Air Quality Impact Analysis Technical Support Document
(Volume 1 of 2)

Appendix A - Air Quality Impact Analysis Protocol
Appendix B - Near-field Modeling Analysis AERMOD Parameters
Appendix C - CALMET and CALPUFF Input Data
Appendix D - Pinedale Anticline Zone Test Analysis
Appendix E - CALPUFF Modeling Results

Draft Supplemental
Pinedale Anticline Oil and Gas Exploration and Development
Environmental Impact Statement

Prepared for

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LIST OF ACRONYMS AND ABBREVIATIONS

µeq/l	Microequivalents per liter
µg/m^3	Micrograms per cubic meter
ANC	Acid neutralizing capacity
AQD	Air Quality Division
AQRV	Air Quality Related Value
AQTSD	Air Quality Technical Support Document
ARS	Air Resource Specialists
BACT	Best available control technology
BLM	Bureau of Land Management
BTEX	Benzene, toluene, ethylbenzene, and xylene
C.F.R.	*Code of Federal Regulations*
CDPHE/APCD	Colorado Department of Public Health and Environment/Air Pollution Control Division
CO	Carbon monoxide
COGCC	Colorado Oil and Gas Conservation Commission
DAT	Deposition analysis thresholds
DEM	Digital elevation model
dv	Deciview
EIS	Environmental impact statement
FLAG	Federal Land Managers' Air Quality Related Values Workgroup
FLM	Federal Land Managers
f(RH)	Relative humidity factor
GRI	Gas Research Institute
HAP	Hazardous air pollutant
HNO_3	Nitric acid
hp	Horsepower
hp-hr	Horsepower-hour
IDEQ	Idaho Division of Environment Quality
IDLH	Immediately dangerous to life or health
IOGCC	Idaho Oil and Gas Conservation Commission
IWAQM	Interagency Workgroup on Air Quality Modeling
JIDP	Jonah Infill Drilling Project
kg/ha-yr	Kilograms per hectare per year
LAC	Level of Acceptable Change
LOP	Life of Project

LULC	Land use and land cover
MEI	Maximum exposed individual
MLE	Most likely exposure
MM5	Mesoscale meteorological model
N	Nitrogen
NAAQS	National Ambient Air Quality Standards
NEPA	*National Environmental Policy Act*
NH_3	Ammonia
NIOSH	National Institute for Occupational Safety and Health
NO_2	Nitrogen dioxide
NO_3	Nitrate
NOI	Notice of Installation
NO_x	Nitrogen oxides
NPS	National Park Service
NSR	New Source Review
NWS	National Weather Service
O_3	Ozone
PAPA	Pinedale Anticline Project Area
PFO	Pinedale Field Office
PM_{10}	Particulate matter less than or equal to 10 microns in size
$PM_{2.5}$	Particulate matter less than or equal to 2.5 microns in size
Ppb	Parts per billion
Protocol	Air Quality Impact Assessment Protocol
PSD	Prevention of Significant Deterioration
QA/QC	Quality Assurance/Quality Control
REL	Reference exposure level
RfC	Reference Concentrations for Chronic Inhalation
RFD	Reasonably foreseeable development
RFFA	Reasonably foreseeable future action
RMP	Resource Management Plan
ROD	Record of Decision
S	Sulfur
SO_2	Sulfur dioxide
SO_4	Sulfate
tpy	Tons per year
TRC	TRC Environmental Corporation

UDEQ-AQD	Utah Department of Environmental Quality-Air Quality Division
UDNR-DOGM	Utah Department of Natural Resources-Division of Oil, Gas, and Mining
URF	Unit risk factor
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
VOC	Volatile organic compound
WAAQS	Wyoming Ambient Air Quality Standards
WAQSR	Wyoming Air Quality Standards and Regulations
WDEQ	Wyoming Department of Environmental Quality
WOGCC	Wyoming Oil and Gas Conservation Commission
WRAP	Western Regional Air Partnership
WYDOT	Wyoming Department of Transportation

1.0 INTRODUCTION

This Air Quality Impact Analysis Technical Support Document (Air Quality TSD) was prepared to summarize analyses performed to quantify impacts from the proposed project in the Pinedale Anticline Project Area (PAPA) to ambient air quality and Air Quality Related Values (AQRVs) from: 1) air emissions resulting from development and production activities within the PAPA during 2005; 2) potential air emissions from development and production within the PAPA after 2005 that could occur under the Proposed Action and Alternative C; 3) potential air emissions after 2005 resulting from continued development and production activities under the No Action Alternative; and 4) air emissions from other documented regional emissions sources within the study area.

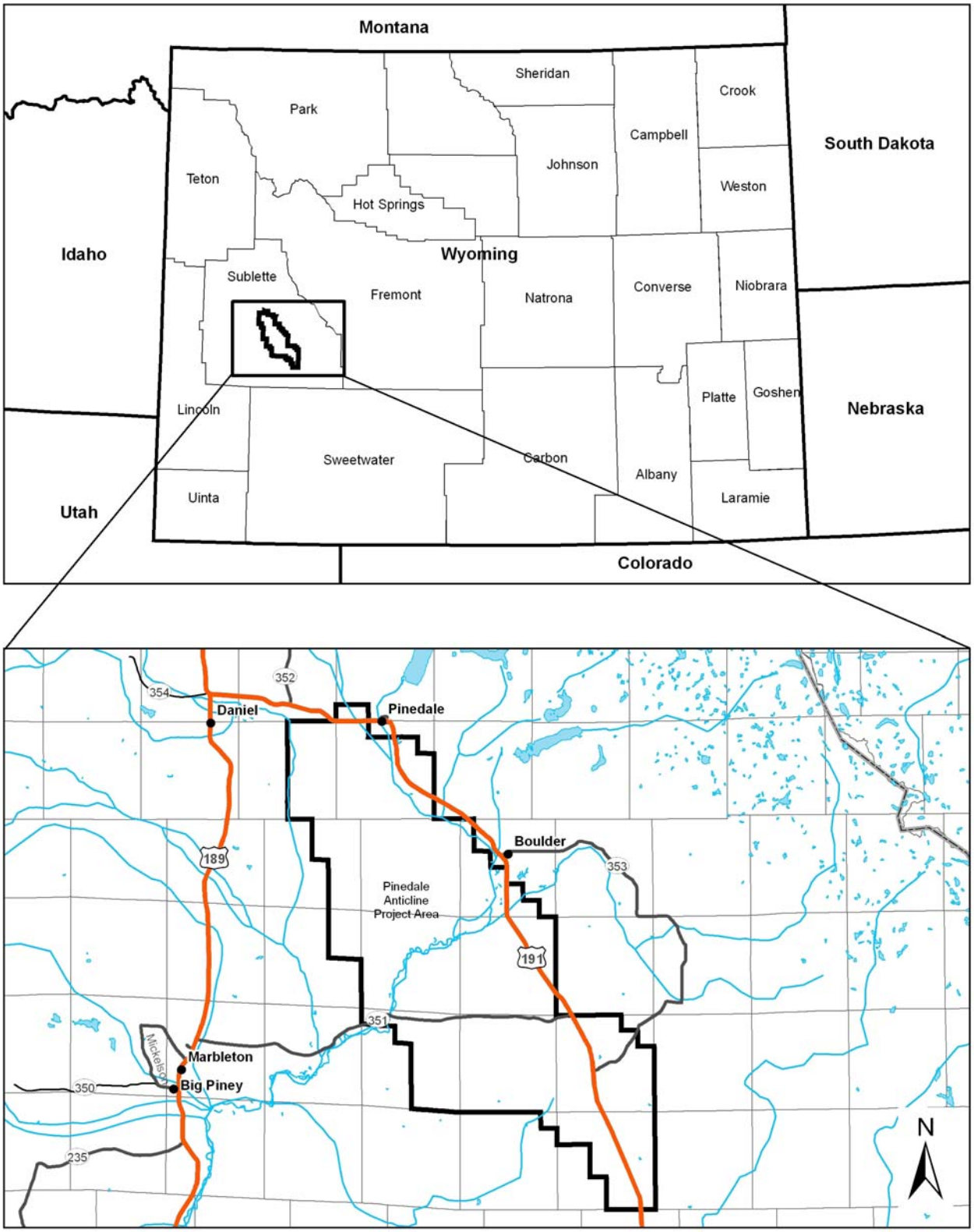
Ambient air quality impacts were quantified and compared to applicable state and federal standards. AQRV impacts (visibility [regional haze], acid deposition, and potential increases in acidification to acid sensitive lakes) were quantified and compared to applicable thresholds as defined in the Federal Land Managers' (FLMs') Air Quality Related Values Workgroup (FLAG), IWAQM guidance documents (FLAG, 2000 and IWAQM, 1998), and other state and federal agency guidance.

The methodologies utilized in the analysis were originally defined in an air quality impact assessment protocol (Protocol) prepared by TRC Environmental Corporation with input from the lead agency, U.S. Department of Interior, Bureau of Land Management (BLM), and project stakeholders including the U.S. Environmental Protection Agency (EPA), National Park Service (NPS), U.S. Department of Agriculture, Forest Service (USDA-FS), and Wyoming Department of Environmental Quality - Air Quality Division (WDEQ-AQD). The protocol is included in Appendix A.

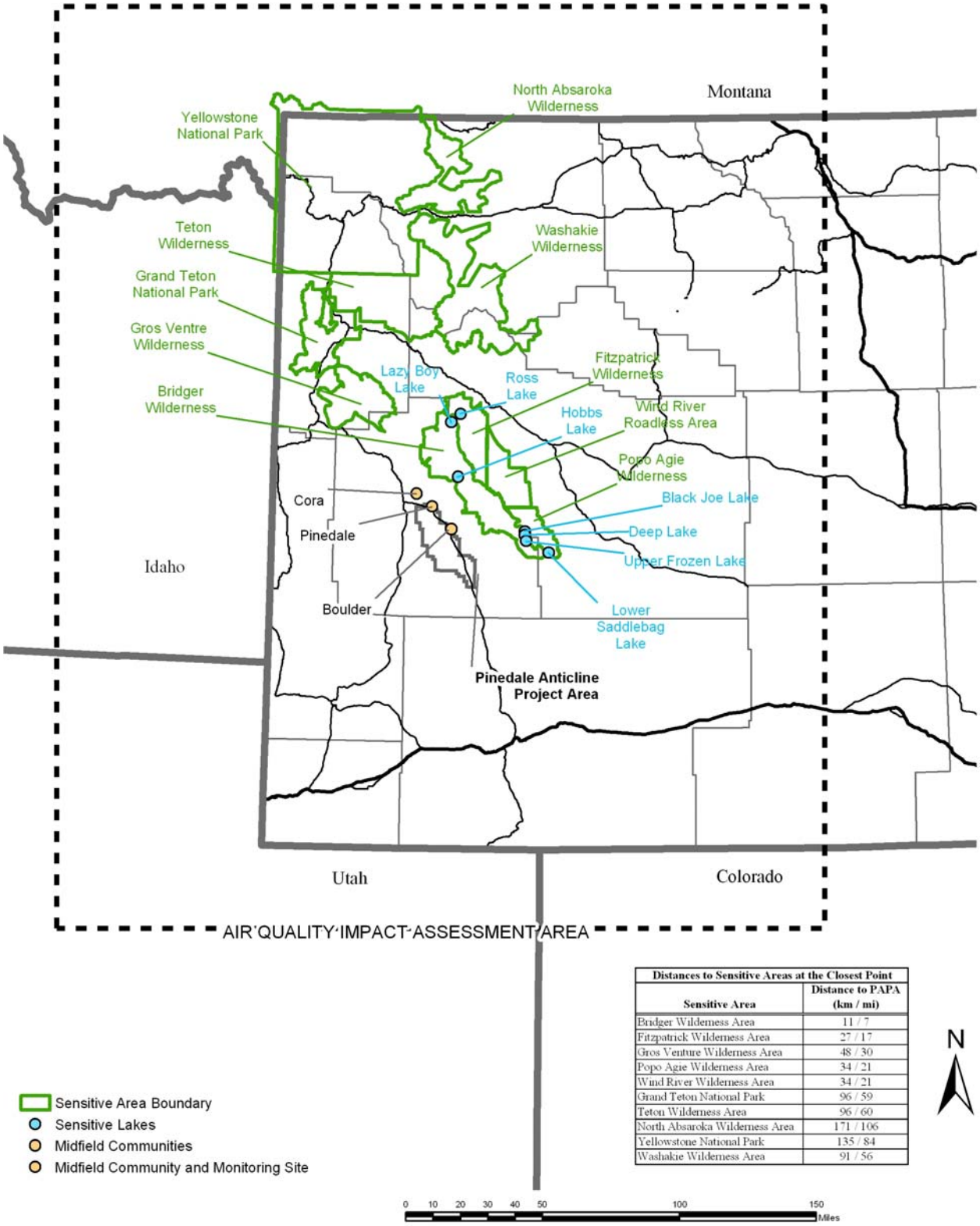
The project's location in west-central Wyoming required the examination of project and cumulative source impacts in Wyoming, northwestern Colorado, northeastern Utah, and southeastern Idaho within a defined study area (modeling domain) (Maps 1.1 and 1.2). The analysis area includes the area surrounding the proposed PAPA and all of the Bridger, Fitzpatrick, Gros Ventre, North Absaroka, Popo Agie, Teton, and Washakie Wilderness Areas; the Wind River Roadless Area; and Grand Teton and Yellowstone National Parks.

The remainder of this Air Quality TSD describes the project in further detail, provides a description of the alternatives evaluated, and presents a list of tasks performed for the study. Descriptions of the near-field air quality impact assessment methodology and impacts are provided in Chapter 3.0, and Chapter 4.0 describes the CALPUFF analyses performed for assessment of near-field and far-field (includes in-field and mid-field) direct and cumulative impacts.

Map 1.1
Pinedale Anticline Project Location, Sublette County Wyoming



Map 1.2
Air Quality Impact Assessment Area



Distances to Sensitive Areas at the Closest Point	
Sensitive Area	**Distance to PAPA (km / mi)**
Bridger Wilderness Area	11 / 7
Fitzpatrick Wilderness Area	27 / 17
Gros Venture Wilderness Area	48 / 30
Popo Agie Wilderness Area	34 / 21
Wind River Wilderness Area	34 / 21
Grand Teton National Park	96 / 59
Teton Wilderness Area	96 / 60
North Absaroka Wilderness Area	171 / 106
Yellowstone National Park	135 / 84
Washakie Wilderness Area	91 / 56

The Air Quality TSD is provided in two volumes. Volume 1 contains this Air Quality TSD Report, Appendix A (Air Quality Impact Analysis Protocol), Appendices B, C, and D, which provide supplemental air quality model parameter information, and Appendix E, the model results summary tables. Volume 2 of the Air Quality TSD contains the PAPA emissions inventory (Appendix F) and the regional emissions inventories (Appendix G).

1.1 PROJECT DESCRIPTION

Jointly referred to as the Operators, Ultra Resources, Inc. (Ultra), Shell Exploration & Production Company (Shell), Questar Market Resources including Wexpro Company (Questar), BP America Production Company, Stone Energy Corporation, Yates Petroleum Corporation, and others who agree to participate, have notified the BLM Pinedale Field Office (PFO) that they propose a new long-term development plan that includes limited year-round drilling and completions of natural gas wells within their leaseholds in the PAPA.

