km) from the source. ISC is a Gaussian model that assumes instantaneous straight line transport of pollutants from the source to the receptor. In general, 100 meter grid spacing was used for the sub-grid modeling.

Near-field modeling was performed using the CALPUFF set of models (CALMET, CALPUFF, and CALPOST). The CALPUFF models are Lagrangian puff models that allow for wind meander and long range transport of pollutants. The Near-field modeling was performed for distances out to 50 km from the project area boundary. A 4 km grid spacing was used for the near field modeling.

Far-field modeling was also performed with the CALPUFF set of models for the entire modeling domain of 400 km (north-south) by 500 km (east-west). A four km receptor grid spacing was used throughout the modeling domain (12,500 receptors) supplemented with an additional 401 receptors located at the boundaries and within the eight sensitive areas and an additional twelve receptors located at the sensitive lakes evaluated for atmospheric deposition. Figure 4-1 presents the near- and far-field domains along with the sensitive receptor areas.

Meteorological data used in the ISC model were collected at the South Baggs station in 1995. For CALPUFF, the meteorological input utilized a 1995 meso-scale MM5 simulation as the initial wind field. The MM5 wind field was refined utilizing terrain and land use data along with surface and upper air meteorological data collected at National Weather Service sites in 1995 throughout the region.

In addition to the sub-grid, near-field and far-field analyses, a fourth modeling methodology was used to assess the impacts of vehicles traveling on unpaved support roads. The CALINE4 model was used with hypothetical screening meteorology coupled with traffic volumes determined as part of the emissions estimates.

Table 4-2. Analyzed Sensitive Areas

Sensitive Area	Managing Agency	Average Distance From Project Area (miles/km)	Direction From Project Area
Bridger Wilderness (Class I)	US Forest Service	140 / 225	NW
Fitzpatrick Wilderness (Class1)	US Forest Service	155 / 250	NW
Popo Agie Wilderness (Class II)	US Forest Service	115 / 185	NW
Wind River Roadless Area (Class II)	US Forest Service	135 / 220	NW
Dinosaur National Monument (Class II)	National Park Service	65 / 105	SW
Savage Run Wilderness (Class I)	US Forest Service	85 / 140	E
Mount Zirkel Wilderness (Class I)	US Forest Service	75 / 120	ESE
Rawah Wilderness (Class I)	US Forest Service	110 / 180	ESE

A fifth modeling methodology was used to assess the potential contribution of VOC emissions to regional ozone concentrations. A simplified Reactive Plume Model (RPM II) screening methodology developed by the EPA (Scheffe 1988) was utilized for the analysis. The Scheffe methodology uses the ratio of VOC to NO_X emissions and the magnitude of the VOC emissions to evaluate potential ozone contribution of point sources. The methodology is a commonly used screening method and is considered very conservative.

4.2.3.1 Alternative A

4.2.3.1.1 Emission Inventory for Alternative A Project Related Sources

An air emission inventory was developed for all sources proposed under Alternative A. The inventory estimated emissions for five criteria pollutants; oxides of nitrogen (NO_X), SO_2, CO, particulate matter less than 10 microns (PM_{10}), and VOC. The inventory also estimated HAP emissions for six compounds including benzene, toluene, ethylbenzene, and total xylenes (collectively called BTEX), normal-hexane (n-hexane), and formaldehyde.

Project related activities evaluated in the emission inventory included:

- construction emissions, including well pad and resource road construction;
- well drilling, completion and testing;
- wind erosion of disturbed areas;
- well production emissions, and
- gas compression and processing.

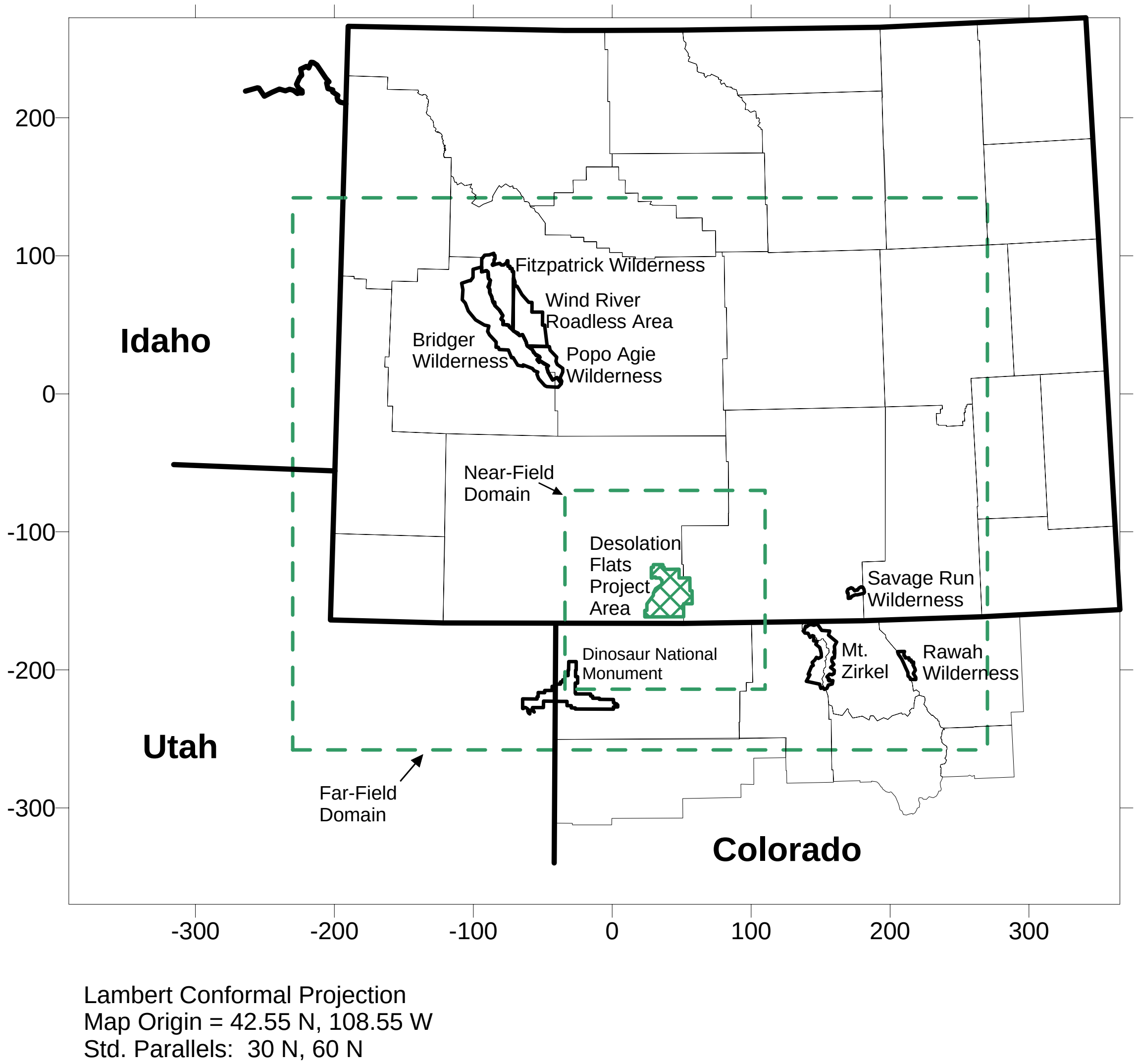


Figure 4-1. Modeling Domains and Sensitive Receptor Areas.

Specific details of the emission inventory are documented in the Air Quality Technical Report. A summary of the emission inventory follows.

Well Development Emissions

Air emissions result from three sequential well development activities: well pad and resource road construction, well drilling, and well completion. Emissions for both regulated pollutants and HAP were estimated for each activity as applicable.

Well pad and resource road construction consists of the clearing, grading, and construction of the road and well pad. The emissions sources associated with these activities include fugitive dust emissions from travel on unpaved roads, heavy construction operations, and tailpipe emissions from mobile sources used in the construction process. It was assumed that controls for these sources would include watering on the well pad and service roads during well pad and resource road construction to control emissions of particulate matter. The watering control efficiency was assumed to be 50 percent.

Well drilling consists of rigging-up, drilling, and rigging-down. The emissions sources associated with well drilling include fugitive dust emissions from travel on unpaved roads and tailpipe emissions from mobile sources such as heavy duty diesel engine powered trucks and drill rigs used in the drilling process. Particulate matter is assumed to be controlled by watering the unpaved roads, with a control efficiency of 50 percent.

Well completion includes the perforation and stimulation of the producing formations and flow testing. The emission sources associated with well completion include fugitive dust emissions from travel on unpaved roads, tailpipe emissions from mobile sources and flaring of natural gas for well evaluation. Particulate matter is assumed to be controlled by watering the unpaved roads, with a control efficiency of 50 percent.

The water application rate necessary to achieve the assumed 50% fugitive dust control efficiency was estimated. As calculated in accordance with a published EPA methodology (EPA 1988), a daily application rate of 0.02 gallons of water per square yard, or 366 gallons per mile of road, should provide a fugitive dust control efficiency of 50% for this project. Climatic data indicate that natural precipitation would provide adequate water to achieve a 50% control efficiency between 40 to 90 days per year.

Both short-term maximum (hourly) and long-term (annual) emissions were estimated for construction operations. For the calculation of short-term emissions, the consecutive nature of these activities was taken into account. During a one-hour period at any given well, only one of the three development activities; road construction, drilling, or completion, would be taking place. Therefore, short-term emissions were calculated as the single maximum hourly emission rate from each of the three development activities. Long-term well development emissions were estimated on an annual basis assuming a development rate of 45 wells per year. Typically, each constructed well would undergo all three development activities; construction, drilling, and completion, over the course of a year. Therefore, long-term emissions were calculated as the sum of the emissions from the three development activities.

Well Production Emissions

Emissions to the atmosphere result primarily from three aspects of gas production: three-phase separation, triethylene glycol (TEG) dehydration, and condensate storage. The emissions of both criteria pollutants and HAP were estimated for each process as applicable.

At each well, a natural gas-fired three-phase separator heater, rated at 750,000 BTU per hour, will operate an average of 15 minutes per hour throughout the year. In addition, a glycol regeneration heater, rated at 250,000 BTU per hour, is assumed to operate 15 minutes per hour on average throughout the year. To account for seasonal variation in heater operations, the emissions were weighted for the impact analysis. During the winter months of November through April, the heater emissions were weighted at 172% of the average rate, while the remaining summer months were weighted at 28% of the average emission rate.

VOC and HAP emissions from the glycol dehydration system were estimated using Gas Research Institute's (GRI's) GlyCalc emissions estimation program. Dehydrator still vent emissions are dependent upon the produced gas composition and throughput. For this study, predicted emissions from a typical well were calculated assuming an average production rate of

1.0 MMscf/day. The inlet gas composition was estimated by averaging the gas analyses from three existing wells in the study area. HAP concentrations were conservatively estimated at the maximum concentration observed in the three existing wells. Dehydrator emissions were calculated on an individual well and a total project basis. It was assumed that no controls will be required for dehydrator still vent emissions.

Flashing emissions occur as a result of pressure differentials between the separator and the storage tank. For this study, the flashing of VOC and HAP from a condensate storage tank were estimated utilizing a HYSYM process simulation conducted for a well located near the study area. Individual well flashing emissions were based upon an average condensate production rate of two barrels per day. Since the average rate of condensate production is relatively low, it was assumed that no controls would be required for flashing emissions.

Storage tank working and breathing losses occur as a result of the filling and emptying of the storage tanks and the daily heating and cooling of the condensate which results in thermal expansion. An emission estimation program, Tanks 4.0, was utilized to calculate the storage tank emissions. For this analysis, the condensate was assumed to have an average Reid vapor pressure of 8.0. Again, an average condensate production rate of two barrels per day was assumed.

<u>Wind Erosion Emissions</u>

Wind erosion emissions were calculated for disturbed areas, such as the well pad and access roads. The wind erosion estimates were calculated based upon meteorological data measured near Baggs, Wyoming in 1995.