As of December 31, 2005, there were approximately 322 producing well pads and 457 producing wells in the PAPA. An additional 26 pads and 205 producing wells are proposed by the Operators in 2006. The Proposed Action consists of drilling approximately 4,400 new wells (in addition to the 662 wells drilled through 2006) within the PAPA, beginning in 2007. As part of the Proposed Action, there would be up to 48 drilling rigs operating in the PAPA after 2007. The Operators propose to install emissions controls to achieve Tier 2 equivalent emissions on approximately 60 percent of the drilling rig engines by 2009. Questar has previously committed (BLM, 2005a) to install Tier 2 equivalent emission controls on all year-round drilling rigs by 2008. In 2005, a liquids (condensate and produced water) gathering system was installed in the northern leaseholds in the PAPA, reducing overall emissions through reduction in truck traffic. As part of the Proposed Action, the Operators propose to install a liquids gathering system in the central and southern portions of the PAPA. Operation of the liquids gathering system would require installation of central gathering facilities within the PAPA which would have associated emissions. Condensate would be gathered within the PAPA and the crude petroleum would be transported via pipeline to processing facilities in southwestern Wyoming. Produced water would be gathered and trucked from a central location within the PAPA. Operators are currently investigating options for produced water disposal both within and outside of the PAPA. Questar Gas Management (QGM) is proposing to install an additional 7,440 horsepower (hp) of compression at the Pinedale/Gobblers Knob Compressor Station within the PAPA in 2006. QGM also intends to install an additional compression of 31,000 hp in 2009 and 15,500 hp in 2015 at the Pinedale/Gobblers Knob Compressor Station. Jonah Gas Gathering Company (JGGC) is proposing to install an additional 184,000 hp of compression at the Paradise Compressor Station, an additional 37,366 hp at the Falcon Compressor Station and 14,672 hp at the Bird Canyon Compressor Station (outside of the PAPA) all in 2011 as part of the Proposed Action. One 30-inch gas sales pipeline (the Rendezvous Phase 6 – R6) is proposed by Rendezvous Gas Services (RGS) to transport natural gas from the PAPA to the Granger and Blacks Fork processing plants in southwestern Wyoming. JGGC is proposing the 36-inch (Paradise to Bird Canyon or PBC Pipeline) and a connecting 45.5-mile long, 30-inch pipeline (Opal Loop III Pipeline) which would transport gas from the PAPA to the Opal and Pioneer gas processing plants. In conjunction with the proposed R6 Pipeline Project, RGS proposes to expand the existing 33.6-acre Granger Gas Processing Plant by 86.4 acres, for a total of 120 acres on BLM-administered federal lands in Section 16, T. 18 N., R. 111 W. The purpose of the proposed expansion is to construct and operate additional natural gas processing facilities to

sufficiently increase processing capacity for an anticipated increased input of 600 million standard cubic feet per day (MMSCF/D) of natural gas and crude petroleum. The current Granger Gas Processing Plant capacity is 600 MMSCF/D. The expansion would represent a 100 percent increase in treatment capacity.

BLM is also analyzing the No Action Alternative (Alternative A) in addition to the Proposed Action Alternative (Alternative B) and a third alternative (Alternative C). The No Action Alternative is defined as continued development of the PAPA under current BLM management practices. The Operators have provided estimates of new pads, expansion pads, and proposed number of wells that would be drilled under the No Action Alternative with continued management practices under the PAPA ROD (BLM, 2000b). However, at some point, the limits of the PAPA Record of Decision (BLM, 2000b) would be reached for maximum allowed well pads within specific Management Areas and further NEPA (National Environmental Policy Act) analysis would be required for continued development. The liquids gathering systems in the southern and central portions of the PAPA would not be installed under the No Action Alternative. The R6, PBC, and Opal Loop III pipelines would be constructed under the No Action Alternative.

Alternative C includes provisions for concentrating development activities to allow for maintenance of wildlife habitat, seasonal wildlife stipulations, as well as additional mitigation for air quality impacts. All components included in the Proposed Action Alternative are also a part of Alternative C, and therefore, emissions and associated impacts for the two alternatives would be similar, except that Alternative C includes additional mitigation.

1.2 RELATIONSHIP TO EXISTING PLANS AND DOCUMENTS

Potential impacts to air quality resulting from exploration and development of natural gas within the PAPA was previously analyzed in the Pinedale Anticline Oil and Gas Exploration and Development Environmental Impact Statement (PAPA EIS) (BLM, 2000a).

In 2004, Questar submitted a proposal to BLM for limited year-round drilling within their lease holdings in the PAPA. As part of their proposal for mitigation, Questar would install a gathering system to remove condensate and water from the PAPA (reducing truck traffic) and utilize Tier 2 compliant engines or alternate fuels on all drilling rig engines by 2007. In November 2004, BLM issued a Decision Record (BLM, 2004) approving Questar's limited year-round drilling proposal. Although potential emissions from the proposal were disclosed, a complete air quality impact analysis was not conducted because the operator-committed mitigation would cause the impacts to be reduced. In 2005, BLM issued a Decision Record (BLM, 2005a) which allowed for modification of the proposed condensate (crude petroleum) pipeline route and extended the requirement for the drilling rig engines to become Tier 2 compliant to 2008. Again, potential emissions were disclosed but a complete air quality impact analysis was not conducted.

Also in 2005, Anschutz, Shell and Ultra (ASU) submitted a proposal to BLM for a year-round demonstration project within the PAPA. In September, 2005, BLM issued a Decision Record (BLM, 2005b) that allowed each operator to have two drilling rigs on one pad each within crucial winter range during the winter of 2005-2006. For mitigation of the air quality impacts, the operators committed to reduce emissions by testing selective catalytic reduction on two of the drilling rigs and testing bi-fuel technology on the other four drilling rigs. Because the

proposal represented an overall reduction in emissions (the rigs would have operated in the PAPA outside of crucial winter range if the proposal were not approved), potential emissions were disclosed but a complete air quality impact analysis was not conducted.

In November of 2005, BLM issued a Decision Record (BLM, 2005c) that allowed Questar to have one additional winter drill rig. Four winter completions and one drill rig move were also approved.

Since the PAPA ROD (BLM, 2000b) was issued in July 2000, natural gas development within the PAPA has occurred at a pace greater than was analyzed in the PAPA DEIS (BLM, 1999) as disclosed in the subsequent NEPA documents. The PAPA ROD authorized the development of 700 producing wells and/or well pads, however, the ROD was ambiguous at to whether the limit was wells or well pads. The air quality impact analysis for the PAPA DEIS assumed 700 producing wells and up to eight drilling rigs operating in the PAPA at any one time. As of December 2005, there were approximately 457 producing wells in the PAPA with an additional 205 wells projected for 2006. Twenty-nine of the existing wells were drilled prior to the PAPA ROD, therefore, there would be potentially 633 producing wells by the end of 2006. The PAPA ROD also set an analysis threshold of 376.59 tpy NO_x emissions from compression and 693.5 tpy of NO_x emissions from all sources in the field. The PAPA ROD stated that additional environmental analysis would be conducted if the analysis thresholds were exceeded. Even though the limit of 700 producing wells and/or well pads has not been exceeded, the NO_x emissions from all sources in the PAPA currently exceeds the 693.5 tpy analysis limit specified in the PAPA ROD. For this reason, and to analyze the current proposal, BLM has determined that it is necessary to prepare a Supplemental Environmental Impact Statement (SEIS) which includes a complete and accurate air quality impact analysis.

The BLM Pinedale Resource Management Plan (RMP) (BLM, 1988) issued in 1988, amended in 2000, and currently under revision, directs the management of BLM administered lands within the PAPA. Management of oil and gas resources, as stated in the RMP, provides for leasing, exploration, and development of oil and gas while protecting other resource values. According to the RMP, all public lands in the PAPA are suitable for oil and gas leasing and development, subject to certain stipulations.

The most recent EIS completed in Sublette County is the Final EIS, Jonah Infill Drilling Project (JIDP), Sublette County, Wyoming (BLM, 2006). This Protocol represents a new and separate analyses from that performed for the JIDP EIS. With the exception of shared methodologies common to many regional modeling analyses, no portions of the JIDP air quality analysis were utilized in this study.

The BLM is currently developing a state-wide cumulative air quality analysis deemed the BLM State of the Atmosphere air quality analysis. That study is in the early development stages, and will utilize a 1-year 2002 Western Regional Air Partnership (WRAP) meteorological dataset and a separate inventory that is not yet available. No portions of the BLM State of the Atmosphere air quality analysis were utilized in this analysis.

1.3 STUDY TASKS

The assessment of impacts will include the completion of the following tasks:

1. **Direct Project Air Emissions Inventory.** Development of air pollutant emissions inventories for the project.
2. **Regional Source Air Emissions Inventory.** Development of an air pollutant emissions inventory for other regional sources not represented by background air quality measurements, including sources from the following:
    - state-permitted sources
    - reasonably foreseeable future actions (RFFA, and
    - reasonably foreseeable development (RFD).
3. **Direct Project Near-Field Analysis.** Assessment of near-field air quality concentration impacts resulting from activities proposed within the PAPA.
4. **Direct Project Far-Field Impact Analysis.** Assessment of far-field air quality concentration and AQRV impacts resulting from proposed project activities.
5. **Direct Project In-Field Analysis.** Assessment of concentration impacts within the PAPA resulting from the project.
6. **Direct Project Mid-Field Analysis.** Assessment of mid-field visibility impacts to regional communities resulting from the project.
7. **Cumulative Far-Field Impact Analysis.** Assessment of far-field air quality concentration and AQRV impacts resulting from proposed project activities and other regional sources.
8. **Cumulative In-Field Analysis.** Assessment of concentration impacts within the PAPA resulting from the project and other regional sources.
9. **Cumulative Mid-Field Impact Analysis.** Assessment of mid-field air quality concentration and AQRV impacts resulting from activities proposed within the PAPA and other regional sources.

2.0 EMISSIONS INVENTORY

2.1 PROJECT EMISSIONS

The direct project emissions inventory for the PAPA is divided into four sections in Appendix:

- 2005 Actual Emissions Inventory (Section.1),
- 2005 Potential Emissions Inventory (Section 2),
- Proposed Action Emissions Inventory (Section 3), and
- No Action Emissions Inventory (Section 4).

Calculation methods are similar for each emissions inventory except as noted in the following sections. Specific details for each inventory are provided in the respective sections of Appendix F.

Criteria pollutant and hazardous air pollutant (HAP) emissions were inventoried for construction activities, production activities, and ancillary facilities. Criteria pollutants included nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), volatile organic compounds (VOCs), particulate matter less than 10 microns in diameter (PM_{10}), and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). HAPs consist of n-hexane; benzene, toluene, ethylbenzene, and xylene (BTEX); and formaldehyde. All emission calculations were completed in accordance with WDEQ-AQD oil and gas guidance (WDEQ-AQD 2001), WDEQ-AQD additional guidance for the Jonah and Pinedale Anticline Gas Fields (WDEQ-AQD 2004), stack test data, EPA's AP-42, or other accepted engineering methods (see Appendix F, Section1). Actual 2005 emissions were obtained from emissions inventories submitted by PAPA Operators to WDEQ-AQD, when available. Emissions not quantified in these inventories were conservatively assumed to be equal to those calculated for the 2005 potential emissions inventory.

2.1.1 Construction Emissions

Construction activities are a source of primarily criteria pollutants. Emissions would occur from construction (well pads, roads, gathering pipelines, and ancillary facilities), drilling, completion/testing, traffic, and wind erosion. Well development rates were provided by the Operators based on their future projections for both the Proposed Action Alternative and the No Action Alternative. These well development rates vary by alternative. Detailed well development rates per year can be found in the tables of Appendix F.

Emissions from construction of well pads and roads and traffic include fugitive PM_{10} and $PM_{2.5}$. Other criteria pollutant emissions would occur from diesel combustion in haul trucks and heavy construction equipment. On well pads and resource roads, water would be used for fugitive dust control, with a control efficiency of 50%. On local roads, magnesium chloride would be used for dust control, with a control efficiency of 85%.

After the well pad is constructed, rig-move/drilling would begin. Emissions would include fugitives from unpaved road travel to and from the drilling site. There would be emissions from diesel drilling engines and from boilers in the winter months. Emissions from well completion and testing would include fugitive PM_{10} and $PM_{2.5}$ from traffic. It would also include combustion emissions from diesel fracturing engines and haul truck tailpipes. All completions would be “green completions” with no flaring other than for upset/emergency conditions.

Pollutant emissions would also occur from gathering pipeline installation activities, including general construction activities, travel to and from the pipeline construction site, and diesel combustion from on-site construction equipment.

Construction emission calculations are provided in detail, showing all emission factors, input parameters, and assumptions, in Appendix F.

2.1.2 Production Emissions

Field production equipment and operations would be a source of criteria pollutants and HAPs including BTEX, n-hexane, and formaldehyde. Pollutant emission sources during field production would include:

- combustion engine emissions and fugitive dust from road travel to and from production sites;
- diesel combustion emissions from haul trucks;
- combustion emissions from production site heaters;
- fugitive VOC/HAP emissions from production site equipment leaks;
- condensate storage tank flashing and flashing control;
- glycol dehydrator still vent flashing;
- wind erosion from well pad disturbed areas
- processing units at gas plants; and
- natural gas-fired reciprocating internal combustion compressor engines

Fugitive PM_{10} and $PM_{2.5}$ emissions would occur from road travel and wind erosion from well pad disturbances. Criteria pollutant emissions would occur from diesel combustion in haul trucks traveling in the field during production.

Heaters required at production facilities include separator/indirect line heaters and dehydrator reboiler heaters. These heaters are sources of mainly NO_x and CO as well as small amounts of VOCs. Emissions from these sources were calculated on run-time percentages for both the summer and winter seasons based on data provided by Operators.

VOC and HAP emissions would occur from fugitive equipment leaks (i.e., valves, flanges, connections, pump seals, and opened lines). Condensate storage tank flashing and glycol dehydrator still vent flashing emissions also would include VOC/HAP emissions. VOC and HAP emissions would decrease over the life of an individual well due to declines in condensate and gas production. Emissions from these sources were based on information provided by Operators.

Production emission calculations are provided in detail, showing all emission factors, input parameters, and assumptions, in Appendix F.

2.1.3 Total Field Emissions

Estimates of maximum potential annual emissions in the PAPA under the No Action and Proposed Action alternatives, and for year 2005 are shown in Table 2.1. Maximum potential annual emissions assume construction and production occurring simultaneously in the field for the maximum emissions year for each project alternative.

Table 2.1 Estimated Potential Emissions by Alternative (tpy), Pinedale Anticline Project.

Source	Pollutant	Year 2005	Alternative A (No Action) 2007	Alternative B (Proposed Action) 2009
Construction Emissions				
Drill Rigs	NO_x	2590.9	4066.5	3232.6
	CO	2031.6	2445.2	2307.0
	SO_2	221.0	48.5	55.7
	PM_{10}	133.5	160.4	130.3
	$PM_{2.5}$	133.5	160.4	130.3
	VOC	244.5	292.9	271.3
Fugitives (Pad/Road Construction, Traffic, Completions, etc...)	NO_x	427.4	641.8	559.4
	CO	305.3	493.5	428.1
	SO_2	10.6	15.6	14.4
	PM_{10}	682.2	712.6	415.9
	$PM_{2.5}$	144.8	143.7	82.7
	VOC	192.9	66.1	57.0
Production Emissions				
Compression:	NO_x	421.9	472.2	532.1
	CO	157.7	175.7	235.5
	SO_2	0.0	0.0`	0.0
	PM_{10}	0.0	0.0	0.0
	$PM_{2.5}$	0.0	0.0	0.0
	VOC	320.5	353..5	357.1
Granger Gas Plant (Expansion)	NO_x	301.7	301.7	301.7
	CO	322.8	322.8	322.8
	SO_2	0.0	0.0	0.0
	PM_{10}	0.0	0.0	0.0
	$PM_{2.5}$	0.0	0.0	0.0
	VOC	140.2	140.2	140.2
Wind Erosion	PM_{10}	254.8	357.2	440.8
	$PM_{2.5}$	101.9	142.9	176.3
Fugitives (Heaters, dehys, tanks, traffic, other production equipment, etc…)	NO_x	72.2	119.8	108.8
	CO	251.1	318.7	54.8
	SO_2	0.2	0.5	0.6
	PM_{10}	128.5	311.7	73.7
	$PM_{2.5}$	21.2	51.3	17.8
	VOC	1736.5	1396.2	1150.7
Total	NO_x	3512.4	5602.0	4734.6
	CO	2745.7	3755.9	2978.3
	SO_2	231.8	64.6	70.7
	PM_{10}	1199.0	1541.9	1060.7
	$PM_{2.5}$	401.4	498.3	407.1
	VOC	2494.4	2248.9	1976.3

Well pad construction emissions were based on the number of pads proposed per year and their estimated size and scale. Drilling, drilling traffic, completions, and completion traffic were based on the number of wells developed per year.

Production emissions were calculated based on the total number of producing wells in the field. Total producing wells were equal to the difference in number of wells proposed and the number

of wells constructed per year. A production decline factor was applied to all wells in production based on actual data from current wells provided by the Operators. This allows estimation of emissions from these sources as production volumes decrease over time. Annual emissions estimates for each project alternative for each year of field development are provided in Appendix F.

2.2 REGIONAL EMISSIONS INVENTORY

An emissions inventory of industrial sources within the PAPA cumulative modeling domain was prepared for use in the cumulative air quality analysis. The modeling domain included portions of Wyoming, Colorado, Utah, and Idaho (see Map 1.2). Industrial sources and oil and gas wells permitted within a defined time frame (January 1, 2005 through February 1, 2006) through state air quality regulatory agencies and state oil and gas permitting agencies were researched. The subset of these sources which had begun operation as of the inventory end-date was classified as state-permitted sources, and those not yet in operation were classified as RFFA. Also included in the regional inventory were industrial sources proposed under NEPA in the State of Wyoming. The developed portions of these projects were assumed to be either included in monitored ambient background or included in the state-permitted source inventory. The undeveloped portions of projects proposed under NEPA were classified as RFD. In accordance with definitions agreed upon by BLM, EPA, WDEQ-AQD, and USDA FS for use in EIS projects, RFD was defined as 1) the NEPA-authorized but not yet developed portions of Wyoming NEPA projects, and 2) not yet authorized NEPA projects for which air quality analyses were in progress and for which emissions had been quantified.

A summary of the regional inventory is shown in Table 2.2. Values presented in Table 2.2 represent the change in emissions between the inventory start-date (January 1, 2005) and the inventory end-date (February 1, 2006).

The regional inventory, including methodologies used to compile the regional source emissions, are provided in Appendix G and includes a description of the data collected, the period of record for the data collected, inclusion and exclusion methodology, stack parameter processing methods, and the state-specific methodologies required due to significant differences in the content and completeness of data obtained from each state.

Table 2.2 Regional Inventory Summary of Emissions Changes from January 1, 2005 to February 1, 2006.

State	Source Category	Quantity of Sources	Emissions NO_x (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Colorado	State-permitted[1]	5	97.8	1.4	2.0	2.0
	RFD	0	--	--	--	--
	Excluded	82	--	--	--	--
Idaho	State-permitted[2]	4	18.9	4.0	45.9	45.9
	RFD	0	--	--	--	--
	Excluded	9	--	--	--	--
Utah	State-permitted[3]	34	13.7	(40.4)	10.0	10.0
	RFD	0	--	--	--	--
	Excluded	1	--	--	--	--
Wyoming	State-permitted[4]	150	(2,705.0)	145.7	418.6	418.6
	RFD[5]	46	6,427.8	406.1	2923.9	802.8
	Excluded	1452	--	--	--	--
Total	State Permitted	193	(2,574.6)	110.7	476.4	476.4
	RFD	46	6,465.3	406.1	2923.9	802.8
	Excluded	1,544	--	--	--	--
Total Change		--	3,853.2	516.8	3,400.4	1,279.3

1 See Appendix G, Tables G.1 and G.9.
2 See Appendix G, Table G.3.
3 See Appendix G, Tables G.5 and G.9.
4 See Appendix G, Tables G.7 and G.9.
5 See Appendix G, Table G.10.

3.0 NEAR-FIELD MODELING ANALYSES

3.1 MODELING METHODOLOGY

A near-field ambient air quality impact analysis was performed to quantify the maximum criteria pollutants (PM_{10}, $PM_{2.5}$, SO_2, NO_2, and CO) and HAPs (BTEX, n-hexane, and formaldehyde) impacts that could occur within and near the PAPA. These impacts would result from emissions associated with project construction and production activities, and are compared to applicable ambient air quality standards and significance thresholds. All modeling analyses were performed in general accordance with the Protocol presented in Appendix A with input from the BLM and members of the Air Quality Stakeholders Group, including the EPA, USDA-FS, NPS, and WDEQ-AQD.

The EPA screening methodology Scheffe (1988) for ozone analysis, which utilizes NO_x and VOC emissions ratios to calculate O_3 concentrations, was planned for inclusion in this Draft SEIS. However, BLM, with the agreement of the Air Quality Stakeholder Group, has determined that the CALGRID model for ozone impact analysis is the most appropriate method for estimating ozone impact from the PAPA. Results from the CALGRID modeling analysis will be released as a supplement to the Air Quality TSD for this Draft SEIS.

The EPA's guideline dispersion model, AERMOD (version 04300), was used to assess near-field impacts of criteria pollutants PM_{10}, $PM_{2.5}$, SO_2, NO_2 and CO, and to estimate short-term and long-term HAP impacts. One year of meteorology data collected in the Jonah Field was used with the AERMOD dispersion model to estimate these pollutant impacts. Various construction and production activities were modeled to provide analyses for a complete range of alternatives and activities. For each pollutant, the magnitude and duration of emissions from each project phase (i.e., construction or production) emissions activity were examined to determine the maximum emissions scenario for modeling.

Modeling analyses were performed to quantify near-field pollutant concentrations within and nearby the PAPA from project-related emissions sources for a range of scenarios to assure that the maximum near-field impacts were estimated. Impacts from scenarios including the construction of well pads, well drilling activities, and field compression were modeled. Drill rig with emissions at EPA Tier 0 (AP-42 levels), Tier 1, and Tier 2 levels were evaluated.

3.2 METEOROLOGY DATA

One year of surface meteorological data, collected in Jonah Field from January 1999 through January 2000, was used in the analysis. A wind rose for these data is presented in Figure 3.1. The Jonah Field meteorology data included hourly surface measurements of wind speed, wind direction, standard deviation of wind direction [sigma theta], and temperature. These data were processed using the AERMET preprocessor to produce a dataset compatible with the AERMOD dispersion model. AERMET was used to combine the Jonah Field surface measurements with twice daily sounding data from Riverton, Wyoming, cloud cover data collected at Big Piney, Wyoming, and solar radiation measurements collected at Pinedale, Wyoming. Seasonal values for albedo, Bowen ratio and surface roughness length, for land use type “desert shrubland”, were

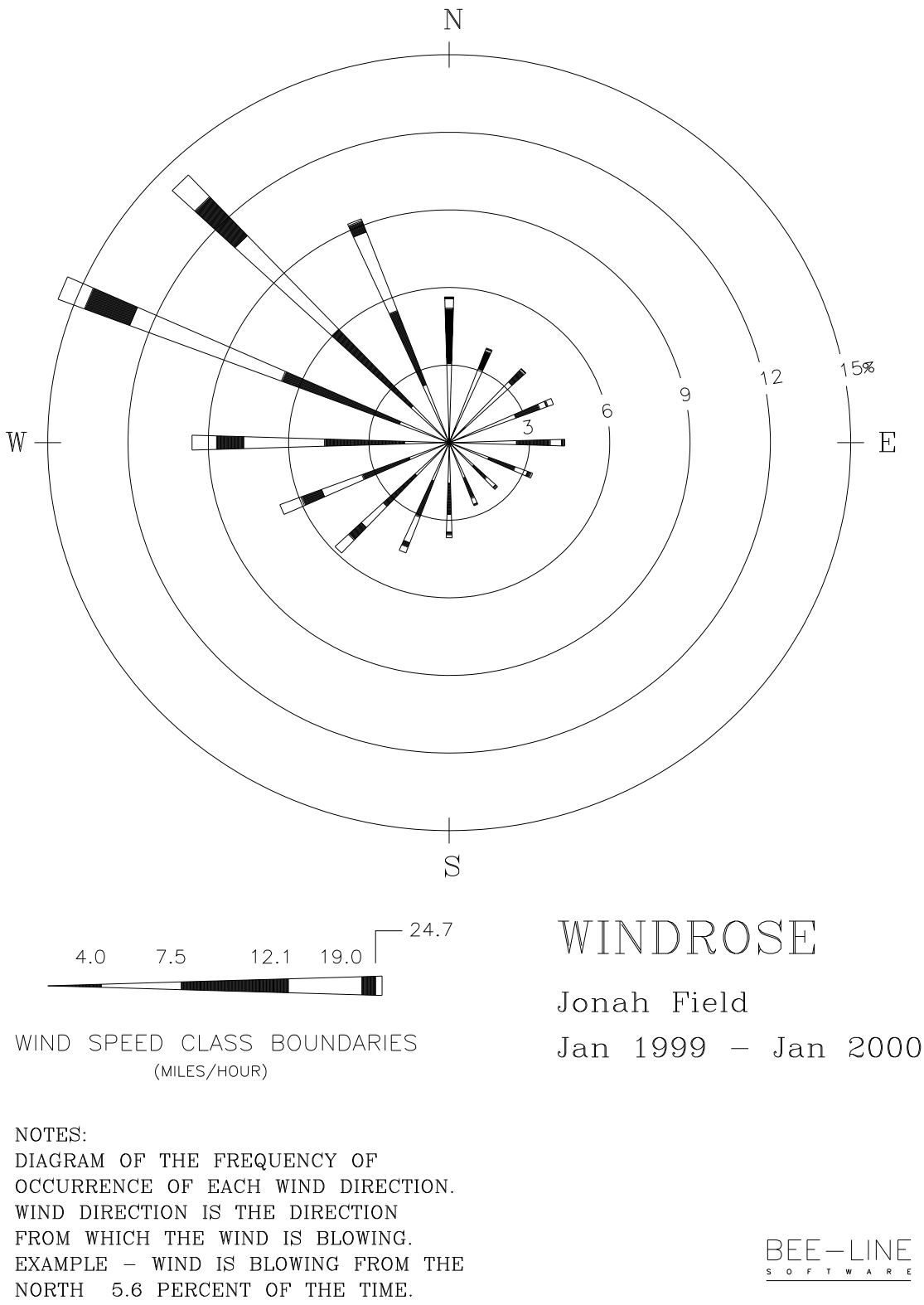


Figure 3.1 Jonah Field Meteorological Data Windrose

selected from tables in the AERMET user's guide and used in processing the meteorological data.

3.3 BACKGROUND POLLUTANT CONCENTRATIONS

Background concentration data collected for criteria pollutants at regional monitoring sites were added to concentrations modeled in the near-field analysis to establish total pollutant concentrations for comparison to ambient air quality standards. The most representative monitored regional background concentrations available for criteria pollutants as identified by WDEQ-AQD are shown in Table 3.1.

Table 3.1 Near-Field Analysis Background Ambient Air Quality Concentrations (Micrograms per Cubic Meter [$\mu g/m^3$])

Pollutant	Averaging Period	Measured Background Concentration
CO[1]	1-hour	1,979
	8-hour	931
NO_2[2]	Annual	8
O_3[2]	8-hour	157
PM_{10}[2]	24-hour	32
	Annual	9
$PM_{2.5}$[3]	24-hour	15
	Annual	6
SO_2[4]	3-hour	132
	24-hour	43
	Annual	9

1 Background data collected during 2005 in Yellowstone National Park, Wyoming, monitoring site near "Old Faithful."
2 Background data collected approximately 5 miles south-west of Boulder, Wyoming during the period April 2005 – March 2006.
3 Background data collected by WDEQ-AQD in Pinedale, Wyoming during the period July 2005 – June 2006.
4 Data collected at LaBarge Study Area, Wyoming at the Northwest Pipeline Craven Creek Site 1982-1983.

3.4 CRITERIA POLLUTANT IMPACT ASSESSMENT

The near-field criteria pollutant impact assessment was performed to estimate maximum potential impacts of PM_{10}, $PM_{2.5}$, SO_2, NO_2, and CO from project emissions sources including well site and compressor station emissions. Maximum predicted concentrations in the vicinity of project emissions sources were compared with the Wyoming Ambient Air Quality Standards (WAAQS), National Ambient Air Quality Standards (NAAQS), and applicable Prevention of Significant Deterioration (PSD) Class II increments shown in Table 3.2. This NEPA analysis compared potential air quality impacts from project alternatives to applicable ambient air quality standards and PSD increments. The comparisons to the PSD Class I and II increments are intended to evaluate a threshold of concern for potential impacts, and does not represent a regulatory PSD increment comparison. Such a regulatory analysis is the responsibility of the state air quality agency (under EPA oversight).

Table 3.2 Ambient Air Quality Standards and Class II PSD Increments for Comparison to Near-Field Analysis Results (μg/m^3).

Pollutant/Averaging Time	NAAQS	WAAQS	PSD Class II Increment[1]
CO			
1-hour[2]	40,000	40,000	--[3]
8-hour[2]	10,000	10,000	--
NO_2			
Annual[4]	100	100	25
PM_{10}			
24-hour[2]	150	150	30
Annual[4]	50	50	17
$PM_{2.5}$			
24-hour	65 (35)[5]	65 (35)[5]	--
Annual[4]	15	15	--
SO_2			
3-hour[2]	1,300	1,300	512
24-hour[2]	365	260	91
Annual[4]	80	60	20

1 The PSD demonstrations serve information purposes only and do not constitute a regulatory PSD increment consumption analysis.
2 No more than one exceedance per year.
3 -- = No PSD Class II increment has been established for this pollutant.
4 Annual arithmetic mean.
5 Revised NAAQS effective December 18, 2006. An area is in compliance with the standard if the 98th percentile of 24-hour $PM_{2.5}$ concentrations in a year, averaged over three years, is less than or equal to the level of the standard.

The AERMOD model was used to estimate the near-field concentrations of PM_{10}, $PM_{2.5}$, SO_2, NO_2, and. CO. AERMOD was run using 1 year of AERMET preprocessed Jonah Field meteorology data following all regulatory default switch settings. Short-term (24-hour) $PM_{10}/PM_{2.5}$ emissions would be greatest during the resource road/well pad construction phase of field development, and were modeled to determine compliance with the 24-hour $PM_{10}/PM_{2.5}$ WAAQS and NAAQS. For determining compliance with the annual $PM_{10}/PM_{2.5}$ WAAQS and NAAQS well drilling operations were modeled. Similarly, SO_2 emissions would be greatest from well drilling operations and were modeled for WAAQS and NAAQS compliance. Impact analyses of CO emissions from field compression and NO_x emissions from both field compression and drilling activities were evaluated.