<u>Compression Emissions</u>

The emissions resulting from compression operations were calculated for a total of 32,000 horsepower, based upon estimated project requirements of 30,000 horsepower for gas transportation and 2,000 horsepower for gas plant processing. The type and size of the proposed compressor engines has not been determined, therefore a mixture of engine types; two-stroke and four-stroke, rich-burn and lean-burn, was assumed for the analysis. The capacity of the individual compressor units is expected to range from several hundred horsepower to greater than 1,000 horsepower. Application of state-regulated BACT was considered in estimating compression emissions. Current control technology can reduce NO_X emissions to between 0.7 and 1.5 grams per horsepower-hour (g/hp-hr). NO_X emissions were quantified at the most typical rate of 1.0 g/hp-hr, while CO and VOC emissions were quantified at 3.0 g/hp-hr and 0.5 g/hp-hr respectively. Hazardous air pollutant emission rates were estimated based on AP-42 emission factors.

Total estimated emissions for Alternative A are summarized in Table 4-3. The estimate assumes 45 wells are constructed each year and 385 wells produce a combined 385 MMscf/day of natural gas and 770 bbls/day of condensate.

4.2.3.1.2 Alternative A Sub-grid Impact Analysis

<u>Single Well Sub-grid Analysis</u>

Each phase in the development of a single well; construction, drilling, completion and production, was analyzed individually. Emissions from the well pad and the associated lease road were included in the analysis. The orientation of the lease road was rotated with respect to the prevailing winds in ten degree increments to determine the greatest impact for all potential site configurations. Table 4-4 presents the potential ambient air quality impacts for each development phase of an individual well. The maximum impact for each individual phase of operation was added to the monitored background concentrations and compared to the applicable ambient air quality standards. As presented in Table 4-5 and Figure 4-2, potential impacts for a single well would not cause an exceedance of the state or federal ambient air quality standards. The predicted well development impacts are also below the Class II PSD increments as shown in Table 4-6.

Table 4-3. Annual Project Emissions

Air Pollutant	Project Emissions (tons/year)			
	Well Construction and Development [1]	Well Production [2,3]	Gas Compression and Processing [4]	Total Project Emissions
NO_X	721.3	41.5	309.0	1,072
CO	198.7	10.9	927.0	1,137
VOC	26.2	14,755	154.5	14,936
SO_2	12.2	-	-	12.2
PM_{10}	236.2	51.4	6.8	294
Benzene	-	360.3	0.6	361
Toluene	-	902.7	0.2	903
Ethylbenzene	-	474.5	-	475
Xylenes	-	624.8	0.1	625
n-Hexane	0.1	31.6	-	31.7
Formaldehyde	0.1	0.03	46.3	46.4

[1] Assumes 45 wells are constructed and developed per year
[2] Assumes 385 gas wells are producing 385 MMscf/day and 770 bbls/day of condensate
[3] Well production emissions include wind erosion
[4] Assumes total compression and processing requires 32,000 hp

Table 4-4. Ambient Air Quality Impacts Adjacent to a Single Well

Pollutant	Averaging Period	Construction Impact (:g/m^3)	Drilling Impact (:g/m^3)	Completion Impact (:g/m^3)	Production Impact (:g/m^3)	Maximum Impact (:g/m^3)
NO_2	Annual	0.0026 (400 meters from well pad)	1.92 (500 meters from drill rig)	0.014 (500 meters from flare)	0.02 (500 meters from production heater)	1.92 (500 meters from rig)

CO	1-hour	22.83 (400 meters from well pad)	123.61 (500 meters from drill rig)	438.83 (500 meters from flare)	0.22 (500 meters from production heater)	438.83 (500 meters from flare)
CO	8-hour	4.00 (400 meters from well pad)	59.79 (500 meters from drill rig)	191.64 (500 meters from flare)	0.09 (500 meters from production heater)	191.64 (500 meters from flare)
SO_2	3-hour	0.83 (400 meters from well pad)	5.93 (500 meters from drill rig)	0.012 (200 meters from access road)	0	5.93 (500 meters from drill rig)
SO_2	24-hour	0.17 (400 meters from well pad)	2.29 (500 meters from drill rig)	0.0027 (200 meters from access road)	0	2.29 (500 meters from drill rig)
SO_2	Annual	0.00005 (400 meters from well pad)	0.032 (500 meters from drill rig)	0.00001 (200 meters from access road)	0	0.032 (500 meters from drill rig)
PM_{10}	24-hour	23.69 (200 meters from access road)	3.48 (400 meters from well pad)	4.99 (200 meters from access road)	0.03 (400 meters from well pad)	23.69 (200 meters from access road)
PM_{10}	Annual	0.0015 (200 meters from access road)	0.047 (400 meters from well pad)	0.012 (200 meters from access road)	0.001 (400 meters from well pad)	0.047 (400 meters from well pad)

Table 4-5. Maximum Ambient Air Quality Impacts for an Individual Well

Pollutant	**Averaging Period**	**Maximum Single Well Impact (:g/m^3)**	**Monitored Back-ground Level (:g/m^3)**	**Maximum Impact Plus Back-ground (:g/m^3)**	**National Ambient Air Quality Standard (:g/m^3)**	**Wyoming Ambient Air Quality Standard (:g/m^3)**	**Colorado Ambient Air Quality Standard (:g/m^3)**	**Percentage of Most Stringent Ambient Air Quality Standard**
NO_2	Annual	1.92	3.4	5.32	100	100	100	5%
CO	1-hour	438.83	2,299	2,738	40,000	40,000	40,000	7%
CO	8-hour	191.64	1,148	1,340	10,000	10,000	10,000	13%
SO_2	3-hour	5.93	29	34.93	1,300	1,300	700	5%
SO_2	24-hour	2.29	18	20.29	365	260	365	8%
SO_2	Annual	0.032	5	5.03	80	60	80	8%
PM_{10}	24-hour	23.69	47	70.69	150	150	150	47%
PM_{10}	Annual	0.047	16	16.05	50	50	50	32%

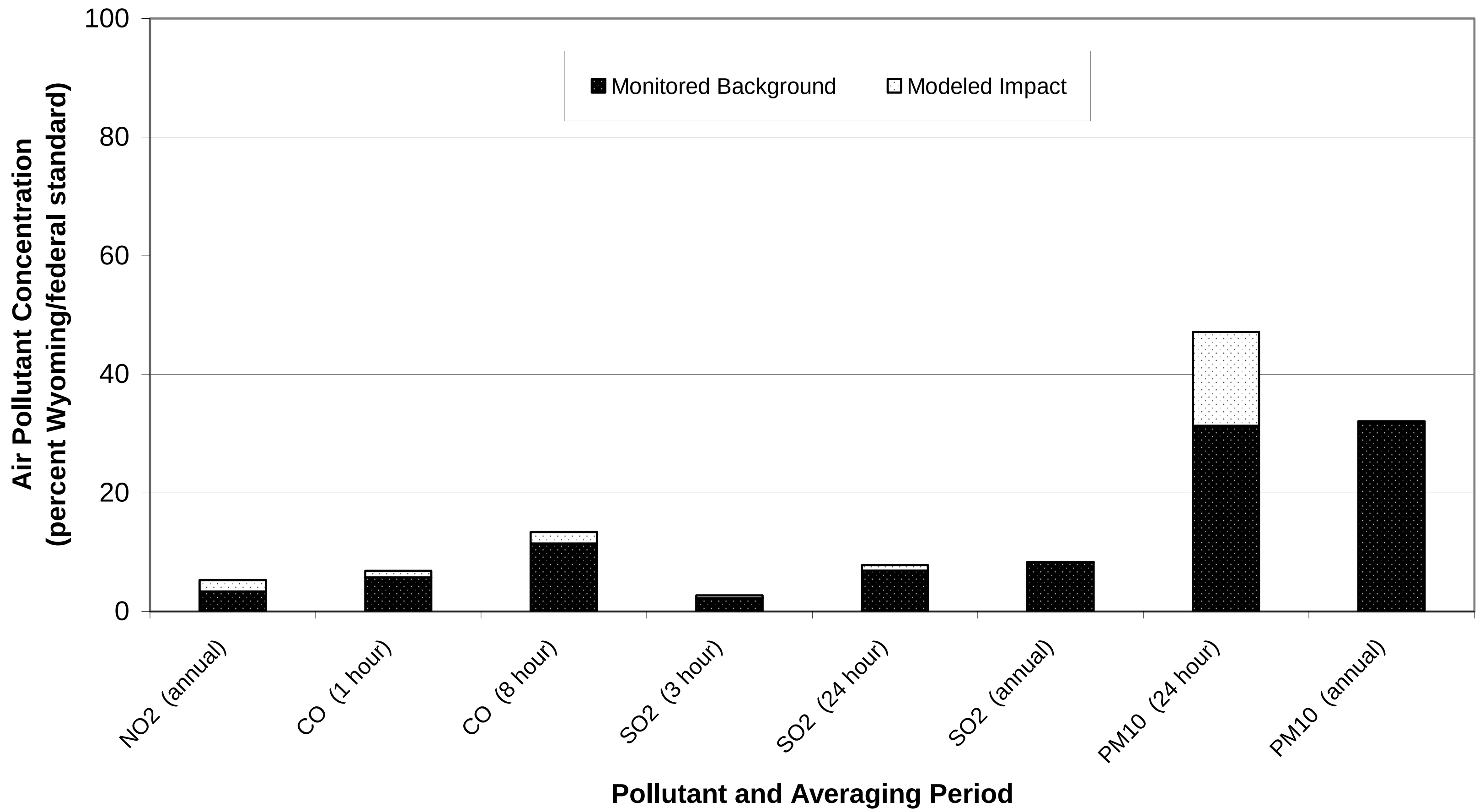


Figure 4-2. Maximum Ambient Air Quality Impacts for an Individual Well.

Table 4-6. Individual Well Increment Comparison

Pollutant	Averaging Time	Individual Well Impact (:g/m^3)	PSD Class II Increment (:g/m^3)	Percentage of Class II Increment (:g/m^3)
NO_2	Annual	1.92	25	8%
SO_2	3-hr	5.93	512	1%
SO_2	24-hr	2.29	91	3%
SO_2	Annual	0.032	20	0.2%
PM_{10}	24-hr	23.69	30	79%
PM_{10}	Annual	0.047	17	3%

Gas Plant and Well Field Sub-grid Analysis

A sub-grid analysis was also performed for a typical gas plant and surrounding well field. For the analysis it was assumed that the gas plant would consist of five separate compressor units totaling 6,000 horsepower. It was also assumed that the gas plant was centered in a producing well field with a density of one well every 40 acres. This development scenario yields the greatest impacts for the combined project sources that are likely to occur. Tables 4-7 and 4-8 present the combined gas plant and well grid impacts and compares the results to the applicable ambient standards and PSD increments. The ambient standard comparisons are also charted in Figure 4-3. As shown, the predicted impacts are below all applicable ambient standards and increment levels.

Support Road Air Pollutant Sub-grid Analysis

The analysis of emissions generated from vehicle traffic on an unpaved support road indicated that the maximum impact is from fugitive dust. The maximum 24-hour average PM_{10} impact is 23.9 :g/m^3. When added to the background concentration of 20 :g/m^3, the combined impact is 43.9 :g/m^3 which is only 29% of the most stringent ambient air quality standard (150 :g/m^3).

Hazardous Air Pollutant Sub-grid Analysis

A HAP analysis was conducted for the well field and gas plant development scenario. The potential acute (1-hour exposure) and long-term (i.e., chronic, annual) health effects that may result from the emission of the six previously listed toxins were analyzed. Emissions of each of the hazardous air pollutants were analyzed for their direct impact on health such as headaches, irritation of eyes and throat, and other potential toxic effects. In addition, benzene and formaldehyde emissions were analyzed for their carcinogenic effects.

There are no applicable Federal, Wyoming, or Colorado ambient air quality standards for assessing potential HAP impacts to human health. Therefore, reference concentrations (RfC) for chronic inhalation exposures and Reference Exposure Levels (REL) for acute inhalation exposures are applied as significance criteria. RfCs represent an estimate of the continuous, i.e. annual average, inhalation exposure rate to the human population (including sensitive subgroups such as children and the elderly) without an appreciable risk of harmful effects. The REL is the acute (i.e. one hour average) concentration at or below which no adverse health effects are expected. Both the RfC and REL guideline values are for non-cancer effects. As summarized in Table 4-9, maximum acute and chronic HAP concentrations are not predicted to exceed the RELs or RfCs. Therefore, no adverse non-carcinogenic human health effects would be expected upon implementation of the project.