3.4.1 $PM_{10}/PM_{2.5}$

Maximum localized $PM_{10}/PM_{2.5}$ impacts would result from well pad and road construction activities and from wind erosion. These emissions would be temporary in nature, and the impacts would be greatest at and immediately adjacent to their source and would decrease rapidly with distance. A modeling scenario to evaluate well pad and road construction activities for short-term (24-hour) $PM_{10}/PM_{2.5}$ impacts was developed assuming a one-section land area (1 square mile (mi^2)) and placing well pad and access road construction activities in each of four quarter sections. Twenty-acre well pads with 3/16 mile resource roads were used. Model receptors were placed, beginning 250 meters from the well pads and resources roads, at 50 meter spacing for a single row, then at 100 meter intervals out to 1 km. Flat terrain was assumed for this modeling scenario. Figure 3.2 presents the configuration used to model the well pad and resource road scenario. Volume sources were used to represent emissions from well pads and roads. The emissions used for modeling the well pad and resource road construction are provided in Appendix B and are further detailed in Appendix F. Hourly emission rate adjustment factors were applied to limit construction emissions to daytime hours. Wind erosion emissions were modeled for all hours where the wind speed exceeded a threshold velocity

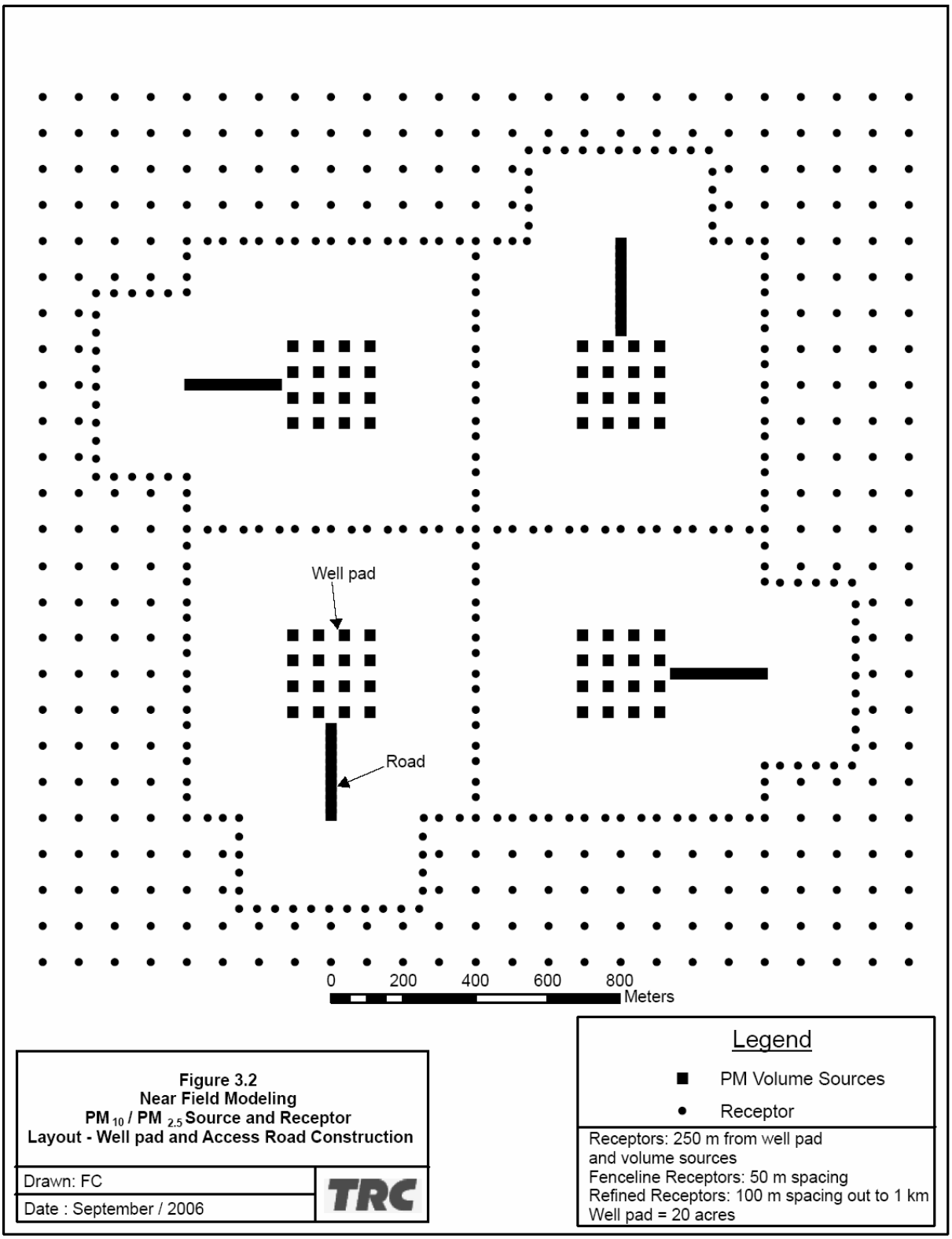


Figure 3.2 Near Field Modeling $PM_{10}/PM_{2.5}$ Source and Receptor Layout – Well pad and Access Road Construction

Defined by emissions calculations performed using AP-42 Section 13.2.5, Industrial Wind Erosion (EPA 2004).

Two modeling scenarios to evaluate well drilling activities for long-term (annual) $PM_{10}/PM_{2.5}$ impacts were also developed using a one-section land area and placing well drilling activities in each of four quarter sections. One scenario considered single drill rigs in each of four quarter sections (one per well pad), and the other scenario had two pairs of drill rigs placed in two of the four quarter sections, with the drill rigs in each pair spaced 1/8 mile apart (2 drill rigs per well pad). Model receptors were placed, beginning 250 meters from the drill rigs, at 50 meter spacing for a single row, then at 100 meter intervals out to 1 km and 250 meter spacing out to 10 km. Flat terrain was assumed for these modeling scenarios. Figures 3.3 and 3.4 illustrate the configurations used to model the drill rigs. Drilling rigs were modeled as point sources, with aerodynamic building downwash from the rig structures. For each of these scenarios drill rig emissions at EPA Tier 1 and Tier 2 levels were modeled. An additional model run was performed with drill rig emissions at Tier 0 (AP-42 levels) assuming two drill rigs on a single well pad spaced 1/8 mile apart. The emissions used for modeling the drill rigs are provided in Appendix B and are further detailed in Appendix F.

Table 3.3 presents the maximum modeled $PM_{10}/PM_{2.5}$ concentrations, for each modeling scenario. When the maximum modeled concentration was added to representative background concentrations, it was demonstrated that PM_{10} and $PM_{2.5}$ concentrations for all scenarios comply with the WAAQS and NAAQS for PM_{10} and $PM_{2.5}$.

Emissions associated with temporary construction activities do not consume PSD increment; therefore, the PM_{10} emissions are excluded from increment consumption comparison.

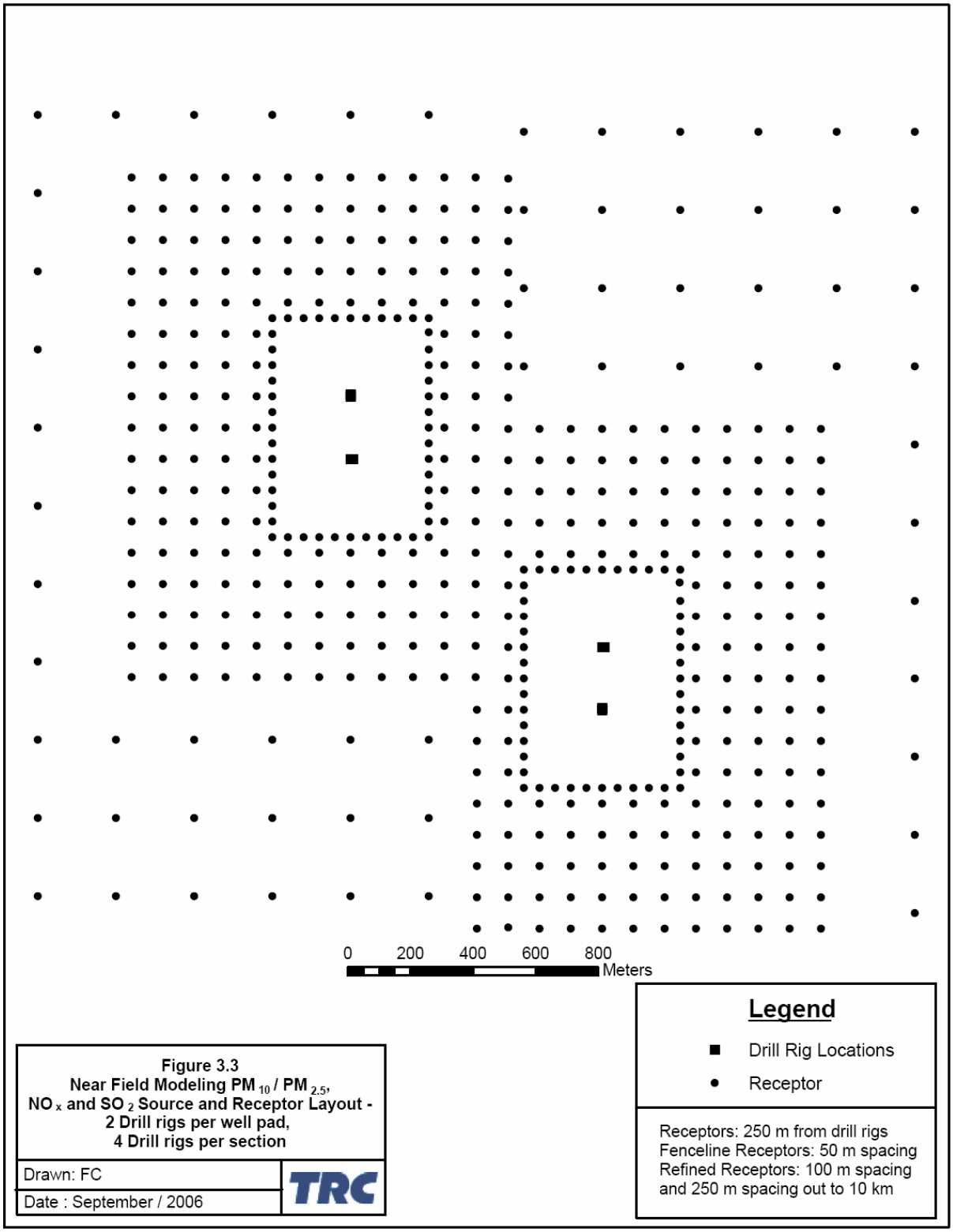


Figure 3.3 Near Field Modeling $PM_{10}/PM_{2.5}$ NO_x and SO_2 Source and Receptor Layout – 2 Drill rigs per well pad, 4 Drill rigs per section

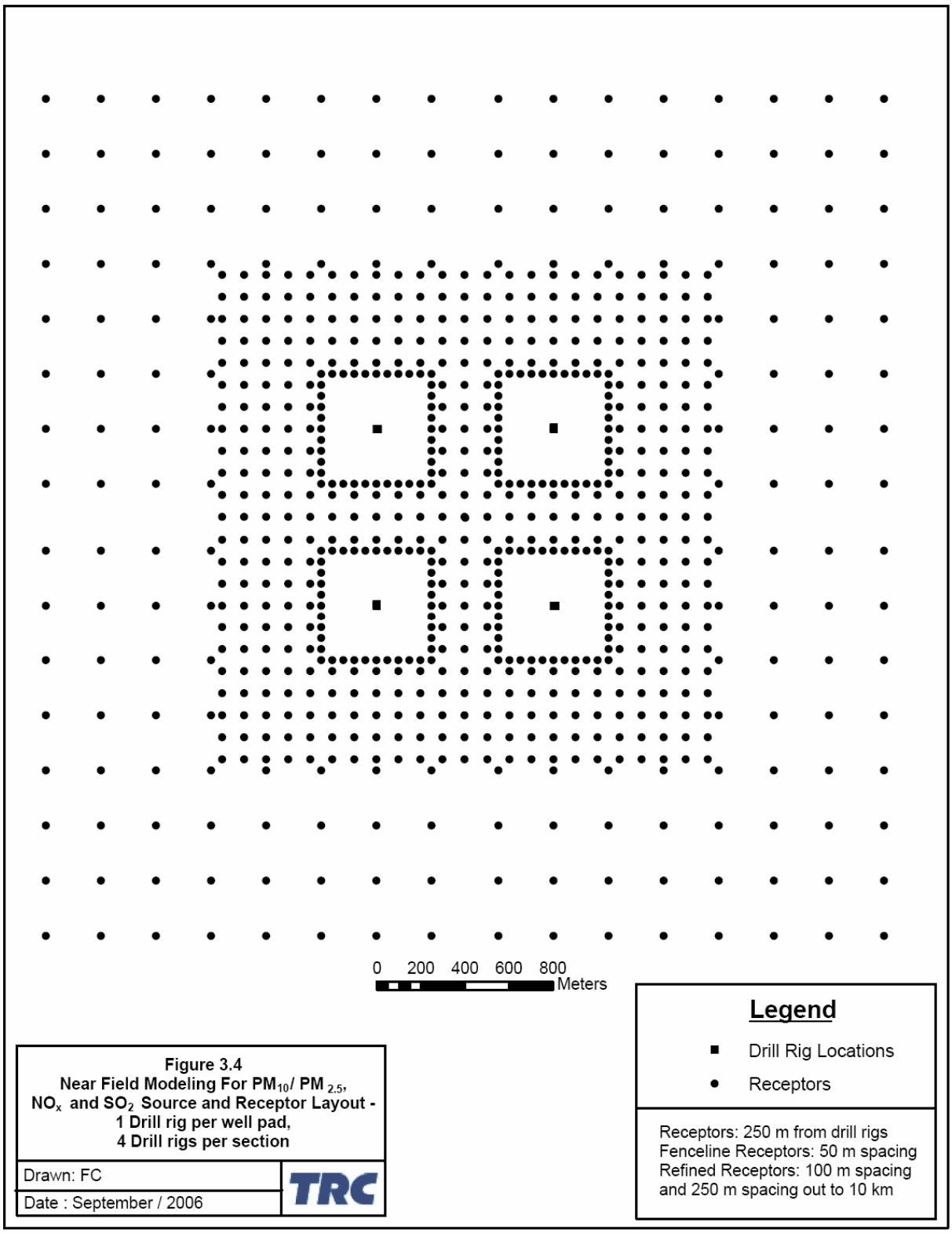


Figure 3.4 Near Field Modeling for $PM_{10}/PM_{2.5}$ NO_x and SO_2 Source and Receptor Layout – 1 Drill rig per well pad, 4 Drill rigs per section

Table 3.3 Maximum Modeled $PM_{10}/PM_{2.5}$ Concentrations, Pinedale Anticline Project.

Scenario	Pollutant	Averaging Time	Direct Modeled ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Predicted ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
20-acre well pad, 4 well pads per section	PM_{10}	24-Hour	74.2	32	106.2	150	150
	$PM_{2.5}$	24-Hour	14.3	15	29.3	65 (35)[1]	65 (35)[1]
2 drill rigs per well pad	PM_{10}	24-Hour	7.3	32	39.3	150	150
		Annual	1.6	9	10.6	50	50
Tier 0 emissions	$PM_{2.5}$	24-Hour	4.9	15	19.9	65 (35)[1]	65 (35)[1]
		Annual	1.6	5	6.6	15	15
2 drill rigs per well pad/ 4 drill rigs Per section	PM_{10}	24-Hour	9.8	32	41.8	150	150
		Annual	2.1	9	11.1	50	50
Tier 1 emissions	$PM_{2.5}$	24-Hour	6.3	15	21.3	65 (35)[1]	65 (35)[1]
		Annual	2.1	5	7.1	15	15
2 drill rigs per well pad/ 4 drill rigs Per section	PM_{10}	24-Hour	3.7	32	35.7	150	150
		Annual	0.8	9	9.8	50	50
Tier 2 emissions	$PM_{2.5}$	24-Hour	2.4	15	17.4	65 (35)[1]	65 (35)[1]
		Annual	0.8	5	5.8	15	15
1 drill rig per well pad/ 4 drill rigs per section	PM_{10}	24-Hour	8.1	32	40.1	150	150
		Annual	1.7	9	9.7	50	50
Tier 1 Emissions	$PM_{2.5}$	24-Hour	5.5	15	20.5	65 (35)[1]	65 (35)[1]
		Annual	1.7	5	6.7	15	15
1 drill rig per well pad/ 4 drill rigs per section	PM_{10}	24-Hour	6.0	32	38.0	150	150
		Annual	1.1	9	10.1	50	50
Tier 2 emissions	$PM_{2.5}$	24-Hour	4.1	15	19.1	65 (35)[1]	65 (35)[1]
		Annual	1.1	5	6.1	15	15

[1] Revised NAAQS effective December 18, 2006.