Benzene and formaldehyde exposure has been associated with potential carcinogenesis. Carcinogenic impacts are assessed by evaluating annual concentrations, and assuming maximum exposure, 24 hours per day, 365 days per year for the lifetime of the project (30 years). This is termed the maximum exposure scenario. Annual concentrations were predicted for both well and compressor station emissions. Formaldehyde would be emitted primarily from compressor engines and maximum impacts were predicted at a minimum distance of 1,320 feet (400 meters) from a compressor site as this is the building offset that would be required between the construction of any occupied public dwellings and a compressor facility. Benzene emissions would be emitted primarily from wellsite dehydrators.

Table 4-7. Gas Plant and Well Field Impact

Pollutant	Averaging Period	Gas Plant and Well Field Impact (:g/m^3)	Monitored Back-ground Level (:g/m^3)	Maximum Impact Plus Back-ground (:g/m^3)	National Ambient Air Quality Standard (:g/m^3)	Wyoming Ambient Air Quality Standard (:g/m^3)	Colorado Ambient Air Quality Standard (:g/m^3)	Percentage of Most Stringent Ambient Air Quality Standard
NO_2	Annual	4.17	3.4	7.57	100	100	100	8%
CO	1-hour	168.39	2,299	2,467	40,000	40,000	40,000	6%
CO	8-hour	83.69	1,148	1,232	10,000	10,000	10,000	12%
SO_2	3-hour	0	29	29	1,300	1,300	700	4%
SO_2	24-hour	0	18	18	365	260	365	7%
SO_2	Annual	0	5	5	80	60	80	8%
PM_{10}	24-hour	7.31	47	54.31	150	150	150	36%
PM_{10}	Annual	1.69	16	17.69	50	50	50	35%

Table 4.8. Gas Plant and Well Field Increment Comparison

Pollutant	Averaging Time	Gas Plant and Well Field Impact (:g/m^3)	PSD Class II Increment (:g/m^3)	Percentage of Class II Increment (:g/m^3)
NO_2	Annual	4.17	25	17%
SO_2	3-hr	0	512	0%
SO_2	24-hr	0	91	0%
SO_2	Annual	0	20	0%
PM_{10}	24-hr	7.31	30	24%
PM_{10}	Annual	1.69	17	10%

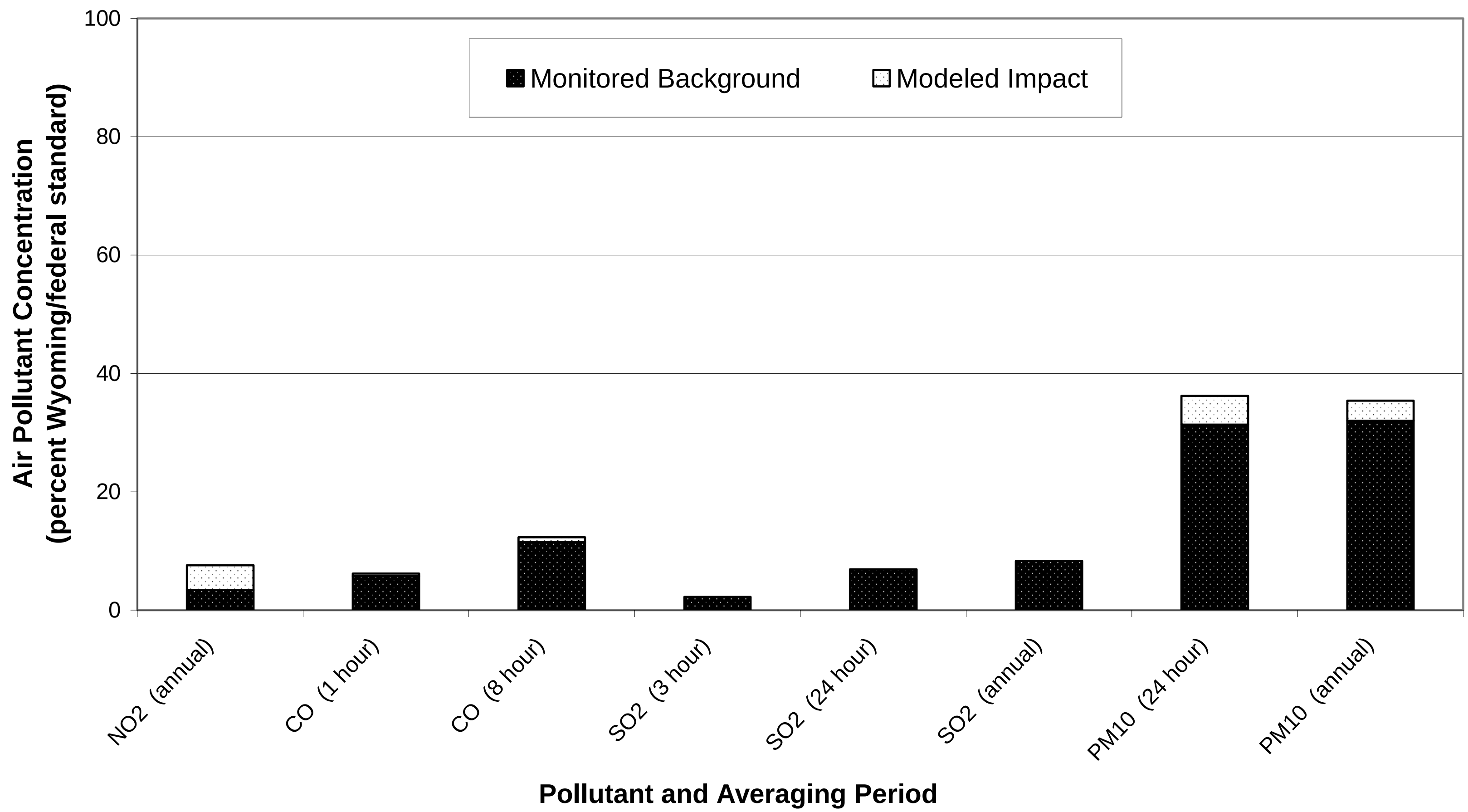


Figure 4-3. Gas Plant and Well Field Impact.

The predicted impacts, summarized in Table 4-10, indicate that the maximum incremental cancer risk which may result from benzene emissions is estimated at 2 incidents per million exposures, which exceeds the threshold level of 1 incident per million. The benzene incremental risk is based upon a maximum concentration predicted within 100 meters of a wellsite dehydrator. However, the benzene concentrations decrease rapidly as the distance from the dehydrator increases, and at distances of 300 meters or greater, the benzene concentration is reduced by 50% and the associated incremental cancer risk would be less than 1 incident per million exposures. In light of the remote nature of the DFPA, it is unlikely that wellsite facilities would be constructed within 300 meters of an occupied public building.

Ozone Sub-grid Analysis

Ozone is formed in the atmosphere through a series of complex nonlinear chemical reactions involving NO_X, VOC and sunlight. The EPA ozone formation screening methodology for point sources (Scheffe 1988) provides an estimate of the maximum potential incremental ozone concentration that could possibly occur due to emissions from the new sources. The maximum potential ozone increment is then added to the current existing maximum background ozone concentration and compared with the ozone standard to determine whether there is a potential for the new sources to cause an exceedance of the ozone standard. If the results of the screening methodology indicate a high potential for an exceedance, a refined analysis is required since the screening methodology is highly conservative.

Table 4-9. Hazardous Air Pollutant Impacts

Hazardous Air Pollutant	Maximum Predicted acute (1-hour) Impact (:g/m^3)	Reference Exposure Level (:g/m^3)	Acute Impact Percentage of the REL	Maximum Predicted Chronic (annual) Impact (:g/m^3)	Reference Concentration (:g/m^3)	Chronic Impact Percentage of the RfC
Benzene	139	1,300 [1]	11 %	0.71	30 [3]	2 %
Toluene	356	37,000 [1]	1 %	3.35	400 [3]	1%
Ethylbenzene	191	350,000 [2]	Less than 1%	1.79	1,000 [3]	Less than 1%
Xylenes	250	22,000 [1]	1 %	2.34	100 [3]	2 %
n-Hexane	127	390,000 [2]	Less than 1%	1.94	200 [3]	1 %
Formaldehyde	8.36	94 [1]	9 %	0.25	9.8 [3]	3 %

1 - EPA Air Toxics Database, Table 2 (EPA 2002)
2 - Immediately Dangerous to Life or Health (IDLH/10), EPA Air Toxics Database, Table 2 (EPA 2002) since no REL is available
3 - EPA Air Toxics Database, Table 1 (EPA 2003)

The total project NO_X and VOC emissions (wells plus compression at full development) were used in the screening analysis. Construction emissions of VOC are much less than 50 tons per year, and are therefore not expected to cause an increase in ozone concentrations (per the screening methodology). The screening tables indicate a maximum potential ozone formation of 0.009 ppm, or 18 :g/m^3. When this maximum potential is added to the background concentrations, the total ozone concentrations are 187 :g/m^3 for the 1-hour average as compared to a standard of 235 :g/m^3.

Table 4-10. Potential Incremental Carcinogenic Risk

Hazardous Air Pollutant	Incremental Carcinogenic Risk (incidents per million exposures)
Benzene	2 incidents per million exposures at 100 meters from a wellsite. Less than 1 incident per million exposures at 300 meters or greater from a wellsite.
Formaldehyde	Less than 1 incident per million exposures at 400 meters from a compressor station.

Table 4-11. Potential Ozone Impact

Pollutant	Averaging Period	Gas Plant and Well Field Impact (:g/m^3)	Monitored Back-ground Level (:g/m^3)	Maximum Impact Plus Back-ground (:g/m^3)	National Ambient Air Quality Standard (:g/m^3)	Wyoming Ambient Air Quality Standard (:g/m^3)	Colorado Ambient Air Quality Standard (:g/m^3)	Percentage of Most Stringent Ambient Air Quality Standard
O_3	1-hr	18	169	187	235	235	235	80%

4.2.3.1.3 Alternative A Near-Field Impact Analysis

The CALPUFF set of models was applied in a near-field mode (4 to 50 km) to estimate short-term (less than or equal to 24-hour) and long-term (annual) regulated pollutant concentrations for comparisons with federal and state ambient air quality standards within 50 km of the DFPA (Table 4-12 and Figure 4-4). The results are also compared to the PSD Class II increments (Table 4-13).

The maximum predicted concentrations for all PSD pollutants range from much less than 1 percent (for SO_2) to 16% (for PM_{10}) of the applicable PSD Class II increments. When the maximum estimated concentrations are added to the existing maximum background concentrations, the total estimated concentrations for all regulated pollutants are also less than the applicable federal and state ambient air quality standards. Therefore, potential pollutant concentrations that may result from the project are not expected to cause significant impacts within 30 miles of the project area.

4.2.3.1.4 Alternative A Impacts Within the Monument Valley Management Area

Potential air quality impacts within MVMA were not directly assessed. However, Alternative A impacts within MVMA would not exceed the gas plant and well field impacts previously presented in Tables 4-6 and 4-7. Similarly, support road, ozone, and HAP impacts would not exceed the previously discussed levels.

Table 4-12. Alternative A Near-Field Ambient Air Quality Impacts

Pollutant	Averaging Period	Total Project Impact (:g/m³)	Monitored Back-ground Level (:g/m³)	Maximum Impact Plus Back-ground (:g/m³)	National Ambient Air Quality Standard (:g/m³)	Wyoming Ambient Air Quality Standard (:g/m³)	Colorado Ambient Air Quality Standard (:g/m³)	Percentage of Most Stringent Ambient Air Quality Standard
NO_2	Annual	1.51	3.4	4.91	100	100	100	5%
SO_2	3-hour	0.15	29	29.15	1,300	1,300	700	4%
SO_2	24-hour	0.08	18	18.08	365	260	365	7%
SO_2	Annual	0.02	5	5.02	80	60	80	8%
PM_{10}	24-hour	4.88	47	51.88	150	150	150	35%
PM_{10}	Annual	1.55	16	17.55	50	50	50	35%

Table 4-13. Alternative A Near-Field Increment Comparison

Pollutant	Averaging Time	Total Project Impact (:g/m³)	PSD Class II Increment (:g/m³)	Percentage of Class II Increment (:g/m³)
NO_2	Annual	1.51	25	6%
SO_2	3-hr	0.15	512	0.03%
SO_2	24-hr	0.08	91	0.1%
SO_2	Annual	0.02	20	0.1%
PM_{10}	24-hr	4.88	30	16%
PM_{10}	Annual	1.55	17	9%

4.2.3.1.5 Alternative A Far-Field Impact Analysis

The CALPUFF model was also applied to estimate the far-field (50 km to over 200 km) ambient air quality and AQRV impacts from the Desolation Flats project. The far-field analysis estimates the total impacts due to the existing background and project sources. Impacts on air quality were estimated at nearby Class I and Class II areas. The sensitive areas include:

- Bridger Wilderness (Class I);
- Fitzpatrick Wilderness (Class I);
- Popo Agie Wilderness (Class II);
- Wind River Roadless Area (Class II);
- Dinosaur National Monument (Class II);
- Savage Run Wilderness (Class I);
- Mount Zirkel Wilderness (Class I), and

- Rawah Wilderness (Class I).

The model was used to estimate ambient NO_2, SO_2, and PM_{10} concentrations for comparison with federal and state ambient air quality standards and PSD Class I increments and to address potential AQRV impacts. The maximum impacts for all pollutants and averaging times were found to occur at Dinosaur National Monument which is classified as a federal PSD Class II area. However, Colorado affords protection to that portion of Dinosaur National Monument within the state with the more stringent PSD Class I increments for SO_2. Table 4-14 and Figure 4-5 present the maximum impacts for the project sources and compare the results to the ambient standards. The estimated concentrations for all pollutants are far below the applicable federal and state ambient air quality standards. In Table 4-15 the impacts for all pollutants at Dinosaur National Monument are compared to the more stringent PSD Class I increments although the Class I increments only apply to SO_2. The maximum concentration impacts due to project sources alone are less than one percent of the Class I increments. The far-field ambient concentration impacts for all eight sensitive areas are provided in the Air Quality Technical Report.

<u>Visibility Impacts</u>

Far field impacts of project emissions on visibility degradation at the sensitive receptor areas was evaluated using the IWAQM/FLAG-recommended method (see the Air Quality Technical Report).

In this method, visibility degradation due to the project sources alone was compared against a background visibility condition based on the mean of the 20 percent cleanest days as reconstructed from IMPROVE aerosol data. Two long-term background data sets were available, one at Bridger Wilderness area and one at Mount Zirkel Wilderness area. In order to apply background visibility data consistent with the 1995 inventory date, Bridger data for the period 1987 through June 30, 1995 and Mount Zirkel data for the period 1994 to 1997 were applied. The Bridger IMPROVE data were used to represent background visibility conditions at Bridger, Fitzpatrick, and Popo Agie Wilderness Areas and the Wind River Roadless Area. The Mount Zirkel data were used to represent conditions in Dinosaur National Monument and the Mount Zirkel, Savage Run, and Rawah Wilderness Areas.

There are two thresholds of visibility change which are used for determining the significance of potential impacts: the number of days in which the deciview change ( ) dv) is 1.0 or greater; and the number of days in which the) dv change is 0.5 or greater. The FS uses the 0.5) dv as a LAC threshold in order to protect visibility in sensitive areas. The 1.0) dv threshold is used in the Regional Haze Regulations as a small but just noticeable change in haziness and has been used by other agencies as a management threshold. The 0.5 and 1.0) dv thresholds are neither standards nor regulatory limits. Rather, they are used to alert the affected land managers that potential adverse visibility impacts may exist and the land manager may wish to look at the magnitude, duration, frequency, and source of the impacts in more detail in order to make a significance determination. The maximum deciview change due to the Desolation Flats project emissions alone is 0.239) dv at Dinosaur National Monument (a PSD Class II area), as shown in Table 4-16. Therefore, the estimated visibility impacts due to the project alone do not exceed the LAC thresholds of 0.5 or 1.0) dv.

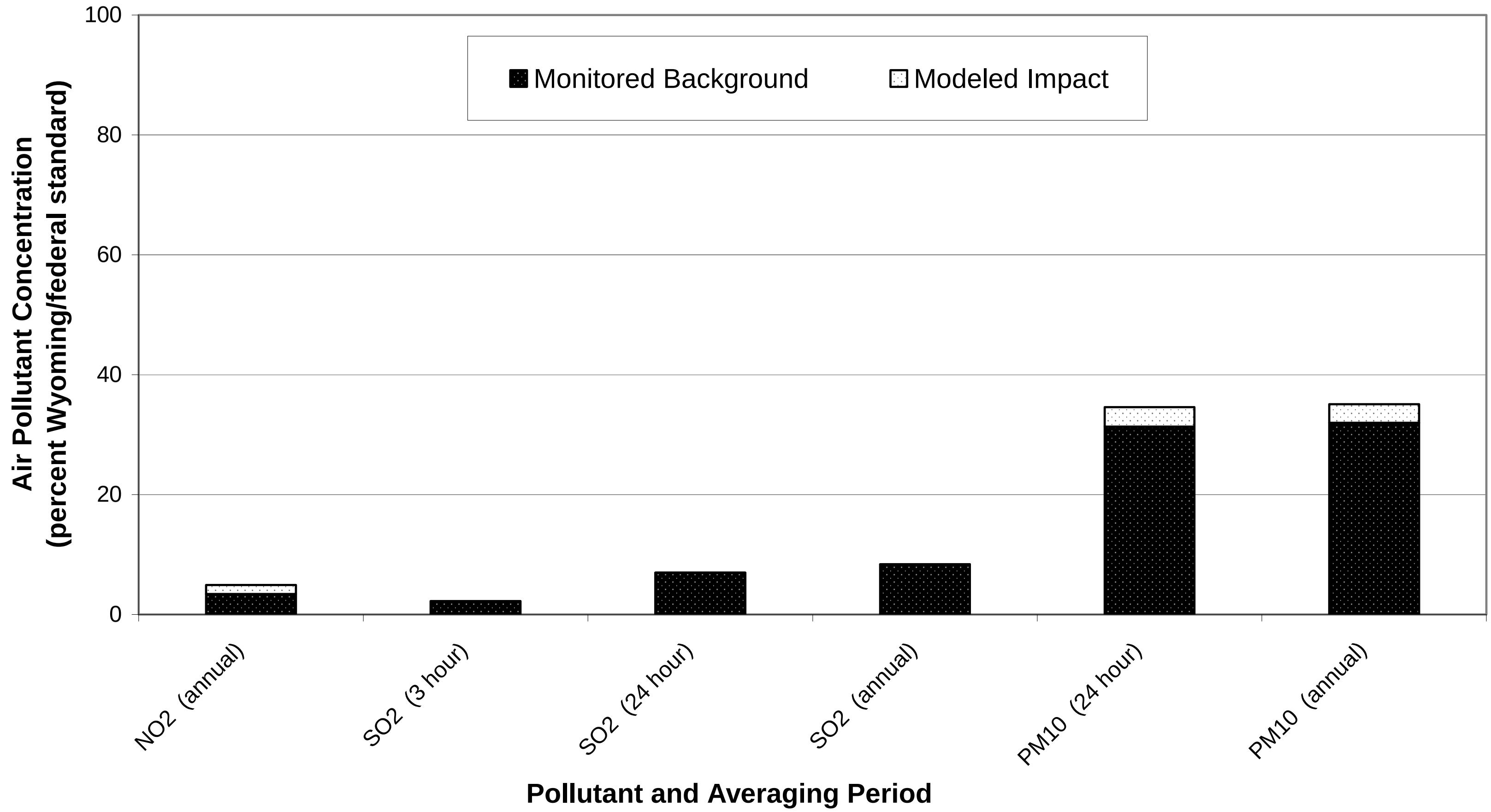


Figure 4-4. Alternative A Near-Field Ambient Air Quality Impacts.

Table 4-14. Alternative A Far-Field Ambient Air Quality Impacts

Pollutant	Averaging Period	Total Project Impact (:g/m^3)	Monitored Back-ground Level (:g/m^3)	Maximum Impact Plus Back-ground (:g/m^3)	National Ambient Air Quality Standard (:g/m^3)	Wyoming Ambient Air Quality Standard (:g/m^3)	Colorado Ambient Air Quality Standard (:g/m^3)	Percentage of Most Stringent Ambient Air Quality Standard
NO_2	Annual	0.011	3.4	3.41	100	100	100	3%
SO_2	3-hour	0.017	29	29.02	1,300	1,300	700	4%
SO_2	24-hour	0.003	18	18.00	365	260	365	7%
SO_2	Annual	0.0001	5	5.00	80	60	80	8%
PM_{10}	24-hour	0.033	47	47.03	150	150	150	31%
PM_{10}	Annual	0.00007	16	16.00	50	50	50	32%

Table 4-15. Alternative A PSD Class I Increment Comparison

Pollutant	Averaging Time	Maximum Project Impact (:g/m^3)	PSD Class I Increment (:g/m^3)	Percentage of Class I Increment (:g/m^3)
NO_2	Annual	0.011	2.5	0.4%
SO_2	3-hr	0.017	25	0.07%
SO_2	24-hr	0.003	5	0.06%
SO_2	Annual	0.0001	2	0.005%
PM_{10}	24-hr	0.033	8	0.4%
PM_{10}	Annual	0.00007	4	0.002%

Atmospheric Deposition and Impacts

The potential impact of the project emission sources on atmospheric deposition were analyzed using the Fox (1989) method (see Air Quality Technical Report). This method was used to estimate the potential change in ANC at each of 12 sensitive lakes (Table 4-17). This approach uses a set of equations to estimate how added deposition may change lake ANC from monitored background conditions. This approach assumes that ANC generation is constant, and does not factor in watershed buffering ability, lake flushing time or aquatic ecosystem bio-geochemistry. However, it does provide a conservative estimate for potential changes in lake ANC.

For lakes with background minimum measured ANC values of 25 :eq/l or greater, the FS has identified a LAC threshold of 10 percent change. For lakes with a minimum ANC background of less than 25 :eq/l, the FS has identified a LAC threshold of 1 :eq/l. Of the twelve lakes

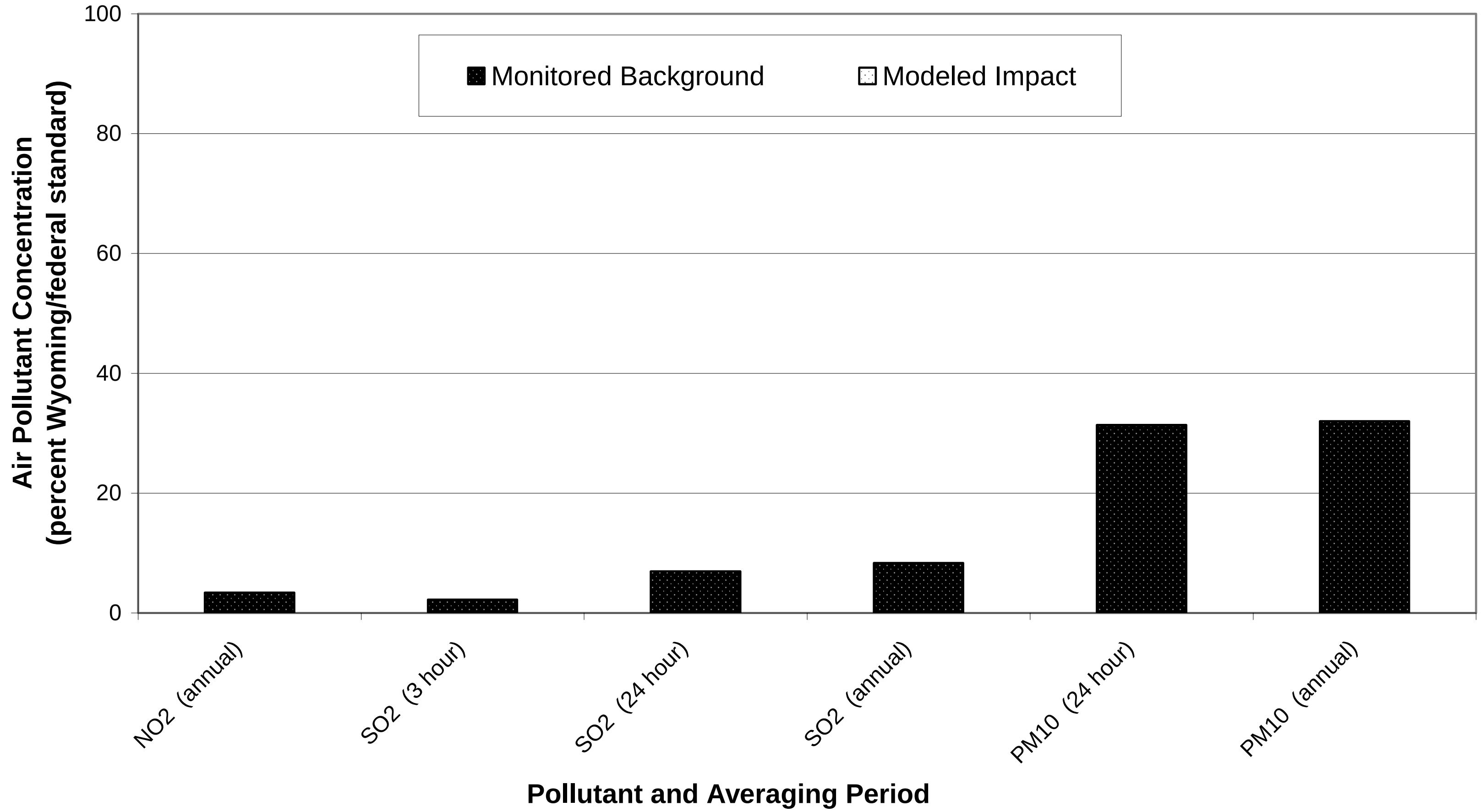


Figure 4-5. Alternative A Far-Field Ambient Air Quality Impacts.

analyzed, three have ANC background less than 25 :eq/l. Table 4-17 presents the results of the analysis and indicates that the potential change in sensitive lake ANC is much less than the levels of acceptable change. Therefore, potential changes in lake ANC due to project impacts alone are not expected to be significant.