3.4.2 SO_2

Well drilling activities were modeled using AERMOD to determine maximum SO_2 concentration impacts. The model scenarios and source parameters used to evaluate long-term $PM_{10}/PM_{2.5}$ impacts were also to estimate maximum SO_2 concentrations (see Figures 3.2 and 3.4). Drill rig emissions at Tier 0 (AP-42 levels), EPA Tier 1 and Tier 2 levels were modeled.

The SO_2 emissions used for modeling the drill rigs are provided in Appendix B and are further detailed in Appendix F.

The Maximum modeled SO_2 concentrations for each modeling scenario are shown in Table 3.4. When the maximum modeled concentration was added to representative background concentrations, it was demonstrated that SO_2 concentrations for all scenarios comply with the WAAQS and NAAQS.

As with PM_{10} construction emissions, emissions from drilling rigs are temporary and do not consume SO_2 PSD increment and as a result are excluded from increment consumption comparison.

Table 3.4 Maximum Modeled SO_2 Concentrations, Pinedale Anticline Project.

Scenario	Pollutant	Averaging Time	Direct Modeled (µg/m^3)	Background (µg/m^3)	Total Predicted (µg/m^3)	WAAQS (µg/m^3)	NAAQS (µg/m^3)
2 drill rigs per well pad Tier 0 emissions	SO_2	3-Hour	13.5	132	145.5	1,300	1,300
		24-Hour	2.9	43	45.9	260	365
		Annual	0.6	9	9.6	60	80
2 drill rigs per well pad/ 4 drill rigs per section Tier 1 emissions	SO_2	3-Hour	13.5	132	145.5	1,300	1,300
		24-Hour	3.2	43	46.2	260	365
		Annual	0.7	9	9.7	60	80
2 drill rigs per well pad/ 4 drill rigs per section Tier 2 emissions	SO_2	3-Hour	13.5	132	145.5	1,300	1,300
		24-Hour	3.2	43	46.2	260	365
		Annual	0.7	9	9.7	60	80
1 drill rig per well pad/ 4 drill rigs per section Tier 1 emissions	SO_2	3-Hour	10.8	132	142.8	1,300	1,300
		24-Hour	2.6	43	45.6	260	365
		Annual	0.6	9	9.6	60	80
1 drill rig per well pad/ 4 drill rigs per section Tier 2 emissions	SO_2	3-Hour	10.8	132	142.8	1,300	1,300
		24-Hour	2.6	43	45.6	260	365
		Annual	0.6	9	9.6	60	80

3.4.3 NO_2

Analyses were performed using AERMOD to quantify the maximum NO_2 impacts that could occur within and nearby the PAPA with the emissions from existing in-field and nearby compressor stations and proposed compression expansions. The compressor stations analyzed include the in-field Pinedale/Gobblers Knob, Paradise and Falcon stations, and the nearby Bird Canyon facility. The compressor stations were modeled as point sources, using aerodynamic building downwash parameters. Model receptors were placed using 25 meter spacing along assumed fencelines placed 150 meters from the compressor stations, at 100 meter intervals out to 500 meters, then at 250 meter intervals out to 5 km, and 500 meter intervals out to 10 km. AERMAP was used to determine receptor height parameters from digital elevation model (DEM) data. Figure 3.5 illustrates the compressor station model configuration.

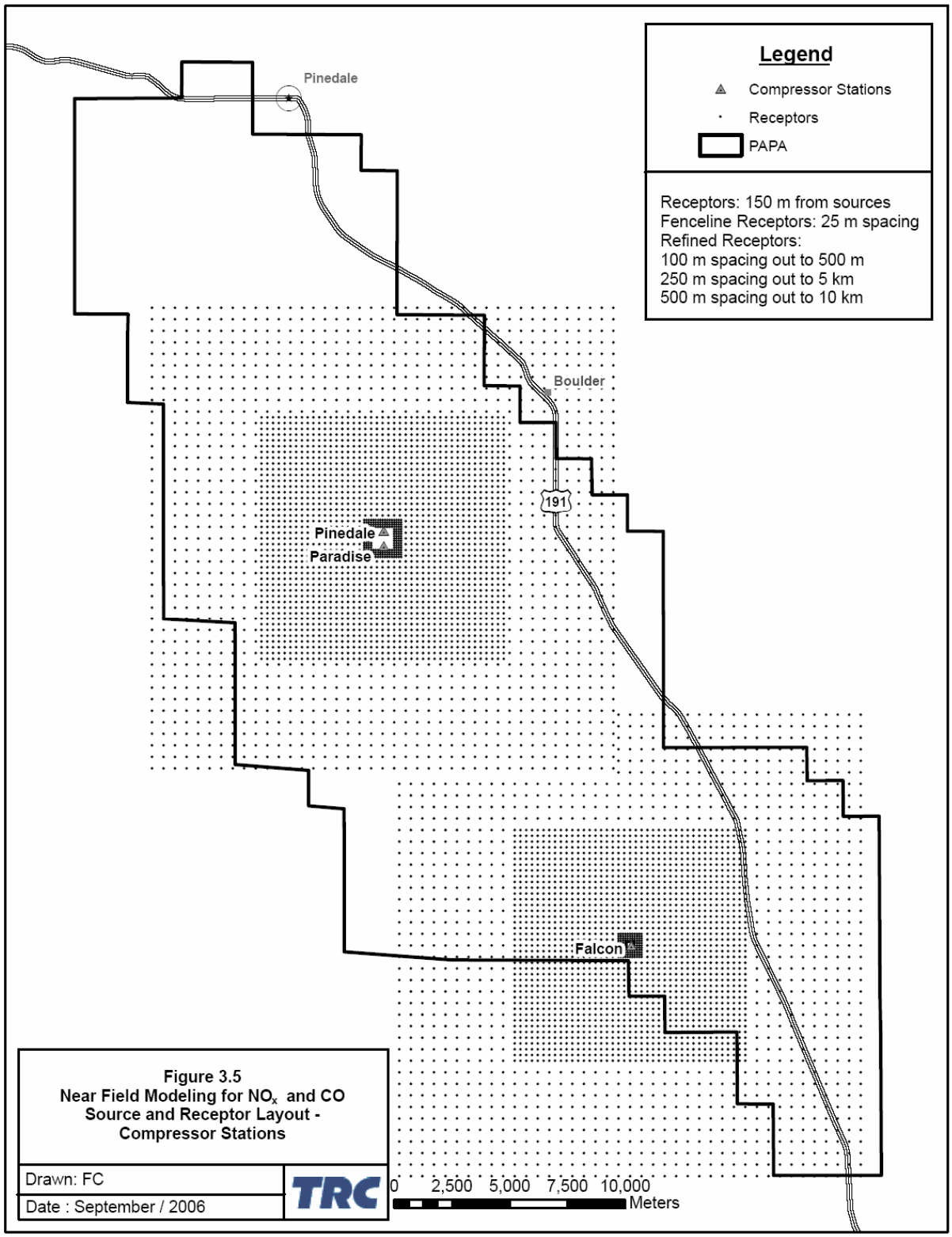


Figure 3.5 Near Field Modeling for NO_x and CO Source and Receptor Layout – Compressor Stations

Well drilling activities were also modeled using AERMOD to determine maximum NO_x concentration impacts. The model scenarios and source parameters used to evaluate long-term $PM_{10}/PM_{2.5}$ impacts and SO_2 concentrations were used (see Figures 3.2 and 3.4). Drill rig emissions at EPA Tier 0 (AP-42 levels), EPA Tier 1 and Tier 2 levels were modeled.

The NO_x emissions and parameters used for modeling the compressor stations and the drill rigs are provided in Appendix B and are further detailed in Appendix F.

The AERMOD model was used to predict maximum NO_x impacts for each modeling scenario. Maximum modeled NO_2 concentrations were determined by multiplying maximum predicted NO_x concentrations by 0.75, in accordance with EPA's Tier 2 NO_x to NO_2 conversion method (EPA 2003a). Maximum predicted NO_2 concentrations are given in Table 3.5.

As shown in Table 3.5, when the maximum modeled NO_2 concentrations are combined with representative background NO_2 concentrations, the predicted impacts for all scenarios are below the applicable WAAQS and NAAQS. Predicted direct project NO_2 impacts from the compressor station modeling scenario are above the PSD Class II increment; however, all NEPA PSD demonstrations serve information purposes only and do not constitute a regulatory PSD increment consumption analysis, which may be completed as necessary by the WDEQ-AQD. In addition, because the emissions from drilling rigs are temporary and do not consume PSD increment, and as a result, are excluded from increment consumption comparison.

Table 3.5 Maximum Modeled Annual NO_2 Concentrations, Pinedale Anticline Project.

Scenario	Pollutant	Direct Modeled ($\mu g/m^3$)	PSD Class II Increment[1,2] ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Predicted ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Compressor stations	NO_2	34.5	25	8	42.5	100	100
2 drill rigs per well pad - Tier 0 emissions	NO_2	39.9	--[3]	8	47.9	100	100
2 drill rigs per well pad/ 4 drill rigs per section - Tier 1 emissions	NO_2	27.6	--[3]	8	35.6	100	100
2 drill rigs per well pad/ 4 drill rigs per section - Tier 2 emissions	NO_2	18.0	--[3]	8	26.0	100	100
1 drill rig per well pad/ 4 drill rigs per section - Tier 1 emissions	NO_2	22.5	--[3]	8	30.5	100	100
1 drill rig per well pad/ 4 drill rigs per section - Tier 2 emissions	NO_2	14.6	--[3]	8	22.6	100	100

1 The PSD demonstrations serve information purposes only and do not constitute a regulatory PSD increment consumption analysis.
2 Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
3 Drilling rigs are temporary and do not consume NO_2 PSD increment and are excluded from increment consumption comparison.

3.4.4 CO

Maximum CO emissions were determined using the same compressor station model scenario that was developed and used for modeling NO_2 (see Figure 3.5). AERMOD was used to predict the maximum CO impacts at receptor location within and nearby the PAPA. Maximum predicted CO concentrations are shown in Table 3.6. As indicated in Table 3.6, maximum modeled CO concentrations, when combined with representative background CO concentrations, are below the applicable WAAQS and NAAQS.

Table 3.6 Maximum Modeled CO Concentrations, Pinedale Anticline Project.

Scenario	Pollutant	Averaging Time	Direct Modeled ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Predicted $\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Compressor stations	CO	1-Hour	328.5	1,979	2,307.5	40,000	40,000
		8-Hour	231.7	931	1,162.7	10,000	10,000

3.5 HAP IMPACT ASSESSMENT

AERMOD was used to determine HAP impacts in the immediate vicinity of the PAPA emission sources for short-term (acute) exposure assessment and at residence locations that are within the PAPA for calculation of long-term risk. Sources of HAPs include well-site fugitive emissions (BTEX and n-hexane) and compressor station combustion emissions (formaldehyde). Because maximum field-wide annual emissions of HAPs occur during the production phase, only HAP emissions from production were analyzed for long-term risk assessment. For long-term risk assessment, estimated field development scenarios were developed for the No Action and Proposed Action project alternatives. Short-term exposure assessments were performed for production HAP emissions using a maximum emissions scenario that included four, multi-well pads, placed in the center of each quarter section of a one-section area (similar to drill rig modeling analyses).

HAPs (BTEX, and n-hexane) from well-site fugitive emissions were modeled with AERMOD to determine the maximum HAP short-term (1-hour) impacts that could occur within and near the PAPA. Volume sources were used for modeling the well-site fugitive HAP emissions. Flat terrain receptors were spaced at 50 m intervals at a minimum distance of 250 m from a well-site in each quarter section, and at 100 m intervals out to 1 km from the well-sites. The source and receptor layouts utilized for the short-term fugitive source HAP modeling are presented in Figure 3.6. For modeling short-term formaldehyde emissions from compressor station sources, an analysis similar to that performed for NO_2 and CO (see Sections 3.4.3 and 3.4.4) was used. The compressor stations analyzed include the in-field Pinedale/Gobblers Knob, Paradise and Falcon stations. The HAP emissions are summarized in Appendix B and further detailed in Appendix F.

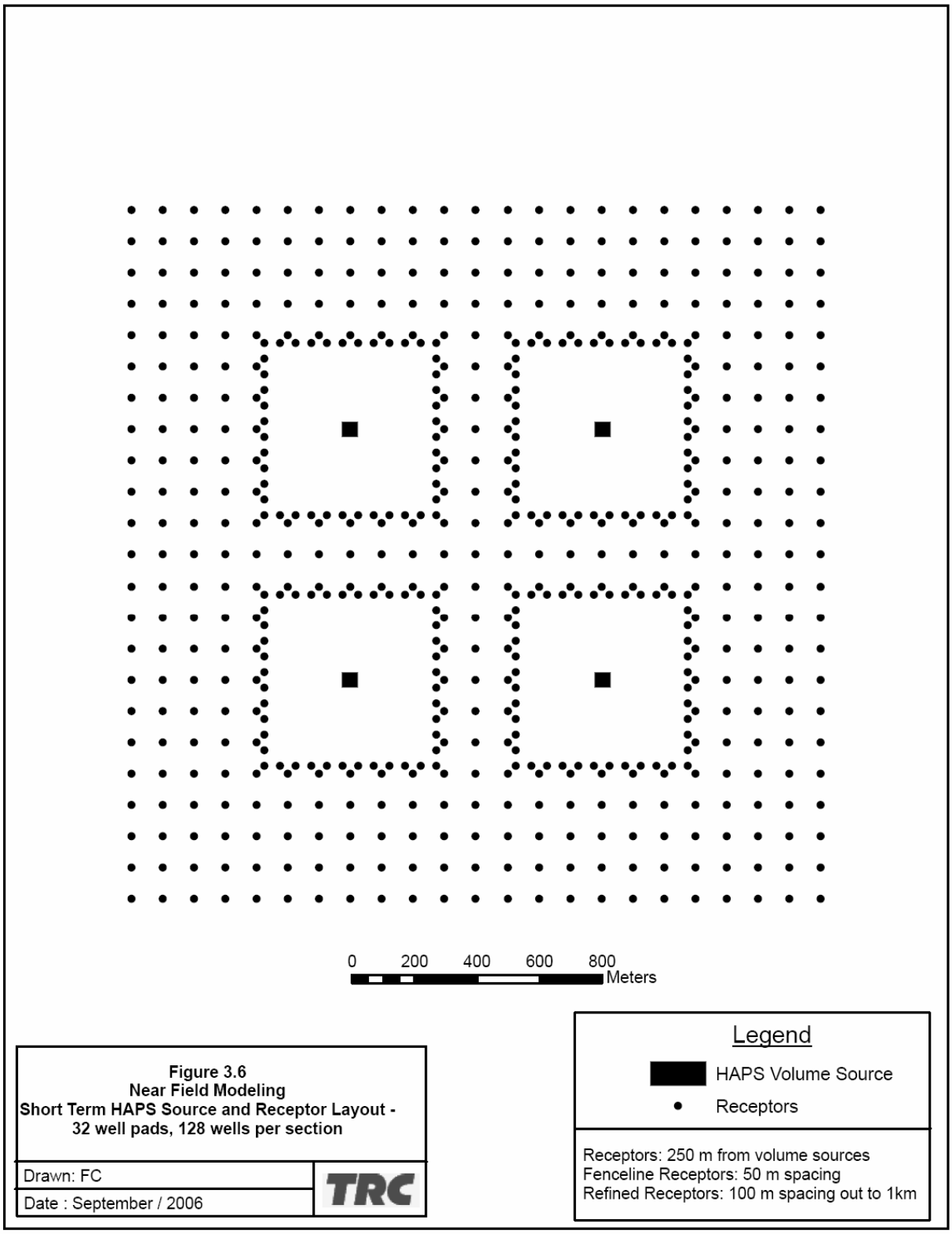


Figure 3.6 Near Field Modeling Short Term HAPS Source and Receptor Layout – 32 well pads, 128 wells per section

Long-term (annual) HAPs were analyzed at residential locations within the PAPA. Maximum projected formaldehyde emissions from compressor station sources including Pinedale/Gobblers Knob, Paradise, and Falcon stations were modeled at each residence location. Compressor stations were modeled as point source emissions. The formaldehyde emissions are provided in Appendix B. Receptor elevations at residence locations were determined from USGS DEM data using AERMAP.