Table4-16. Alternative A Predicted Visibility Impacts From the Project

Sensitive Receptor Area	Maximum Visibility Impact () dv)	Visibility Significance Criteria () dv)	Number of Days Greater Than 0.5) dv	Number of Days Greater Than 1.0) dv
Bridger Wilderness	0.079	0.5 / 1.0	0	0
Fitzpatrick Wilderness	0.046	0.5 / 1.0	0	0
Wind River Roadless Area	0.048	0.5 / 1.0	0	0
Popo Agie Wilderness	0.073	0.5 / 1.0	0	0
Dinosaur National Monument	0.239	0.5 / 1.0	0	0
Savage Run Wilderness	0.115	0.5 / 1.0	0	0
Mount Zirkel Wilderness	0.093	0.5 / 1.0	0	0
Rawah Wilderness	0.079	0.5 / 1.0	0	0

4.2.3.2 Proposed Action

Under the Proposed Action, 385 wells would be developed with an expected success rate of 65 percent or 250 producing wells. The Proposed Action represents a 35 percent reduction in well development when compared to Alternative A and it is expected that compression requirements for the Proposed Action would also be reduced by a similar percentage. Potential air quality impacts resulting from the implementation of the Proposed Action would be less than those previously described for Alternative A. No significant adverse impacts to air quality are anticipated as a result of the implementation of the Proposed Action.

Table 4-17. Alternative A Potential Atmospheric Deposition Impacts

Sensitive Lake	Sensitive Area	Monitored Background ANC (µeq/l)	Level of Acceptable Change	Change In ANC (µeq/l)	Percentage of LAC
Black Joe Lake	Bridger Wilderness	69.0	10% (6.9 µeq/l)	0.008	0.12%
Deep Lake	Bridger Wilderness	61.0	10% (6.1 µeq/l)	0.008	0.13%
Hobbs Lake	Bridger Wilderness	68.0	10% (6.8 µeq/l)	0.005	0.07%
Upper Frozen	Bridger	5.7	1 µeq/l	0.008	0.80%

Lake	Wilderness				
Ross Lake	Fitzpatrick Wilderness	61.4	10% (6.1 µeq/l)	0.004	0.07%
Lower Saddlebag	Popo Agie Wilderness	55.5	10% (5.6 µeq/l)	0.010	0.17%
Pothole A-8	Mount Zirkel Wilderness	16.0	1 µeq/l	0.037	3.70%
Seven Lakes	Mount Zirkel Wilderness	35.5	10% (3.6 µeq/l)	0.069	1.92%
Upper Slide Lake	Mount Zirkel Wilderness	24.7	1 µeq/l	0.039	3.90%
West Glacier Lake	Medicine Bow	26.1	10% (2.6 µeq/l)	0.044	1.69%
Island Lake	Rawah Wilderness	64.6	10% (6.5 µeq/l)	0.031	0.47%
Rawah #4 Lake	Rawah Wilderness	41.2	10% (4.1 µeq/l)	0.032	0.78%

4.2.3.3 Alternative B - No Action

Impacts to air quality under the No Action Alternative would occur at allowable levels and no significant impacts are anticipated. Actions approved under the Mulligan Draw EIS and Dripping Rock / Cedar Breaks EA may still be completed within the project area. Completion of the previously approved actions would involve the development of approximately 71 wells, therefore the impacts are expected to be less than Alternative A and the Proposed Action. In the absence of further development in the DFPA, no additional project related air quality impacts would occur.

4.2.4 Impacts Summary

No significant adverse impacts to air quality from the project alone are anticipated as a result of the implementation of the Proposed Action, Alternative A or the No Action Alternative. Localized increases in criteria pollutants would occur, but maximum concentrations would be below applicable federal and state standards. Similarly, hazardous air pollutant concentrations and incremental increases in cancer risk would also be below applicable significance levels. Potential impacts to visibility and acid neutralizing capacity would be below the levels of acceptable change. Table 4-18 summarizes the potential impacts that may occur if the project were implemented.

Table 4-18. Alternative A Impacts Summary

Air Quality Component	Potential Impacts
Criteria Pollutant Concentrations	

Air Quality Component	Potential Impacts
Ambient Air Quality Standards	Alternative A Gas Plant and Well Field concentrations are in compliance with applicable NAAQS, WAAQS and CAAQS • NO_2 concentration 8% of standard • CO concentrations are 6 - 12% of standards • SO_2 concentrations 4 - 8% of standards • PM_{10} concentrations 35 - 36% of standards Alternative A Near-Field concentrations are in compliance with applicable NAAQS, WAAQS and CAAQS • NO_2 concentration 5% of standard • SO_2 concentrations 4 - 8% of standards • PM_{10} concentrations 35% of standards • O_3 concentration 80% of standard Alternative A Far-Field concentrations are in compliance with applicable NAAQS, WAAQS and CAAQS • NO_2 concentration 3% of standard • SO_2 concentrations 4 - 8% of standards • PM_{10} concentrations 31 - 32% of standards
PSD Increments	Alternative A Gas Plant and Well Field concentrations are well below applicable PSD Class II increments • NO_2 concentration 17% of increment • SO_2 concentration 0% of increments • PM_{10} concentrations 10 - 24% of increments Alternative A Near-Field project concentrations are well below applicable PSD Class II increments • NO_2 concentration 6% of increment • SO_2 concentration 0.03 - 0.1% of increments • PM_{10} concentrations 9 - 16% of increments Alternative A Far-Field project concentrations are well below applicable PSD Class I increments • NO_2 concentration 0.4% of increment • SO_2 concentration 0.005 - 0.07% of increments • PM_{10} concentrations 0.002 - 0.4% of increments
Hazardous Air Pollutant Concentrations	
Acute and Chronic Exposure Levels	Alternative A HAP concentrations are below the acute and chronic human health exposure thresholds • Acute (1-hr) concentrations < 1 - 9% of Reference Exposure Levels • Chronic (Annual) concentrations <1 - 3% of Reference Concentrations
Incremental Cancer Risk	Alternative A incremental cancer risk is within a reasonable range • Benzene risk of 2 incidents per million exposures at 100 meters from a wellsite • Benzene risk is reduced to less than 1 incident per million exposures at 300 meters from a wellsite • Formaldehyde risk of less than 1 incident per million exposures at 400 meters from a compressor station.

Air Quality Component	Potential Impacts
Visibility Impacts	
Number of Days with Greater Than 0.5)dv or 1.0)dv	Alternative A potential visibility impacts would be less than the 0.5 and 1.0)dv thresholds • Bridger Wilderness 0.079)dv • Fitzpatrick Wilderness 0.046)dv • Wind River Roadless Area 0.048)dv • Popo Agie Wilderness 0.073)dv • Dinosaur National Monument 0.239)dv • Savage Run Wilderness 0.115)dv • Mount Zirkel Wilderness 0.093)dv • Rawah Wilderness 0.079)dv

Air Quality Component	Potential Impacts
Atmospheric Deposition Impacts	
Lake Acid Neutralizing Capacity Levels of Acceptable Change (LAC)	Changes in lake ANC resulting from Alternative A would Be less than the LACs • Black Joe Lake 0.12% of LAC • Deep Lake 0.13% of LAC • Hobbs Lake 0.07% of LAC • Upper Frozen Lake 0.8% of LAC • Ross Lake 0.07% of LAC • Lower Saddlebag Lake 0.17% of LAC • Pothole A-8 Lake 3.7% of LAC • Seven Lakes 1.92% of LAC • Upper Slide Lake 3.9% of LAC • West Glacier Lake 1.69% of LAC • Island Lake 0.47% of LAC • Rawah #4 Lake 0.78% of LAC

4.2.5 Additional Mitigation Measures

Potential air quality impacts resulting from the project could be reduced through the implementation of engineering controls or other measures. The following potential mitigation measures (Table 4-19) could reduce impacts from emissions. The appropriate level of control will be determined and required by the WDEQ-AQD during the pre-construction permit process.

Table 4-19. Summary of Potential Mitigation Measures

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
NO_X and CO Mitigation Measures				
Utilize selective catalytic reduction on compressors.	Relatively expensive as compared to non-selective catalysts. Typical costs are $125/horsepower (EPA Cost Control Manual, January 2002).	Requires the use and storage of ammonia, which presents health and safety issues. Results in increased ammonia emissions which may contribute to the formation of ammonium sulfates and increased visibility degradation.	NO_X emission rate reduced to 0.1 g/hp-hr. Reduced ammonium nitrate formation and resulting visibility impacts.	Not applicable for 2-stroke engines.
Application of non-selective catalytic reduction.	$5,000 to $25,000 per unit.	Regeneration / disposal costs for catalysts.	As a result of the BACT process, average NO_X emission rates for Wyoming engines 100 hp or greater is 1.0 g/hp-hr. The application of non-selective catalysts may reduce the NO_X emission rate to 0.7 g/hp-hr for some types of engines.	Not applicable for Lean-burn or 2-stroke engines.

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
Utilize compressors driven by electrical motors.	Capital costs equal 40% of gas turbine costs. Operating cost dependent upon the location of high voltage power lines.	Displaced air emissions from compressor units to electrical power plant.	May potentially relocate emissions away from sensitive Class I areas.	Requires high voltage power lines.
Increased diameter of sales pipelines.	With larger diameter sales pipelines, capital costs increase while operating costs decrease.	Slightly more surface disturbance.	Lower pipeline pressures resulting in lower compression hp requirements.	
Utilize wind generated electricity to power compressors.	Capital costs are very large.	Visual impacts from generation equipment. Increased mortality of birds including raptors.	Reduced use of fossil fuels and associated emissions.	Location of wind generation facilities is critical. Requires consistent strong winds for economic operation. Also requires high voltage transmission lines between generation facility and compressor stations.

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
Increased Monitoring.	Unknown.	None.	The WDEQ-AQD currently has an emission tracking agreement with the BLM. The *Amended Letter of Agreement for Tracking Nitrogen Oxide Emissions* dated April 2000 calls for annual reports tracking changes in NOX emission beginning January 1, 1996.	The monitoring of emission sources provides improved information for estimating impacts, but does not reduce the magnitude of the impacts.

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
Phased development.	Short term loss of State and Federal royalties.	Emissions generated at a lower rate averaged over a longer period.	Peak emissions and associated impacts reduced.	Administration / jurisdiction limitations - The WDEQ-AQD is the regulatory authority for air quality within the State of Wyoming. Therefore, the BLM cannot limit or otherwise restrict development based upon potential air quality impacts. Economic limitations - A minimum production rate is required to cost effectively develop the resource while maintaining the processing and transportation infrastructure.

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
Particulate Matter Mitigation Measures				
Increase water application rate to achieve greater than 50% fugitive dust control.	Varies with the source of the water and the trucking distance.	None	Can achieve fugitive dust control rates up to 95%.	Diminishing returns per gallon of water applied. Water must be applied at much greater rates to achieve control efficiencies greater than 75%.
Unpaved Road Dust Suppressant Treatments.	$2,400 to $50,000 per mile.	Treatment chemicals have the potential to negatively impact water quality.	Estimated 20% to 100% reduction in fugitive dust emissions.	
Administrative control of speed limits	Relatively low costs for installation of signs and enforcement.	None	Slower speeds may provide 20% to 50% reduction in dust emissions.	State or County may retain authority for determining speed limits on primary roads.

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
Installation of remote telemetry.	Approximately $13,000 per well.	None	Reduction in vehicle miles traveled and associated vehicle emissions during production operations. No benefit for construction operations which generate the greatest amount of PM.	Effective only for the production phase of the operations. Would have no impact upon construction activities which generate the greatest amount of particulate matter.
Gravel roads.	Approximately $9,000 per mile.	None	Estimated 30% reduction in fugitive road dust.	
Pave roads.	Approximately $11,000 to $60,000 per mile	None	Estimated 90% reduction in fugitive road dust.	

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
Phased development.	Short term loss of State and Federal royalties.	Emissions generated at a lower rate averaged over a longer period.	Peak emissions and associated impacts reduced.	Administration / jurisdiction limitations - The WDEQ-AQD is the regulatory authority for air quality within the State of Wyoming. Therefore, the BLM cannot limit or otherwise restrict development based upon potential air quality impacts. Economic limitations - A minimum production rate is required to cost effectively develop the resource while maintaining the processing and transportation infrastructure.

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
VOC and HAP Mitigation Measures				
Use of condenser controls on dehydrator still vents.	$1,000 to $10,000 for capital equipment.	Larger units may require electrical power.	VOC/HAP emission reductions ranging from 1% to 50%.	The effectiveness of passive condensers is dependent upon ambient air temperatures. Control efficiency decreases with increasing temperatures.
Use of combination condenser / combustion controls on dehydrator still vents.	$5,000 to $25,000 for capital equipment plus increased maintenance costs.	Larger units may require electrical power. Increased NO_X and CO emissions.	VOC/HAP control rates ranging from 95% to better than 99%.	May require continuous electrical power source for larger units.
Minimize dehydrator glycol circulation rates.	Minimal costs associated with increased monitoring and maintenance.	None.	May reduce VOC and HAP emissions by 1% to 50%.	Glycol circulation rates may only be reduced to the point where gas quality still meets pipeline specifications.

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
Use of oxidation catalysts on compressor engines.	$5,000 to $10,000 capital costs.	Disposal of spent catalysts.	Typically reduces formaldehyde emissions by 50%. Reductions of up to 90% may be achieved. Also reduces CO emissions by similar percentages.	Not applicable for 2-stroke engines.
Use of flares or smokeless combustion units to control vapors from condensate storage tanks	$5,000 to $20,000 per well.	Increased NO_X and CO emissions. May contribute to light pollution.	Reduction in tank emissions of 95% or better.	
Use of activated carbon filters on condensate tanks	$1,000 initial capital costs. High maintenance costs.	High energy costs for replacement / regeneration of carbon filters	Estimated 50% to 80% reduction in VOC and HAP emissions.	
Green completion / flowback unit.	Capital costs range from $1,000 to $10,000. Operating costs estimated at $1,000 per year.	Potential for reduced gas production.	Potentially reduces completion flaring/venting emissions by 70% to 90%.	

Type of Mitigation	Estimated Cost of Mitigation	Environmental Cost	Environmental Benefit	Potential Limitations
Phased development.	Short term loss of State and Federal royalties.	Emissions generated at a lower rate averaged over a longer period.	Peak emissions and associated impacts reduced.	Administration / jurisdiction limitations - The WDEQ-AQD is the regulatory authority for air quality within the State of Wyoming. Therefore, the BLM cannot limit or otherwise restrict development based upon potential air quality impacts. Economic limitations - A minimum production rate is required to cost effectively develop the resource while maintaining the processing and transportation infrastructure.

4.2.6 Residual Impacts

Implementation of the Proposed Action or Alternative A would cause increased levels of pollutants in the ambient air. As previously discussed, the increased pollutant concentrations are not predicted to exceed ambient air quality standards or PSD increments. The increased pollutant concentrations from the project would not directly cause visibility or atmospheric deposition impacts exceeding the applicable LAC.

With the implementation of one or more of the previously described additional mitigation measures, the emission of air pollutants would be reduced below the levels previously described for Alternative A.

4.4.3.1.1 Surface Water

Page 4-42, delete sentence starting with "However," in the 4th paragraph.

Page 4-43, between second and third paragraph add paragraph: "Dust abatement activities on local roads may use water obtained from SEO-approved surface water sources and/or water wells. Magnesium chloride or other approved dust control chemicals may be used to enhance the effectiveness of these activities. Supplemental materials added to dust abatement water will comply with product labels and state and federal laws. No adverse effects are anticipated from such activity."

Page 4-44, second paragraph, add the following to the end of the paragraph: "No deterioration of surface or ground water quality is anticipated under this project."

4.4.3.2 Alternative A

Page 4-46, second paragraph delete the sentence starting with "The source of …" and in the second sentence change it to read:

> "Water would be obtained from an SEO-approved water well that is non-tributary to the Colorado River System."

4.4.4 Impacts Summary

Page 4-47, delete sentence starting with "However," in the 3rd paragraph.

4.5.3.1 Proposed Action

Page 4-49, change last sentence in fourth paragraph to read: "However with incorporation of invasive/noxious weed management strategies into planning and design processes for all surface disturbance activities, and utilization of other invasive/non-native species mitigations and reclamation, no significant impacts are expected."

Page 4-50, delete from "…or under Wyoming General Permit…" in the first paragraph (third line) to the end of that paragraph.

Page 4-50, add the following text to the end of 4.5.3.1:

Biological soil crusts may be affected by DFPA implementation activities. Crusts are well adapted to severe growing conditions, but poorly adapted to compressional disturbances such as trampling by humans and livestock, wild horses, wildlife, or vehicles driving off roads. Disruption of the crusts can result in localized decreases in organism diversity, soil nutrients, stability, and organic matter. Applicant committed measures, combined with mitigations reducing off-road vehicular traffic and minimizing soil disturbance will reduce adverse effects on biological soil crusts. Significant effects are not anticipated within the DFPA to biological soil crusts or other associated, related, or dependent biota under this alternative. Effects from Alternative A are anticipated to be slightly greater extent than the proposed action, but still not significant.

4.7.1 Introduction

Page 4-56, change paragraph to read, "The principal wildlife impacts likely to be associated with the Proposed Action or alternatives include: (1) a direct loss of certain wildlife habitat, (2) the displacement of some wildlife species, (3) an increase in the potential for collisions between wildlife and motor vehicles, (4) an increase in the potential for the illegal kill and harassment of wildlife, and (5) increased shooter accessibility within the overall DFPA which could result in increased mortality to legally hunted species including prairie dogs and game species.

4.7.1.3.6 Combinations of Wildlife Concerns

Page 4-69, at the end of the section, add: "Proposed "Additional Mitigation Measure's" are detailed at 4.7.5, page 4-72."

4.7.3.1.1 General Wildlife

Page 4-59, Add the following text at the end of the first paragraph.

"Displacement of wildlife from construction and operational activities would occur, however the extent would vary depending on the specifics of the proposal and the areas effected. In addition, different species and individuals have differing tolerance levels. Subsequent site specific NEPA analysis would provide for minimization or mitigation of adverse impacts, including disturbance".

4.7.5 Additional Mitigation Measures

Page 4-72, replace text in the 6th bullet with the following: "No permanent above-ground structures would be constructed within 825 feet for all raptors, except 1,200 feet for ferruginous hawks."

4.8.1.2.1 Proposed Action

Page 4-76, replace text starting with "The Proposed Action …" at the end of the 5th paragraph with the following text: "The Proposed Action would deplete approximately 2.3 acre-feet of water per year, and thus a mitigation fee would be applicable. In case water connected to the Colorado River system is inadvertently used by third party contractors or others erroneously, the BLM has consulted with and received concurrence from the USF&WS on the effects of such an action upon endangered fishes."

4.8.1.4 Additional Mitigation Measures

Page 4-80, add the following mitigation measure:

> “Water used for well drilling operations would be obtained from an SEO-approved water well that is non-tributary to the Colorado River System.”

4.8.2.2.1 Proposed Action

Page 4-82, White-tailed Prairie Dog, insert the following before the last sentence: “While placement of structures near prairie dog colonies will be avoided where feasible, increased raptor perching with accordingly higher levels of prairie dog predation may occur in the immediate vicinity of such perches, if any occur. The anticipated disturbance….”

Page 4-83, Western Burrowing Owls, change “should” to “will” in the third line of the paragraph. In the same section, fifth line, change “4.7.4.1.6” to “4.7.3.1.5.”

Page 4-85, Ferruginous Hawk, fourth line, change “4.7.4.1.6” to “4.7.3.1.5.”

4.8.2.2.3   Alternative B – No Action

Page 4-89, delete the word ”considerably” in the fourth sentence.

4.11.3.1 Proposed Action

Page 4-99, add the following after the first paragraph:

“Under the proposed action it is anticipated that 385 oil and gas wells would be drilled (592 for the alternative A), disturbing about 2,029 acres of land (including all related facilities and pipelines) (3,193 acres for alternative A). Standard inventory and recordation procedures conducted in conjunction with actions would protect most cultural resources from significant damage and would increase the database of known cultural properties.

Construction activities resulting from minerals actions that disturb the ground surface and subsurface would have the potential to directly impact cultural resources not identified prior to the activity. Unanticipated subsurface discoveries (cultural resources found during and not prior to ground disturbing activities) would potentially occur from well location, road, and pipeline construction in culturally sensitive areas. Impacts to cultural resources identified in a discovery situation are greater than impacts to resources that were previously identified (and thereby avoided or subjected to mitigation measures) because damage to discovered sites occurs prior to their recordation and evaluation, thereby complicating mitigation procedures. Unanticipated discoveries result in the loss of some or occasionally all of the cultural resource involved. However, mitigation of impacts to discoveries is often accomplished through data recovery excavations that increase our understanding of prehistory.

Areas within ¼ mile of cultural resources eligible to the NRHP under Criteria A, B, or C would be subject to avoidance for all ground disturbing activities. This will ensure the protection of those sites from activities that may compromise the values for which they are eligible.

The visual setting (viewshed) of cultural resources eligible to the NRHP under Criteria A, B, or C would be managed to mitigate adverse visual impacts to a distance of two miles or the visual horizon, for actions which do not exceed 20 feet in height. Development projects that are greater than 20 feet in height would be evaluated on a case-by-case basis to determine the visual impacts greater than two miles. This will ensure the protection of those sites from activities that may compromise the values for which they are eligible."

Page 4-99, add the following at the end of the second (middle) paragraph: "Increased accessibility from roads within the DFPA can increase the amount of illegal artifact collection activity."

Page 4-99, change the first sentence of the last paragraph to read: "Contributing segments of historic trails, including the Cherokee Trail, would be avoided…."

4.15.3.1 Proposed Action

Page 4-128, fourth paragraph in the part, change the reference to sage grouse noise sensitivity from "4.7.4.1.4" to "4.7.3.1.4."

SECTION 2: ADDENDUM AND ERRATA

CHAPTER 5: CUMULATIVE IMPACT ANALYSIS

5.3.2 Climate and Air Quality

Page 5-6, Replace entire Section 5.3.2 of DEIS with the following text:

The CIA area for climate and air quality consists of southwestern Wyoming and northwestern Colorado. Cumulative impacts result from the development of the DFPA and other NEPA approved projects in combination with state permitted sources and other sources not subject to NEPA analysis.

5.3.2.1 Cumulative Emissions Inventory

For the cumulative analysis, three additional emission inventories were developed and combined with the Desolation Flats project emissions. One of the additional inventories accounted for emissions from state permitted sources that began operation between July 1995 and January 2001. Emissions for sources operating before 1995 were assumed to be included in the background monitoring data. Permit records obtained from the WDEQ-AQD and the CDPHE-APCD provided the basis for this inventory. Both permitted emission increases and decreases were accounted for in the inventory. One notable permitted emission decrease was the installation of low NO_X burners on boiler #3 at the Naughton power plant in southwest Wyoming, approximately 130 miles from the DFPA. This control project was financed by Ultra Petroleum and resulted in a reported 1,000 ton per year decrease in NO_X emissions.

A second emission inventory addressed changes in existing well emissions that occurred between the 1995 background monitoring date and January 2001. To account for emissions resulting from new wells drilled in the region and the decline in production or the abandonment of existing wells, production figures between the 1995 inventory date and January 2001 were used to estimate the change in well emissions by county. Both county wide increases and decreases in well emissions were observed in this inventory.