Model scenarios for the No Action and Proposed Action alternatives were developed for modeling long-term fugitive HAP emissions. Estimated project field development areas for year 2007 (No Action) and year 2019 (Proposed Action) were used to estimate fugitive HAP source locations. These years were selected for modeling because the maximum HAP emissions are expected to occur during these years under each project alternative. The emissions for the long-term HAPs analyses are provided in Appendix F. Area sources dimensioned using 1-mile sections were used for modeling the fugitive HAPs. Figures 3.7 (No Action) and 3.8 (Proposed Action) illustrate the modeling scenarios used for the long-term HAPs analyses. These figures indicate the projected development areas for the project, the compressor stations, and the residence locations.

Reference Exposure Levels (RELs) are defined as concentrations at or below which no adverse health effects are expected. Since no RELs are available for ethylbenzene and n-hexane, the available Immediately Dangerous to Life or Health (IDLH) values, divided by 10, were used. These REL and IDLH values are determined by the National Institute for Occupational Safety and Health (NIOSH) and were obtained from EPA's Air Toxics Database (EPA 2005b). Modeled short-term HAP concentrations are compared to REL and IDLH values in Table 3.7. As shown in Table 3.7 the maximum predicted short-term HAP impacts within and near the PAPA would be below the REL or IDLH values under all project alternatives.

Table 3.7 Maximum Modeled 1-Hour HAP Concentrations, Pinedale Anticline Project.

	Direct Modeled Concentration by Modeling Scenario ($\mu g/m^3$)		REL or IDLH[1] ($\mu g/m^3$)
HAP	No Action	Proposed Action	
Benzene	128.5	128.5	1,300[2]
Toluene	248.9	248.9	37,000[2]
Ethylbenzene	15.4	15.4	35,000[3]
Xylene	189.7	189.7	22,000[2]
n-Hexane	82.2	82.2	39,000[3]
Formaldehyde	79.3	79.3	94[2]

1 EPA (2005b).
2 Reference Exposure Level
3 Immediately Dangerous to Life or Health value divided by 10.

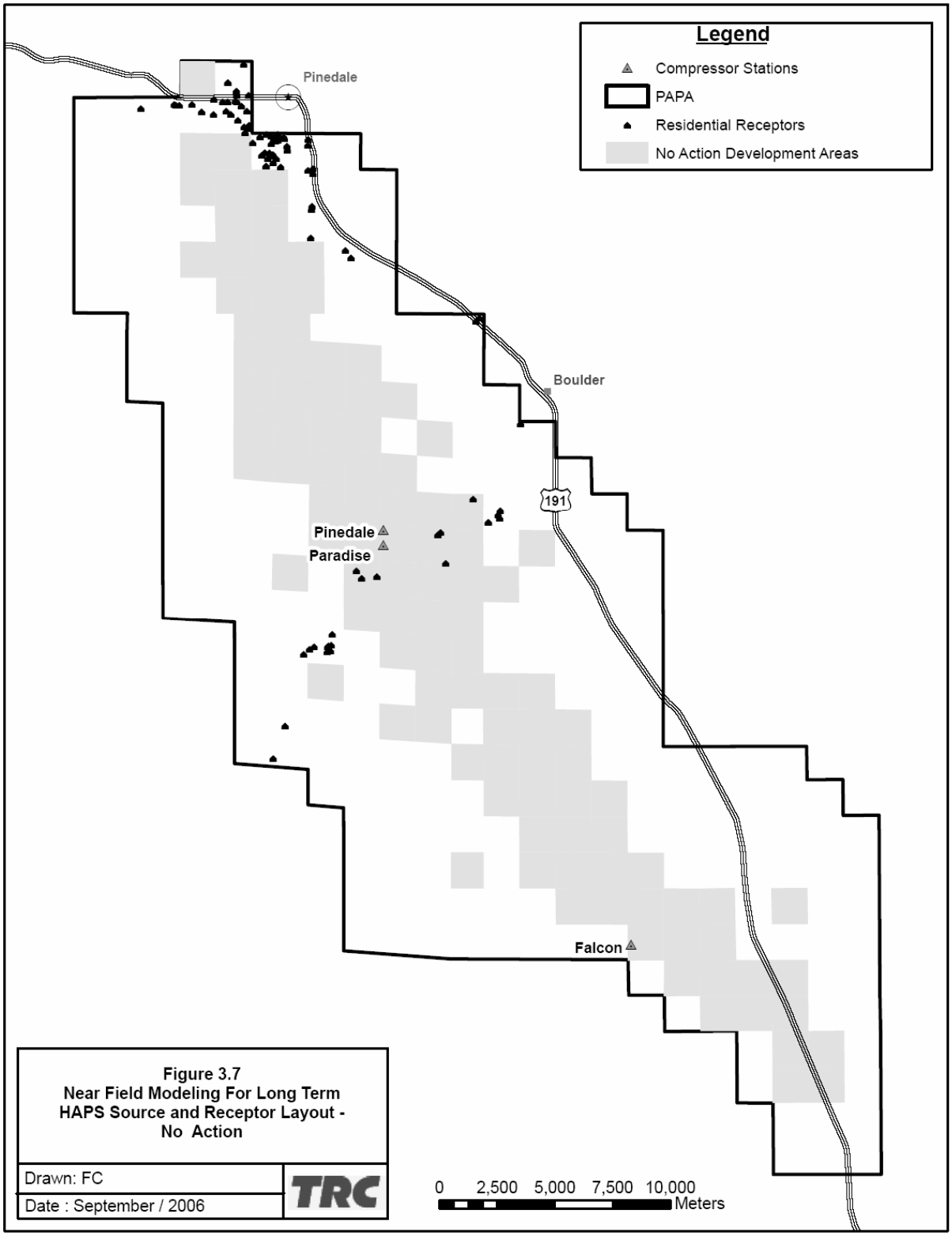


Figure 3.7 Near Field Modeling for Long Term HAPS Source and Receptor Layout – No Action

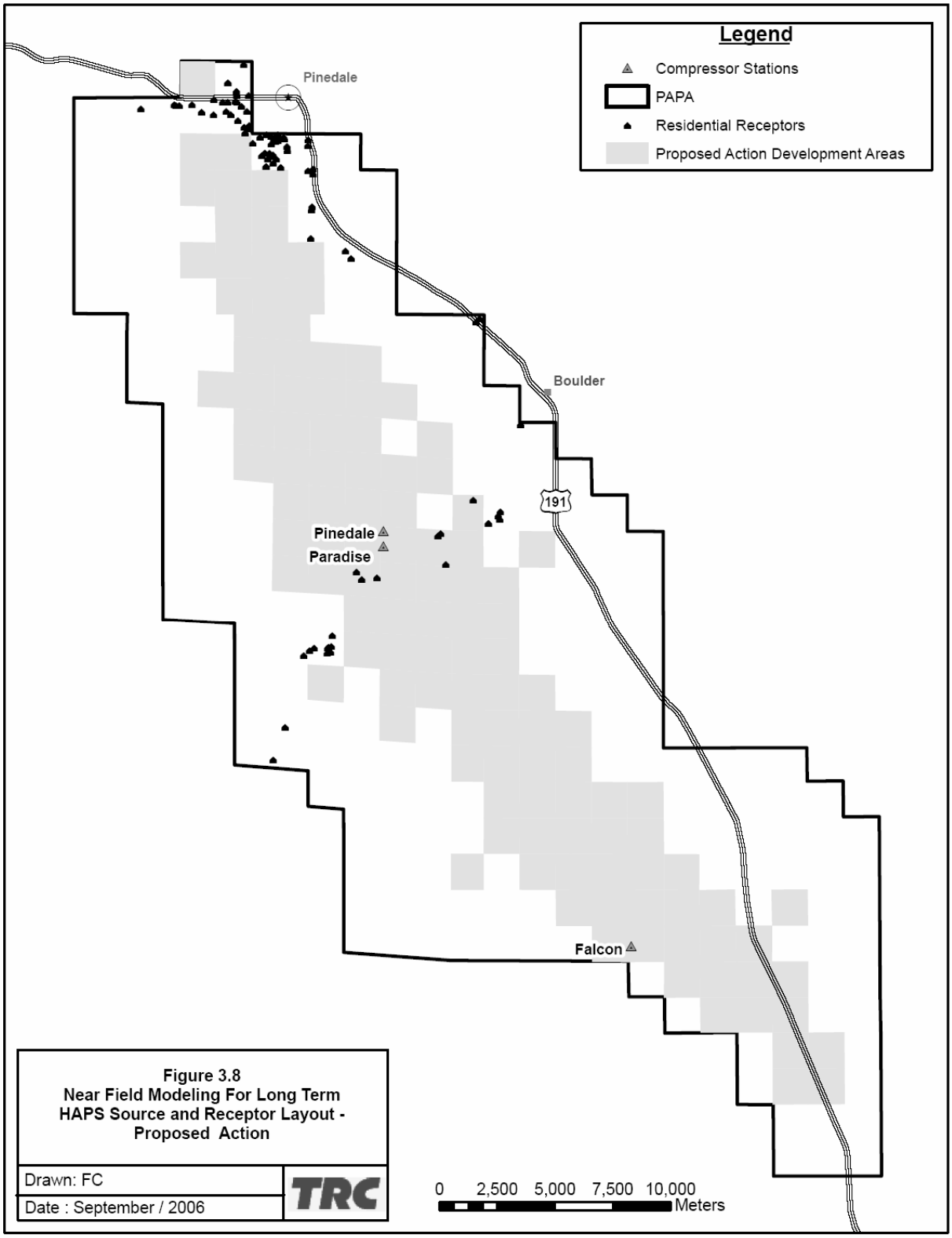


Figure 3.8 Near Field Modeling for Long Term HAPS Source and Receptor Layout – Proposed Action

Long-term (annual) modeled HAP concentrations at the nearest residence are compared to Reference Concentrations for Chronic Inhalation (RfCs). A RfC is defined by EPA as the daily inhalation concentration at which no long-term adverse health effects are expected. RfCs exist for both non-carcinogenic and carcinogenic effects on human health (EPA 2005c). The maximum predicted annual HAP concentrations at the nearest residential area are compared to the corresponding non-carcinogenic RfC in Table 3.8.

As shown in Table 3.8 the maximum predicted long-term (annual) HAP impacts at the nearest residence locations within the PAPA would be below the RfCs for all alternatives.

Table 3.8 Maximum Modeled Long-term (Annual) HAP Concentrations, Pinedale Anticline Project.

HAP	Direct Modeled Concentration by Modeling Scenario ($\mu g/m^3$)		Non-carcinogenic RfC[1] ($\mu g/m^3$)
	No Action	Proposed Action	
Benzene	0.2	0.5	30
Toluene	0.6	1.2	400
Ethylbenzene	0.03	0.06	1,000
Xylene	0.4	1.0	430
n-Hexane	0.1	0.1	200
Formaldehyde	0.2	0.2	9.8

1 EPA (2005c).

Long-term exposures to emissions of suspected carcinogens (benzene and formaldehyde) were evaluated based on estimates of the increased latent cancer risk over a 70-year lifetime. This analysis presents the potential incremental risk from these pollutants, and does not represent a total risk analysis. The cancer risks were calculated using the maximum predicted annual concentrations and EPA's chronic inhalation unit risk factors (URF) for carcinogenic constituents (EPA 2002). Estimated cancer risks were evaluated based on the Superfund National Oil and Hazardous Substances Pollution Contingency Plan (EPA 1990a), where a cancer risk range of 1 to 100 x 10^{-6} is generally acceptable. Two estimates of cancer risk are presented: 1) a most likely exposure (MLE) scenario; and 2) a maximum exposed individual (MEI) scenario. The estimated cancer risks are adjusted to account for duration of exposure and time spent at home.

The adjustment for the MLE scenario is assumed to be 9 years, which corresponds to the mean duration that a family remains at a residence (EPA 1993). This duration corresponds to an adjustment factor of 9/70 = 0.13. The duration of exposure for the MEI scenario is assumed to be 60 years (i.e., the LOP), corresponding to an adjustment factor of 60/70 = 0.86. A second adjustment is made for time spent at home versus time spent elsewhere. For the MLE scenario, the at-home time fraction is 0.64 (EPA 1993), and it is assumed that during the rest of the day the individual would remain in an area where annual HAP concentrations would be one quarter as large as the maximum annual average concentration. Therefore, the final MLE adjustment factor is (0.13) x [(0.64 x 1.0) + (0.36 x 0.25)] = 0.0949. The MEI scenario assumes that the individual is at home 100% of the time, for a final MEI adjustment factor of (0.86 x 1.0) = 0.86.

For each constituent, the cancer risk is computed by multiplying the maximum predicted annual concentration by the URF and by the overall exposure adjustment factor. The cancer risks for both constituents are then summed to provide an estimate of the total inhalation cancer risk.

The modeled long-term risk from benzene and formaldehyde are shown in Table 3.9. The maximum predicted formaldehyde concentration representative of cumulative impacts was used. Under the MLE scenario, the estimated cancer risk associated with long-term exposure to benzene and formaldehyde is below 1×10^{-6}. Under the MEI analyses, the incremental risk for formaldehyde is less than 1×10^{-6}, and both the incremental risk for benzene and the combined incremental risk fall at the lower end of the presumptively acceptable cancer risk range of 1 to 100×10^{-6} as stated by EPA (EPA 1999).

Table 3.9 Long-term Modeled MLE and MEI Cancer Risk Analyses, Pinedale Anticline Project.

Modeling Scenario	Analysis	HAP Constituent	Modeled Concentration ($\mu g/m^3$)	Unit Risk Factor $1/(\mu g/m^3)$	Exposure Adjustment Factor	Cancer Risk
No Action	MLE	Benzene	0.24	7.8×10^{-6}	0.0949	0.18×10^{-6}
		Formaldehyde	0.18	1.3×10^{-5}	0.0949	0.22×10^{-6}
Total Combined[1]						0.4×10^{-6}
No Action	MEI	Benzene	0.24	7.8×10^{-6}	0.86	1.6×10^{-6}
		Formaldehyde	0.18	1.3×10^{-5}	0.86	2.0×10^{-6}
Total Combined[1]						3.6×10^{-6}
Proposed Action	MLE	Benzene	0.45	7.8×10^{-6}	0.0949	0.33×10^{-6}
		Formaldehyde	0.18	1.3×10^{-5}	0.0949	0.22×10^{-6}
Total Combined[1]						0.55×10^{-6}
Proposed Action	MEI	Benzene	0.45	7.8×10^{-6}	0.86	3.0×10^{-6}
		Formaldehyde	0.18	1.3×10^{-5}	0.86	2.0×10^{-6}
Total Combined[1]						5.0×10^{-6}

[1] Total risk is calculated here; however, the additive effects of multiple chemicals are not fully understood and this should be taken into account when viewing these results.

4.0 FAR-FIELD ANALYSES

The purpose of the far-field analysis is to quantify potential air quality impacts on PSD Class I and sensitive PSD Class II areas from air pollutant emissions of NO_x, SO_2, PM_{10}, and $PM_{2.5}$ expected to result from the development of the project. The analyses were performed using the EPA CALMET/CALPUFF modeling system to predict air quality impacts from project and regional sources at far-field PSD Class I and sensitive PSD Class II areas and at several mid-field PSD Class II areas. The PSD Class I areas and sensitive PSD Class II areas analyzed are shown on Map 1.2 and include:

- Bridger Wilderness Area (Class I);
- Fitzpatrick Wilderness Area (Class I);
- Gros Ventre Wilderness Area (Class II);
- Popo Agie Wilderness Area (Class II);
- Wind River Roadless Area (Class II)
- Grand Teton National Park (Class I);
- Teton Wilderness Area (Class I);
- North Absaroka Wilderness Area (Class I);
- Yellowstone National Park (Class I); and
- Washakie Wilderness Area (Class I).