The remaining emission inventory accounted for emissions from Reasonably Foreseeable Development (RFD). The RFD category was comprised of emissions addressed in previously approved NEPA actions that had not been constructed as of January, 2001. Table 5-1 summarizes the NEPA actions included in the analysis while Figure 5-2 presents the location of the projects.

Table 5-1. NEPA Approved Reasonable Foreseeable Development

Approved NEPA Action	Map Symbol	Project Area	Remaining Wells to Be Developed	Remaining Compression to Be Installed (hp)
BTA Bravo	BB	23.80	2	0
Burley	BR	3.18	16	560 [1]
CAP Big Piney – Labarge	BP	501.65	200	0
Castle Creek Unit	CC	74.92	10	0
Continental Divide/Wamsutter II	CD	3,701.32	1,768	58,1000 [2]
Creston/Blue Gap	CB	1,272.00	156	5,460 [3]
East LaBarge	EL	22.30	9	0
Essex Mountain	EM	50.67	3	0
Fontenelle Reservoir	FR	414.63	1,017	0
Hickey-Table Mountain EA	HK	79.54	39	0
Jake Morrow Hills CAP EIS	JM	936.82	108	3,480
Jonah II EIS	J2	153.65	285	0
Miscellaneous Wells – East	WE	126.94	15	0
Miscellaneous Wells – West	WW	1,517.28	185	0
Moxa Arch	MA	972.68	1,162	17,066
Pinedale Anticline EIS	PA	798.63	700	26,000
Riley Ridge	RR	541.40	209	0
Sierra Madre	SM	76.68	9	0
South Baggs	SB	214.08	43	2,580 [4]
Stagecoach Draw	SD	150.39	59	0
Vermillion Basin	VB	372.29	56	NO_x Specified
Bridger-Teton DEIS including the following four management areas:				
Hoback Basin	HB	326.36	10	0
Moccasin Basin	MB	234.63	5	0
Union Pass	UP	354.63	10	0
Upper Green River	GR	617.79		

[1] Compression estimated at 35 hp per well
[2] A total of 70,000 hp was approved, the amount installed was estimated based upon well completion
[3] Compression estimated at 35 hp per well
[4] A total of 3,000 hp was approved, the amount installed was estimated based upon well completion
[5] Compression emissions were specified at 200 tons per year NO_X

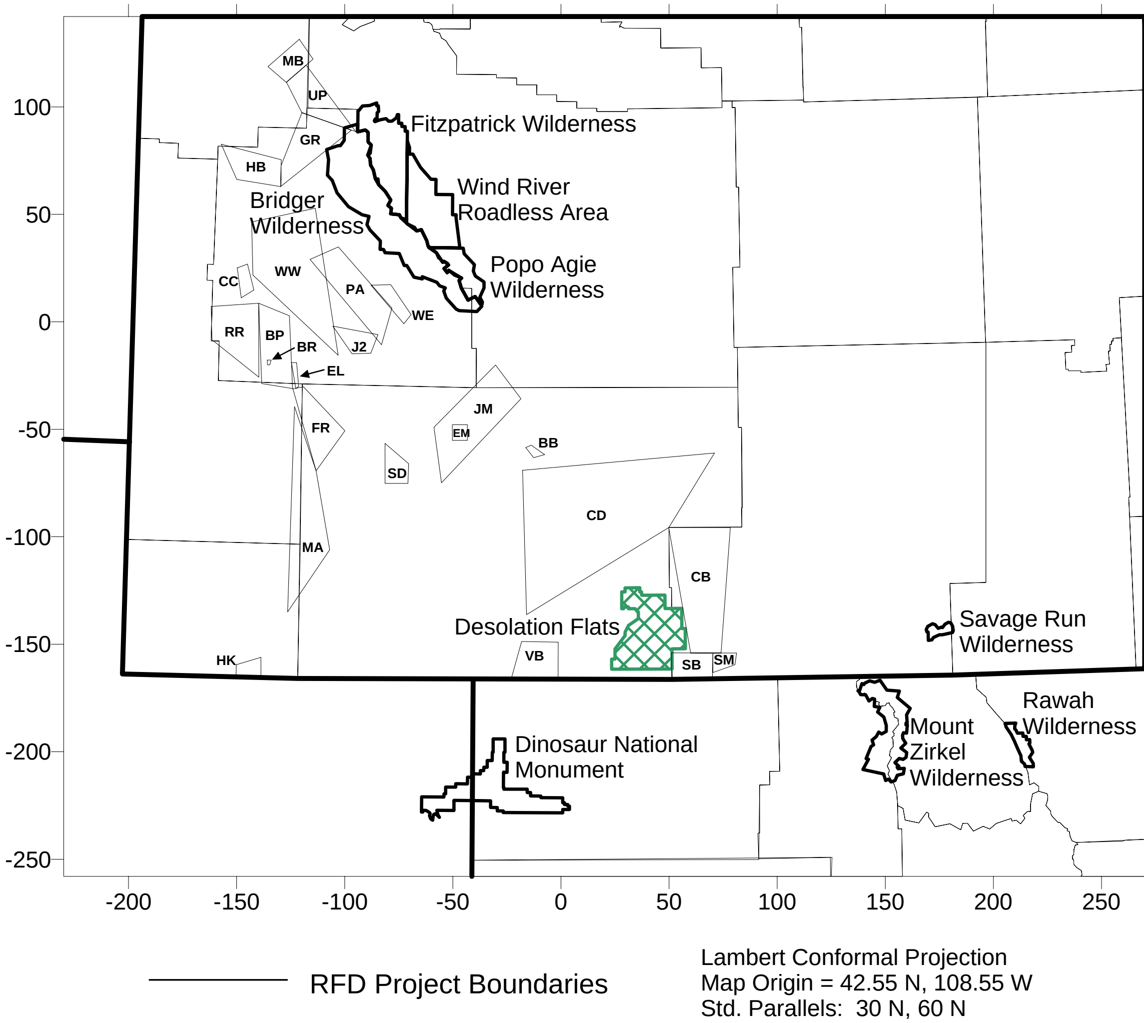


Figure 5-2.   Reasonably Foreseeable Development Projects.

The estimated emissions from sources permitted between 1995 to 2001, along with the changes in producing well emissions and future RFD emissions were added to the Desolation Flats emissions to obtain the cumulative emissions inventory (see the Air Quality Technical Report for a more detailed discussion of the emission inventories). Table 5-2 presents a summary of the cumulative emission inventory.

Table 5-2. Cumulative Emission Inventory Summary.

Inventory Category	NO_x (TPY)	SO_x (TPY)	PM_{10} (TPY)
Permitted Emission Increases Post 1995	7,011	4,305	2,110
Permitted Emission Decreases Post 1995 (Excluding Naughton)	(1,777)	(557)	(737)
Naughton Low NO_x Burners	(1,000)		
Regional Gas Wells Post 1995	(13)		
Desolation Flats Project	1,072	12	295
Reasonably Foreseeable Development	1,640		
Cumulative Emissions	6,933	3,760	1,668

5.3.2.2 Cumulative Far-Field Air Quality Impacts

The CALPUFF model was applied to estimate far-field air quality and Air Quality Related Value (AQRV) impacts resulting from cumulative emissions including the Desolation Flats project, state permitted emission sources, producing natural gas wells and approved NEPA actions. Potential impacts on air quality were estimated at PSD Class I and Class II sensitive receptor areas. The analyzed sensitive receptor areas were comprised of:

$ Bridger Wilderness (Class I);
$ Fitzpatrick Wilderness (Class I);
$ Popo Agie Wilderness (Class II);
$ Wind River Roadless Area (Class II);
$ Dinosaur National Monument (Class II);
$ Savage Run Wilderness (Class I);
$ Mount Zirkel Wilderness (Class I), and
$ Rawah Wilderness (Class I).

The CALPUFF model was used to estimate ambient NO_2, SO_2, and PM_{10} concentrations to evaluate potential cumulative impacts and for comparison with applicable ambient air quality standards and PSD increments. The maximum cumulative impacts from all sources occurred at different sensitive areas depending upon the pollutant under consideration and the applied averaging time. As shown in Tables 5-3 and 5-4, the maximum cumulative impacts from all sources, including Desolation Flats, do not exceed the ambient air quality standards or the PSD Class I increments.

Table 5-3. Comparison of Cumulative Air Quality Impacts with Ambient Air Quality Standards

Pollutant and Averaging Time	Maximum Impact Location	Cumulative Impact (:g/m^3)	Monitored Back-ground Level (:g/m^3)	Maximum Impact Plus Back-ground (:g/m^3)	National Ambient Air Quality Standard (:g/m^3)	Wyoming Ambient Air Quality Standard (:g/m^3)	Colorado Ambient Air Quality Standard (:g/m^3)	Percentage of Most Stringent Ambient Air Quality Standard
NO_2 Annual	Bridger	0.763	3.4	4.16	100	100	100	4%
SO_2 3-hr	Dinosaur	2.886	29	31.886	1,300	1,300	700	5%
SO_2 24-hr	Dinosaur	0.862	18	18.862	365	260	365	7%
SO_2 Annual	Dinosaur	0.014	5	5.014	80	60	80	8%
PM_{10} 24-hr	Rawah	0.105	47	47.11	150	150	150	31%
PM_{10} Annual	Dinosaur	0.004	16	16.00	50	50	50	32%

Table 5-4. Comparison of Cumulative Impacts with PSD Class I Increments

Pollutant	Averaging Time	Total Project Impact (:g/m^3)	PSD Class I Increment (:g/m^3)	Percentage of Class I Increment (:g/m^3)
NO_2	Annual	0.763	2.5	31%
SO_2	3-hr	2.886	25	12%
SO_2	24-hr	0.862	5	17%
SO_2	Annual	0.014	2	0.7%
PM_{10}	24-hr	0.105	8	1.3%
PM_{10}	Annual	0.004	4	0.1%

5.3.2.3 Cumulative Visibility Impacts

The effects of cumulative emissions on visibility at the sensitive receptor areas were evaluated using the IWAQM/FLAG recommended method (see Air Quality Technical Report). In this method, visibility degradation resulting from cumulative source emissions was compared against a background visibility based on the mean of the 20 percent cleanest days from a long-term record of the IMPROVE aerosol monitoring data. The background data were previously described in Section 4.2.3.1.5. There are two thresholds of visibility change which are used for reporting purposes, the number of days in which the deciview change (delta-deciview or) dv) is 0.5 or greater and 1.0 or greater. These thresholds were also discussed in Section 4.2.3.1.5.

Table 5-5 presents a summary of the cumulative visibility impact analysis. The analysis indicates that there potentially would be a total of 25 days with greater than 0.5)dv and 7 days with greater than 1.0)dv. Table 5-6 lists the number of days greater than 0.5 and 1.0)dv and the maximum)dv for each sensitive area. Note that although there are 25 days listed, the impacts exceed the thresholds in several areas on the same calendar day. There are only 14 different calendar days with impacts in any area over 0.5) dv and 6 different calendar days with impacts over 1.0) dv. The greatest number of days greater than 0.5)dv occurs at the Bridger Wilderness Area. However, the maximum impact of the Desolation Flats Project alone at the Bridger Wilderness area is only 0.079) dv, and that occurred on a different day (April 16, 1995) than the maximum cumulative impact (April 10, 1995). On April 10, 1995, the day of maximum cumulative visibility impact, the Desolation Flats contribution to the cumulative total) dv at the Bridger Wilderness Area is zero) dv. On average, for the days in which the visibility impact is greater than 1.0) dv, the Desolation Flats project contribution is less than two percent, and for all days where the impact is greater than 0.5) dv, the average Desolation Flats contribution is five percent. In the absence of the Desolation Flats project, cumulative visibility impacts are reduced by two days with greater than 0.5) dv.

Table 5-5. Summary of Cumulative Visibility Impacts

Sensitive Area	Days Greater Than 0.5) dv	Days Greater Than 1.0) dv	Maximum) dv
Bridger Wilderness Area	9	5	2.315
Fitzpatrick Wilderness Area	3	1	1.696
Savage Run Wilderness	2	1	1.377
Popo Agie Wilderness Area	4	0	0.680
Rawah Wilderness	3	0	0.613
Dinosaur National Monument	2	0	0.572
Wind River Roadless Area	1	0	0.826
Mount Zirkel Wilderness	1	0	0.755
Total Visibility Event Days at All Areas	25	7	

Table 5-6. Cumulative Visibility Impacts for All Days Greater Than 0.5) dv

Rank	Sensitive Area	Julian Day	Cumulative Visibility Impact (φdv)	Desolation Flats Project Contribution (φdv)
1	Bridger Wilderness	100	2.315	0.000
2	Bridger Wilderness	264	1.913	0.000
3	Bridger Wilderness	107	1.794	0.005
4	Fitzpatrick Wilderness	100	1.696	0.000
5	Bridger Wilderness	110	1.442	0.014
6	Savage Run Wilderness	116	1.377	0.115
7	Bridger Wilderness	86	1.334	0.000
8	Bridger Wilderness	85	0.985	0.000
9	Fitzpatrick Wilderness	146	0.873	0.008
10	Wind River Roadless Area	110	0.826	0.015
11	Mount Zirkel Wilderness	116	0.755	0.093
12	Bridger Wilderness	124	0.752	0.004
13	Fitzpatrick Wilderness	124	0.716	0.000
14	Popo Agie Wilderness	146	0.680	0.018
15	Bridger Wilderness	146	0.660	0.016
16	Rawah Wilderness	116	0.613	0.076
17	Rawah Wilderness	113	0.611	0.000
18	Bridger Wilderness	106	0.606	0.079
19	Popo Agie Wilderness	106	0.582	0.073
20	Savage Run Wilderness	263	0.573	0.031
21	Dinosaur National Monument	355	0.572	0.144
22	Dinosaur National Monument	85	0.539	0.003
23	Rawah Wilderness	263	0.536	0.043
24	Popo Agie Wilderness	110	0.532	0.013
25	Popo Agie Wilderness	61	0.512	0.006

5.3.2.4 Cumulative Atmospheric Deposition Impacts

The potential impacts of cumulative emission sources on atmospheric deposition were analyzed using the Fox (1989) method (see Air Quality Technical Report). This method was used to estimate the potential change in acid neutralizing capacity (ANC) at each of 12 sensitive lakes. The cumulative potential impacts resulting from atmospheric deposition are summarized in Table 5-7. The predicted change in sensitive lake ANC levels resulting from cumulative source atmospheric deposition were found to be far below the levels of acceptable change.

Table 5-7. Summary of Potential Cumulative Atmospheric deposition Impacts

Sensitive Lake	Sensitive Area	Monitored Background ANC (:eq/l)	Level of Acceptable Change	Change In ANC (:eq/l)	Percentage of LAC
Black Joe Lake	Bridger Wilderness	69.0	10% (6.9 :eq/l)	0.246	3.56%
Deep Lake	Bridger Wilderness	61.0	10% (6.1 :eq/l)	0.256	4.19%
Hobbs Lake	Bridger Wilderness	68.0	10% (6.8 :eq/l)	0.133	1.95%
Upper Frozen Lake	Bridger Wilderness	5.7	1 :eq/l	0.271	27.1%
Ross Lake	Fitzpatrick Wilderness	61.4	10% (6.1 :eq/l)	0.073	1.19%
Lower Saddlebag	Popo Agie Wilderness	55.5	10% (5.6 :eq/l)	0.292	5.27%
Pothole A-8	Mount Zirkel Wilderness	16.0	1 :eq/l	0.194	19.4%
Seven Lakes	Mount Zirkel Wilderness	35.5	10% (3.6 :eq/l)	0.279	7.85%
Upper Slide Lake	Mount Zirkel Wilderness	24.7	1 :eq/l	0.199	19.9%
West Glacier Lake	Medicine Bow Wilderness	26.1	10% (2.6 :eq/l)	0.377	14.4%
Island Lake	Rawah Wilderness	64.6	10% (6.5 :eq/l)	0.218	3.37%
Rawah #4 Lake	Rawah Wilderness	41.2	10% (4.1 :eq/l)	0.236	5.72%

5.3.2.5 Discussion of Significance

The cumulative impact analysis predicts that the maximum criteria pollutant concentrations will not exceed federal or state ambient air quality standards. In addition, cumulative impacts are predicted to be less than the PSD Class I increments. Potential impacts to sensitive lake ANC are less than the applicable limits of acceptable change. Table 5-8 provides a summary of the cumulative impacts.

Visibility impacts of up to 25 days exceeding the 0.5) dv threshold are predicted as a result of cumulative emissions. However, the presence or absence of the Desolation Flats Project does not significantly change the predicted cumulative visibility impact. On only two of the 25 event days would the absence of Desolation Flats change the visibility impacts to levels below the thresholds, and these are only for days slightly over 0.5) dv. None of the) dv days over 1.0 would be changed to below the 1.0 threshold with the absence of the Desolation Flats project.

Of the two days that Desolation Flats would contribute to 0.5) dv impacts, one occurs at Dinosaur National Monument while the second occurs at Rawah Wilderness.

Table 5-8. Cumulative Impacts Summary

Air Quality Component	Potential Impacts
Criteria Pollutant Concentrations	
Ambient Air Quality Standards	Cumulative source concentrations are in compliance with applicable NAAQS, WAAQS and CAAQS • NO_2 concentration 4% of standard • SO_2 concentrations 5 - 8% of standards • PM_{10} concentrations 31 - 32% of standards
PSD Increments	Alternative A Gas Plant and Well Field concentrations are well below applicable PSD Class II increments • NO_2 concentration 31% of increment • SO_2 concentration 0.7 - 17% of increments • PM_{10} concentrations 0.1 - 1.3% of increments
Visibility Impacts	
Number of Days Greater Than 1.0)dv	Cumulative source potential visibility impacts are predicted to exceed the USFS/NPS 1.0)dv threshold for a total of 7 days • Bridger Wilderness 5 days • Fitzpatrick Wilderness 1 day • Wind River Roadless Area 0 days • Popo Agie Wilderness 0 days • Dinosaur National Monument 0 days • Savage Run Wilderness 1 day • Mount Zirkel Wilderness 0 days • Rawah Wilderness 0 days
Number of Days Greater Than 0.5)dv	Cumulative source potential visibility impacts are predicted to exceed the USFS/NPS 0.5)dv threshold for a total of 25 days • Bridger Wilderness 9 days • Fitzpatrick Wilderness 3 days • Wind River Roadless Area 1 day • Popo Agie Wilderness 4 days • Dinosaur National Monument 2 days • Savage Run Wilderness 2 days • Mount Zirkel Wilderness 1 day • Rawah Wilderness 3 days

Air Quality Component	Potential Impacts
Atmospheric Deposition Impacts	
Lake Acid Neutralizing Capacity Levels of Acceptable Change (LAC)	Changes in lake ANC resulting from cumulative sources would be range from 1.2% to 19.9% of the LACs, • Black Joe Lake 3.6% of LAC • Deep Lake 4.2% of LAC • Hobbs Lake 2.0% of LAC • Upper Frozen Lake 27.1% of LAC • Ross Lake 1.2% of LAC • Lower Saddlebag Lake 5.3% of LAC • Pothole A-8 Lake 19.4% of LAC • Seven Lakes 7.9% of LAC • Upper Slide Lake 19.9% of LAC • West Glacier Lake 14.4% of LAC • Island Lake 3.4% of LAC • Rawah #4 Lake 5.7% of LAC

5.3.2.6 Update of Cumulative Impacts

Scoping for the Desolation Flats project was initiated in June of 2000, and the previously presented cumulative impact assessment was completed in early 2001. Due to delays in publishing this document, the cumulative impacts analysis may no longer represent expected impacts given current conditions.

The Desolation Flats cumulative impact assessment was conducted utilizing a 1995 through 2000 emissions inventory. Since 1995, numerous air pollutant emission sources have been permitted by the WDEQ-AQD and the development of natural resources, including petroleum, natural gas and coal, has continued throughout the state. However, despite this continued development, current monitoring data suggest that visibility conditions and lake chemistry within the region have remained relatively stable, neither improving nor degrading significantly. Current monitoring data have not detected the cumulative visibility impacts predicted in this analysis.

A number of new development projects have been proposed within southwestern Wyoming since the completion of this analysis in 2001. In part, these new development projects include: Powder River Basin Oil and Gas Project, South Piney Natural Gas Development, Jonah Field Infill Drilling, Atlantic Rim CBM, Seminoe Road Gas Development, Wind River Natural Gas Development, Big Porcupine CBM, Copper Ridge Shallow Gas Development, Little Monument Infill Drilling, and the Pacific Rim Shallow Gas Development. Cumulative impacts that may result from all of these new development projects have yet to be determined.

The Powder River Basin Oil and Gas Project Final EIS published in January 2003 may provide more current estimates of cumulative impacts. Other air quality impacts analyses for the southwestern Wyoming region are underway, but are not yet available to the public. Preliminary results suggest that predicted potential cumulative impacts to visibility and atmospheric deposition may exceed significance criteria, although violations of Wyoming or federal pollutant concentration standards are unlikely. BLM expects that several environmental impact statements will be available to the public in the summer or fall of 2004. The following future documents may provide more timely estimates of potential cumulative impacts in the region.

- South Piney Natural Gas Development Project EIS: Contact project lead Carol Kruse at Carol _Kruse @blm.gov
- Jonah Infill Drilling Project EIS: Contact project lead Carol Kruse at Carol _Kruse @blm.gov
- Atlantic Rim Coalbed Methane Project EIS: Contact project lead David Simons at David _Simons@blm.gov
- Seminoe Road Gas Development Project EIS: Contact project lead David Simons at David_Simons@blm.gov
- Wind River Natural Gas Development Project EIS: Contact Ramon Nation, BIA - Wind River Agency.

CHAPTER 6: CONSULTATION AND COORDINATION

There were no changes to Chapter 6 text.

REFERENCES CITED

Page R-1, Add the following references to the DEIS References Cited section:

Belnap, J. K., J. Hilty, R. Rosentreter, J. Williams, S. Leonard, and D. Eldridge. 2001. Biological soil crusts: ecology and management. USDI-BLM Tech. Ref. 1730-2, Denver, CO.

IMPROVE - Interagency Monitoring of Protected Visual Environments. 2003. Annual Trends (5 Year Rolling Average) Annual Group 10, 50, 90 averages of reconstructed light extinction and the light scattering of the major aerosol types (April 30, 2003). Http://vista.circa.colostate.edu

U. S. Environmental Protection Agency. 1988. Control of Open Fugitive Dust Sources. EPA-450/3-88-008. Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina. September 1988.

U.S. Environmental Protection Agency, 2002. Air Toxics Database. Dose-Response Assessment for Assessing Health Risks Associated with Exposures to Hazardous Air Pollutants, Table 2 - Acute Dose-Response Values (12/02/2002). Office of Air Quality and Planning Standards.

U.S. Environmental Protection Agency, 2003. Air Toxics Database. Dose-Response Assessment for Assessing Health Risks Associated with Exposures to Hazardous Air Pollutants, Table 1 - Prioritized Dose-Response Values (10/28/2003). Office of Air Quality and Planning Standards.

SECTION 2: ADDENDUM AND ERRATA

GLOSSARY

There were no changes to Glossary text.

APPENDIX A: Criteria for Meeting "Acceptable Plan" in Oil and Gas Lease Terms, Desolation Flats Natural Gas Project

There were no changes to Appendix A text.

APPENDIX B: Standard Mitigation Guidelines

There were no changes to Appendix B text.

APPENDIX C: Reclamation Plan

There were no changes to Appendix C text.

APPENDIX D: Hazardous Materials Management Plan

There were no changes to Appendix D text.

APPENDIX E: Classification of Surface Drainages and Reservoirs/Springs According to NWI Maps
WYNDD Correspondence Regarding Sensitive Plant Species

There were no changes to Appendix E text.

APPENDIX F: Wildlife and Fish Species List
U.S. Fish and Wildlife Service Letter

There were no changes to Appendix F text.

APPENDIX G: Wildlife Resources – Locations and Types within the DFPA

There were no changes to Appendix G text.

SECTION 2: ADDENDUM AND ERRATA

APPENDIX H: Wildlife Monitoring/Protection Plan

There were no changes to Appendix H text.

APPENDIX I: Biological Assessment of Threatened, Endangered, and Proposed Species

Page I-14, delete 4th paragraph, starting with "Average annual water …"

Page I-15 under section 4.2.2 Fish Species, change to read the same as the paragraph in section 2.2.3.3 Colorado Pikeminnow, Bony …

Page I19, add the following mitigation measure under section 6.2 Fish Species:

> "Water used for well drilling operations would be obtained from an SEO-approved water well that is non-tributary to the Colorado River System."