Modeled pollutant concentrations at these sensitive areas were compared to applicable WAAQS, NAAQS, and PSD Class I and Class II increments, and were used to assess potential impacts to AQRVs (i.e., visibility [regional haze] and atmospheric deposition). Note that visibility is protected in Class I areas only; Class II areas have no visibility protection and are included here only to further define impacts in potentially sensitive areas. In addition, analyses were performed for seven lakes designated as acid sensitive located within the sensitive PSD Class I and Class II wilderness areas to assess potential lake acidification from atmospheric deposition impacts (see Map 1.2). These lakes include:

- Deep Lake in the Bridger Wilderness Area;
- Black Joe Lake in the Bridger Wilderness Area;
- Hobbs Lake in the Bridger Wilderness Area;
- Upper Frozen Lake in the Bridger Wilderness Area;
- Lazy Boy Lake in the Bridger Wilderness Area;
- Ross Lake in the Fitzpatrick Wilderness Area; and
- Lower Saddlebag Lake in the Popo Agie Wilderness Area.

The far-field analysis also includes in-field analysis. Impacts were assessed for direct project and regional source impacts at in-field locations within the PAPA. It also includes mid-field analysis in which impacts were assessed at mid-field locations (regional communities) (see Map 1.2), which include the Wyoming communities of:

- Boulder;
- Cora; and
- Pinedale.

Predicted pollutant impacts at in-field locations were compared to applicable ambient air quality standards. At mid-field Wyoming community locations impacts to visibility (regional haze) were

assessed, although these communities are classified as PSD Class II areas where no visibility protection exits under local, state, or federal law.

4.1 MODELING METHODOLOGY

The EPA-approved CALMET/CALPUFF modeling system (CALMET Version 5.53b and CALPUFF Version 5.711b dated December 16, 2005) was used for the mid-field and far-field modeling analyses. The CALMET meteorological model was used to develop windfields for 3 years of meteorological data (2001, 2002, and 2003) and the CALPUFF dispersion model combined these wind fields with project-specific and regional emissions inventories of NO_x, SO_2, NO_x, PM_{10}, and $PM_{2.5}$ to estimate ambient concentrations and AQRV impacts at in-field, mid-field, and far-field receptor locations. The study area is shown in Map 1.2.

The CALMET and CALPUFF models were utilized in this analysis following the methods described in the Protocol (Appendix A) and the following guidance sources:

- *Guideline on Air Quality Models,* 40 *Code of Federal Regulations* (C.F.R.), Part 51, Appendix W (EPA 2003a);
- *Interagency Work Group on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts*, EPA-454/R-98-019, Office of Air Quality Planning and Standards, December 1998 (IWAQM 1998); and
- *Federal Land Managers - Air Quality Related Values Workgroup (FLAG), Phase I Report*, December 2000 (FLAG 2000).

4.2 PROJECT ALTERNATIVE MODELING SCENARIOS

Modeling scenarios were developed for the proposed project development scenarios including the No Action (Alternative A) Proposed Action (Alternative B), and Alternative C and for the level of project development that occurred during year 2005. Project alternative modeling scenarios were based on the maximum emissions year determined for each alternative. Emissions calculations were performed for each project alternative for each year over the LOP (see Appendix F). The project year under each alternative that is expected to have to overall largest pounds per hour emissions of pollutants NO_x, SO_2, and $PM_{10}/PM_{2.5}$ was selected for modeling to assure that the maximum impacts under each alternative were quantified. For the No Action Alternative, year 2007 was selected, and for the Proposed Action, year 2009. Alternative C is similar to the Proposed Action (Alternative B), however it includes mitigation options. For Alternative C, two mitigation options were modeled, Phase 1 and Phase 2. Phase 1 is Alternative B with emissions levels mitigated to year 2005 levels, and under Phase 2 the emissions levels mitigated to year 2005 levels are further reduced by mitigating the drill rig emissions an additional 80 percent.

The PAPA field activities in year 2005 and both the No Action and Proposed Action maximum emissions years include both field development (construction) and field operation (production) emissions. An additional modeling scenario was developed for the Proposed Action when the field is in full production, which is expected to occur in 2026. The modeled emissions for year 2005 project activities and the analyzed project alternatives are shown in Table 4.1.

Note that the modeled emissions for these scenarios assume continuous operation of drill rigs and other PAPA sources that operate intermittently throughout the year and therefore are not

comparable to annual field-wide emissions estimates provided in Table 2.1. The field-wide emissions provided in Table 2.1 include source emissions duration in the annual emissions total. The Project Alternative emissions modeled and shown in Table 4.1 represent conservative estimates of the annual emission that could potentially occur under each alternative. These modeling analyses are used to quantify the maximum short-term impacts (24-hour) that could occur under project alternatives because visibility impairment has been identified as a major concern and visibility impairment calculations are performed on a 24-hour average basis.

Table 4.1 Summary of Maximum Modeled Field-Wide Emissions (tpy), Pinedale Anticline Project.

Emissions	PAP 2005	Alternative A 2007	Alternative B 2009	Alternative C (Phase 1)	Alternative C (Phase 2)	Alternative B 2026
Field Compression						
NO_x	379.7	425.0	478.9	379.7	379.7	1537.7
SO_2	0.0	0.0	0.0	0.0	0.0	0.0
PM_{10}	0.0	0.0	0.01	0.0	0.0	0.04
$PM_{2.5}$	0.0	0.0	0.01	0.0	0.0	0.04
Granger Gas Plant						
NO_x	0.0	301.7	301.7	301.7	301.7	301.7
SO_2	0.0	0.0	0.0	0.0	0.0	0.0
PM_{10}	0.0	0.0	0.0	0.0	0.0	0.0
$PM_{2.5}$	0.0	0.0	0.0	0.0	0.0	0.0
Drill Rigs						
NO_x	2632.2	4748.2	4390.0	2632.2	526.4	0.0
SO_2	222.9	54.8	64.2	222.9	44.6	0.0
PM_{10}	141.6	184.9	185.7	141.6	28.3	0.0
$PM_{2.5}$	141.6	184.9	185.7	141.6	28.3	0.0
Fugitives						
NO_x	495.7	731.1	661.3	495.7	495.7	414.7
SO_2	10.8	16	15.1	10.8	10.8	2.5
PM_{10}	730.9	1024.9	531.8	730.9	730.9	384.9
$PM_{2.5}$	154.1	193.2	107.0	154.1	154.1	85.7
Wind Erosion						
PM_{10}	254.8	357.2	440.8	440.8	440.8	764.2
$PM_{2.5}$	101.9	142.9	176.3	176.3	176.3	305.7
Total						
NO_x	3507.6	6206.0	5831.9	3809.3	1703.5	2254.1
SO_2	233.7	70.8	79.3	233.7	55.4	2.5
PM_{10}	1127.3	1567.0	1158.3	872.5	759.2	1149.2
$PM_{2.5}$	397.6	521.0	469.0	295.7	182.4	391.4

4.3 METEOROLOGICAL MODEL INPUT AND OPTIONS

The CALMET model was used to develop windfields for the study area shown in Map 1.2. The modeling domain covers the PAPA and PSD Class I and other sensitive PSD Class II areas within 200-km of the PAPA with a sufficient buffer zone to allow for potential recirculation or flow reversal effects to be evaluated. The modeling domain follows IWAQM guidance that recommends that the horizontal domain of the model grid extend 50 to 80 km beyond the receptors and sources being modeled, for modeling potential recirculation wind flow effects.
Three years of CALMET windfield data were developed and used for the modeling analysis. The years 2001, 2002, and 2003, were selected based on the availability of representative MM5 mesoscale model data for the analysis. The 2001, 2002 and 2003 MM5 data were developed for EPA or for a Regional Planning Organization (RPO), have undergone significant QA/QC verification and peer review, and are the most recent available consecutive 3 years of prognostic data that are available. The MM5 data sets that were used for the analysis include year 2001 data processed at 36-km spacing for EPA (Alpine Geophysics, LLC, 2003), year 2002 data processed at 36-km spacing for WRAP (ENVIRON, 2005) and year 2003 data processed at 36-km spacing for the Midwest RPO (Baker, 2005).

Surface meteorology data for sites throughout the modeling domain obtained from National Climatic Data Center (NCDC) integrated surface observation data sets, Clean Air Status and Trends Network (CASTNET) sites, and from onsite data collected by BP America Production Company in the Jonah Field were incorporated into the windfields. In addition, upper air rawinsonde meteorology data, and precipitation data for applicable observation sites throughout the modeling domain were obtained from NCDC and included in the analysis. Listings of the surface and upper air meteorological stations that were used in this analysis are provided in Appendix C.

The modeling domain was processed to a uniform horizontal grid using 4-km resolution, based on a Lambert Conformal Projection defined with a central longitude/latitude at (-109.80°/43.05°) and first and second latitude parallels at 30° and 60°. The modeling grid consisted of 116 x 138 4-km grid cells that cover the project area and all analyzed PSD Class I and sensitive PSD Class II areas. Ten vertical layers were used, with heights of 20, 40, 100, 160, 320, 560, 1,000, 1,500, 2,250, and 3,200 meters.

The CALMET analysis utilized the MM5 data, surface meteorological data, precipitation data, and upper air meteorological stations to supplement MM5 upper air estimates. USGS 1:250,000-scale Land Use and Land Cover (LULC) data, and USGS 1º DEM data were used for land use and terrain data in the development of the CALMET wind fields. All CALMET model control switch settings follow IWAQM guidance.

4.4 DISPERSION MODEL INPUT AND OPTIONS

The CALPUFF model was used to model project-specific and regional emissions of NO_x, SO_2, PM_{10}, and $PM_{2.5}$. CALPUFF was run using the IWAQM-recommended default control file switch settings for all parameters. Chemical transformations were modeled based on the MESOPUFF II chemistry mechanism for conversion of SO_2 to sulfate (SO_4) and NO_x to nitric acid (HNO_3) and nitrate (NO_3). Each of these pollutant species was included in the CALPUFF model runs. NO_x, HNO_3, and SO_2 were modeled with gaseous deposition, and SO_4, NO_3, PM_{10}, and $PM_{2.5}$ were modeled using particle deposition. The PM_{10} emissions input to CALPUFF

included only the PM_{10} emissions greater than the $PM_{2.5}$ (i.e., modeled PM_{10} = PM_{10} emission rate – $PM_{2.5}$ emission rate). Total PM_{10} impacts were determined in the post-processing of modeled impacts, as discussed in Section 4.5.

4.4.1 Chemical Species

The CALPUFF chemistry algorithms require hourly estimates of background O_3 and ammonia (NH_3) concentrations for the conversion of SO_2 and NO/NO_2 to sulfates and nitrates, respectively. Background hourly O_3 data, for monitoring stations within the modeling domain were used in the CALPUFF modeling for each of the three modeling years. A list of the O_3 monitoring stations is provided in Appendix C. Monthly averaged O_3 data from these stations for each year were used as default values for missing hours. A background NH_3 concentration of 1.0 ppb was used as suggested in the IWAQM guidance for arid lands.

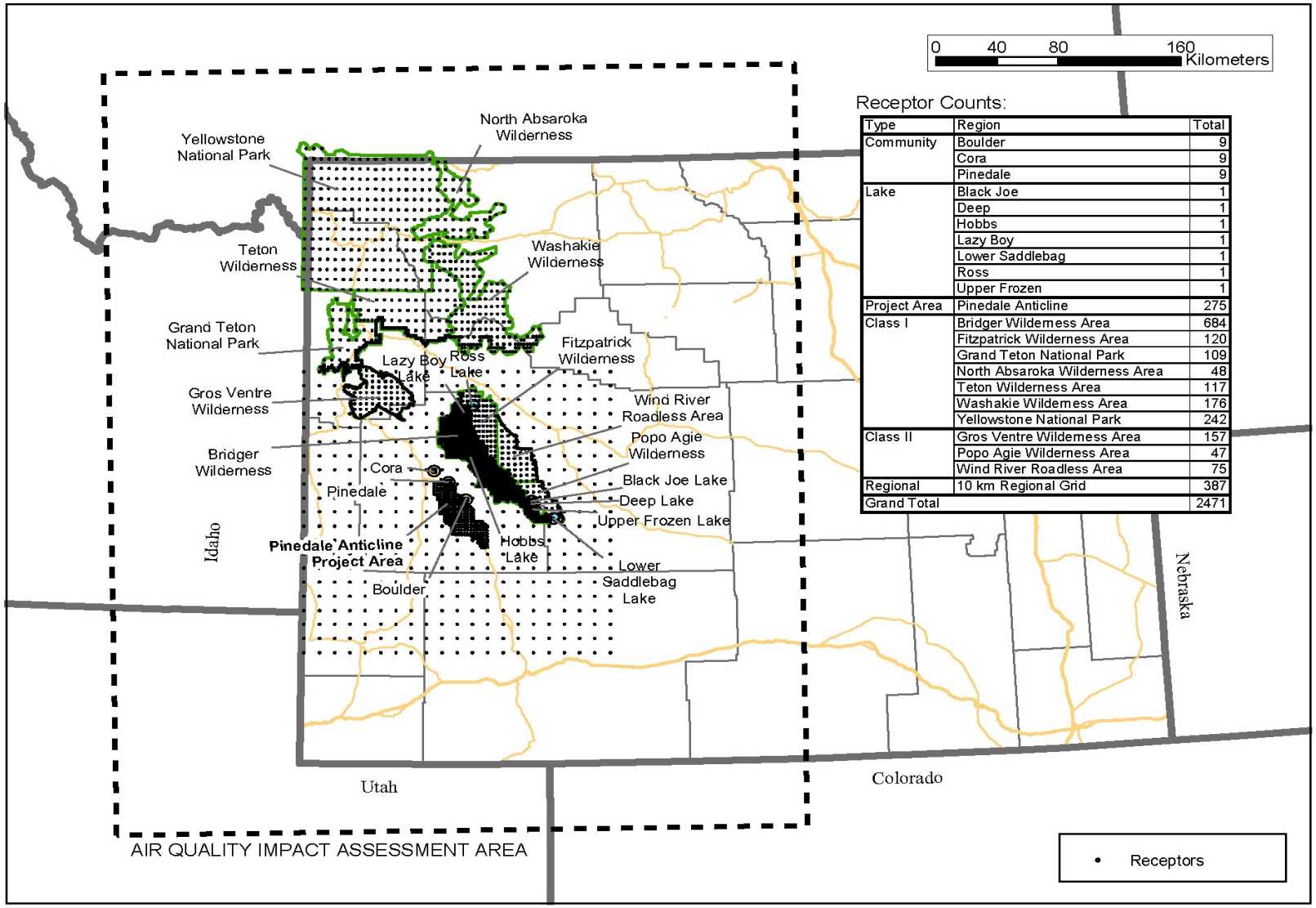
4.4.2 Model Receptors

Receptor sets available from the NPS for PSD Class I areas were used as a basis for determining modeling receptors for all PSD Class I and sensitive PSD Class II areas. The complete NPS receptor set was used for modeling the nearby Bridger Wilderness Area, however the receptor grid densities were thinned at the more distant PSD Class I areas, while maintaining adequate area coverage, for consideration of model run times. For the three sensitive PSD Class II areas located within the modeling domain (Gros Ventre and Popo Agie Wilderness Areas, and Wind River Roadless Area), receptor sets were developed using 2-km spacing along the wilderness area boundaries and at 4-km spacing within each area. Receptors were placed within the PAPA using 2-km spacing, and out to 100 km from the PAPA using 10-km spacing. For the regional communities of Boulder, Pinedale and Cora receptors 3 x 3, 1-km grids were used. Receptor elevations for the sensitive PSD Class II area receptors, the regional communities, the receptors within the PAPA and extending outward 100 km were determined from 1:250,000 scale USGS DEM data. Discrete receptors were placed at the seven lakes identified as sensitive to acid deposition. Elevations for the sensitive lake receptors were derived from 7.5-minute USGS maps.

All model receptors utilized in the CALPUFF modeling are shown in Figure 4.1.

4.4.3 Source Parameters

CALPUFF source parameters were determined for all project and regional source emissions of NO_x, SO_2, PM_{10}, and $PM_{2.5}$. Project sources were input to CALPUFF using point sources to idealize the Granger Gas Plant expansion, compressor stations and drilling rig engines. Additionally, 1-mi^2 area sources were placed throughout the PAPA to idealize fugitive emissions from well-site heaters, vehicle traffic, well completion activities and wind erosion. Source locations for each modeled scenario were estimated from the current PAPA development and future projected expansion. The source locations used for each modeled scenario are provided in Appendix C, in Tables C.4 through C.11. Compressor station, gas plant, and drill rig emissions are provided in Appendix F. Parameters used for modeling the gas plant, compressor stations and drill rigs are in Appendix C. Monthly emissions scalars were used to adjust the heater and drill rig emissions for seasonal variations.



Receptor Counts:

Type	Region	Total
Community	Boulder	9
	Cora	9
	Pinedale	9
Lake	Black Joe	1
	Deep	1
	Hobbs	1
	Lazy Boy	1
	Lower Saddlebag	1
	Ross	1
	Upper Frozen	1
Project Area	Pinedale Anticline	275
Class I	Bridger Wilderness Area	684
	Fitzpatrick Wilderness Area	120
	Grand Teton National Park	109
	North Absaroka Wilderness Area	48
	Teton Wilderness Area	117
	Washakie Wilderness Area	176
	Yellowstone National Park	242
Class II	Gros Ventre Wilderness Area	157
	Popo Agie Wilderness Area	47
	Wind River Roadless Area	75
Regional	10 km Regional Grid	387
Grand Total		2471

Figure 4.1 CALPUFF Model Receptors

Non-project regional emissions were input to CALPUFF using area sources to idealize non-compression RFD sources, county-wide well emissions, and point sources to idealize state-permitted sources, RFD compression sources, and RFFA. The source parameters used in modeling all state-permitted and RFFA sources are provided in Appendix G. Non-compression RFD emissions were modeled using area sources developed for each proposed field development as a "best fit" to the respective project area. The source parameters used for modeling the compression sources for each RFD project are provided in Appendix G. County-wide well emissions were modeled using area sources developed as a “best fit” to the respective county area. Seasonal emission-rate adjustment factors were applied to emissions from well site heaters to account for seasonal variations in heater use. Source elevations for all RFD and county-wide area sources were determined from 1:250,000 scale USGS DEM data.

4.5 BACKGROUND DATA

4.5.1 Criteria Pollutants

Ambient air concentration data collected at monitoring sites in the region provide a measure of the background conditions during the most recent available time period. The most representative regional monitoring-based background values for criteria pollutants (NO_2, PM_{10}, $PM_{2.5}$, and SO_2), as identified by WDEQ-AQD, collected at monitoring sites in Wyoming, are summarized in Table 4.2. The ambient air background concentrations provided in Table 4.2 were added to modeled pollutant concentrations (expressed in $\mu g/m^3$) to arrive at total ambient air quality impacts for comparison to NAAQS and WAAQS.

Table 4.2 Far-field Analysis Background of Ambient Air Quality Concentrations ($\mu g/m^3$).

Pollutant	Averaging Period	Measured Background Concentration
NO_2[1]	Annual	8
PM_{10}[1]	24-hour	32
	Annual	9
$PM_{2.5}$[2]	24-hour	15
	Annual	6
SO_2[3]	3-hour	132
	24-hour	43
	Annual	9

[1] Background data collected by WDEQ-AQD approximately 5 miles south-west of Boulder, Wyoming during the period April 2005 - March 2006.
[2] Background data collected by WDEQ-AQD in Pinedale, Wyoming during the period July 2005 - June 2006.
[3] Data collected at LaBarge Study Area, Wyoming at the Northwest Pipeline Craven Creek Site 1982-1983.

4.5.2 Visibility

Background visibility data representative of the study area were collected from IMPROVE monitoring sites located at the Bridger Wilderness Area, North Absaroka Wilderness Area and at Yellowstone National Park (Table 4.3). These background visibility data are used in combination with modeled pollutant impacts to estimate change in visibility conditions (measured as change in light extinction) at PSD Class I and sensitive PSD Class II areas. The IMPROVE background visibility data are provided as reconstructed aerosol total extinction data,

based on the quarterly mean of the 20% cleanest days measured at the Bridger Wilderness Area and Yellowstone National Park IMPROVE sites for a 5 year period, years 2000 through 2004.

Table 4.3 IMPROVE Background Aerosol Extinction Values.[1]

IMPROVE Site	Quarter	Hygroscopic (Mm^{-1})[2]	Non-hygroscopic (Mm^{-1})[2]
Bridger	1	0.775	1.233
	2	1.565	3.283
	3	1.791	4.965
	4	0.704	1.192
North Absaroka	1	0.774	1.565
	2	1.326	2.249
	3	1.360	4.931
	4	0.600	1.368
Yellowstone	1	1.104	1.588
	2	1.453	2.983
	3	1.550	5.414
	4	0.738	1.544

1 Cooperative Institute for Research in the Atmosphere (2006).
2 Mm^{-1} = inverse megameters.

Background visibility data were also collected at a nephelometer monitoring site near Boulder beginning in late January 2005. Quarterly averages of the cleanest 20th percent days were determined from daily averaged extinction measurements and from transmissometer extinction data and IMPROVE aerosol data collected at the Bridger Wilderness Area (ARS, 2006) for the 1 year period, March 1, 2005 through February 28, 2006. These data are shown in Table 4.4. These background visibility data were used in combination with modeled pollutant impacts to estimate change in visibility conditions for the Wyoming regional community locations (Boulder, Cora, and Pinedale).

Table 4.4 Boulder Background Extinction Data.

Quarter	20th Cleanest Days (Mm-1)
1	14.0
2	14.7
3	19.0
4	14.3

4.5.3 Deposition

Background total sulfur (S) and nitrogen (N) deposition data (expressed in kilograms per hectare per year [kg/ha-yr]) collected at National Acid Deposition Program (NADP) National Trends Network (NTN) and Clean Air Status and Trends Network (CASTNET) station monitoring locations near Pinedale, Wyoming, and Yellowstone National Park are provided in Table 4.5. These background S and N deposition data are added to modeled cumulative (project alternative and regional sources) deposition impacts to estimate total S and N deposition impacts.

Table 4.5 Background N and S Deposition Values (kg/ha-yr).

Site Location	Nitrogen Deposition	Sulfur Deposition	Year of Monitoring
Pinedale	1.4	0.74	2004
Yellowstone National Park	1.3	0.70	2003

4.5.4 Lake Chemistry

The most recent lake chemistry background acid neutralizing capacity (ANC) data were obtained for each sensitive lake included in the analysis. The 10th percentile lowest ANC values were calculated for each lake following procedures provided by the USDA Forest Service. These ANC values and the number of samples used in the calculation of the 10th percentile lowest ANC values are provided in Table 4.6.

Table 4.6 Background ANC Values for Acid Sensitive Lakes.[1]

Wilderness Area	Lake	Latitude (Deg-Min-Sec)	Longitude (Deg-Min-Sec)	10th Percentile Lowest ANC Value (μeq/l)[2]	Number of Samples	Monitoring Period
Bridger	Black Joe	42º44'22"	109º10'16"	67.1	67	1984-2005
Bridger	Deep	42º43'10"	109º10'15"	59.7	64	1984-2005
Bridger	Hobbs	43º02'08"	109º40'20"	69.9	71	1984-2005
Bridger	Lazy Boy	43º19'57"	109º43'47"	10.8	3	1997-2004
Bridger	Upper Frozen	42º41'13"	109º09'39"	6.0	8	1997-2005
Fitzpatrick	Ross	43º22'41"	109º39'30"	53.7	49	1988-2005
Popo Agie	Lower Saddlebag	42º37'24"	108º59'38"	55.2	48	1989-2005

[1] From USFS (2006).
[2] 10th Percentile Lowest ANC Values reported.

4.6 IMPACT ASSESSMENT

CALPUFF modeling was performed to compute direct project impacts from direct project emissions for year 2005, direct project impacts for each of the alternatives, and for estimating cumulative impacts from potential project alternative emissions and regional sources. The alternatives, as described in Section 4.2, include Alternative A (No Action), Alternative B (Proposed Action), and Alternative C (Proposed Action mitigation to year 2005 emissions levels – Phase 1), and Alterative C (Proposed Action mitigation to year 2005 emissions levels with an additional 80 percent mitigation on drill rig emissions – Phase 2). Maximum emissions scenarios for each alternative were analyzed which included year 2007 emissions for the No Action Alternative and year 2009 emissions for the Proposed Action Alternative. An additional full-field development emissions scenario was developed for the Proposed Action assuming that PAPA field development is complete and the project is operating at maximum production (Year 2026). Regional emissions inventories of existing state-permitted RFD and RFFA sources, as described in Chapter 2.0, were modeled in combination with project alternatives to provide

cumulative impact estimates for each alternative. A total of 11 modeling scenarios were evaluated in this analysis. A list of these scenarios is summarized in Table 4.7.

Table 4.7 Modeling Scenarios Analyzed for the Pinedale Anticline Project.

Modeling Scenario	Source Impacts Evaluated	Project Alternative
1	Direct Project	PAPA Year 2005 actual emissions from field activities
2	Direct Project	No Action Alternative (Alternative A) – Year 2007
3	Direct Project	Proposed Action Alternative (Alternative B) – Year 2009
4	Direct Project	Alternative C – Phase 1 (Proposed Action mitigated to 2005 levels)
5	Direct Project	Alternative C – Phase 2 (Proposed Action mitigated to 2005 levels, additional 80 % control on drill rig emissions)
6	Direct Project	Proposed Action Alternative (Alternative B) – Year 2026
7	Cumulative	No Action Alternative (Alternative A) – Year 2007 and regional sources
8	Cumulative	Proposed Action Alternative (Alternative B) – Year 2009 and regional sources
9	Cumulative	Alternative C – Phase 1 (Proposed Action mitigated to 2005 levels) and regional sources
10	Cumulative	Alternative C – Phase 2 (Proposed Action mitigated to 2005 levels, additional 80 % control on drill rig emissions) and regional sources
11	Cumulative	Proposed Action Alternative (Alternative B) – Year 2026 and regional sources

For each far-field sensitive area, CALPUFF-modeled concentration impacts were post-processed with POSTUTIL and CALPOST to derive: 1) concentrations for comparison to ambient air quality standards (WAAQS and NAAQS), PSD Class I and II increments; 2) deposition rates for comparison to sulfur (S) and nitrogen (N) deposition levels of concern and to calculate changes to ANC at sensitive lakes; and 3) light extinction changes for comparison to visibility impact thresholds. For the mid-field analyses, CALPOST concentrations were post-processed to estimate light extinction changes at regional communities for comparison to the visibility impact thresholds. For in-field locations, CALPUFF concentrations were post-processed to compute maximum concentration impacts for comparison to WAAQS and NAAQS.

An additional modeling analysis was performing using CALPUFF to test whether sources located in particular areas or zones within the PAPA may have a larger influence on impacts at the Bridger Wilderness Area. This test was performed due to the close proximity and physical alignment of the PAPA to the Bridger Wilderness Area. The results of the sensitivity modeling are provided in Appendix D.

4.6.1 Concentration

The CALPOST and POSTUTIL post-processors were used to summarize concentration impacts of NO_2, SO_2, PM_{10}, and $PM_{2.5}$ at PSD Class I and sensitive PSD Class II areas, and at in-field locations. Predicted impacts are compared to applicable ambient air quality standards and PSD Class I and Class II increments as shown in Table 4.8. All NEPA PSD demonstrations serve information purposes only and do not constitute a regulatory PSD increment consumption analysis, which may be completed as necessary by the WDEQ-AQD.

Table 4.8 NAAQS, WAAQS, and PSD Class I and Class II Increments for Comparison to Far-field Analysis Results (μg/m^3).

Pollutant/Averaging Time	NAAQS	WAAQS	PSD Class I Increment	PSD Class II Increment
NO_2				
Annual[1]	100	100	2.5	25
SO_2				
3-hour[2]	1,300	1,300	25	512
24-hour[2]	365	260	5	91
Annual[1]	80	60	2	20
PM_{10}				
24-hour[2]	150	150	8	30
Annual[1]	50	50	4	17
$PM_{2.5}$				
24-hour[3]	65(35)[3]	65(35)[3]	--	--
Annual[3]	15	15	--	--

1 Annual arithmetic mean.
2 No more than one exceedance per year is allowed.
3 Revised NAAQS effective December 18, 2006.

PM_{10} concentrations were computed by adding predicted CALPUFF concentrations of PM_{10} (fraction of PM greater than $PM_{2.5}$), $PM_{2.5}$, SO_4, and NO_3. $PM_{2.5}$ concentrations were calculated as the sum of modeled $PM_{2.5}$, SO_4, and NO_3 concentrations. In post-processing the PM_{10} impacts at all far-field receptor locations, project alternative traffic emissions of PM_{10} (production and construction) were not included in the total estimated impacts, only the $PM_{2.5}$ impacts were considered. This assumption was based on supporting documentation from the Western Regional Air Partnership (WRAP) analyses of mechanically generated fugitive dust emissions that suggest that particles larger than $PM_{2.5}$ tend to deposit out rapidly near the emissions source and do not transport over long distances (Countess et al., 2001). This phenomenon is not modeled adequately in CALPUFF; therefore, to avoid overestimates of PM_{10} impacts at far-field locations, these sources were not considered in the total modeled impacts. However, the total PM_{10} impacts from traffic emissions were included in all in-field concentration estimates.

Far-field Results

The maximum predicted concentrations of NO_2, SO_2, PM_{10}, and $PM_{2.5}$ at each of the analyzed PSD Class I and sensitive Class II areas, for year 2005 PAPA sources and each of the modeled direct project alternatives and cumulative source modeling scenarios, are provided in Appendix E. Predicted direct impacts are compared to applicable PSD Class I and Class II increments, and when added to representative background pollutant concentrations (see Table 4.2), the total concentration is compared to applicable NAAQS and WAAQS. Cumulative impacts from all alternatives are compared directly to applicable PSD Class I and Class II increments, and to the NAAQS and WAAQS when background pollutant concentrations are added. Tables E.1.1 through E.1.11 provide the maximum modeled NO_2 concentrations at each of the sensitive areas.

The maximum modeled SO_2 concentrations are provided in Tables E.2.1 through E.2.11, and the maximum modeled PM_{10} and $PM_{2.5}$ impacts are provided in Tables E.3.1 through E.3.11, and Tables E.4.1 through E.4.11, respectively.

As shown in these tables there were no predicted exceedances of the NAAQS, WAAQS, or the applicable PSD increments at any of the analyzed PSD Class I and sensitive PSD Class II areas resulting from year 2005 project source emissions. The modeling results also indicate that neither direct project impacts nor cumulative source impacts would exceed any ambient air quality standards (WAAQS and NAAQS) or be above PSD increment.

In-Field Results

The maximum predicted concentrations of NO_2, SO_2, PM_{10}, and $PM_{2.5}$ within and nearby the PAPA, for each of the modeled direct project and cumulative scenarios are provided in Appendix E, Tables E.5.1 through E.5.11, Tables E.6.1 through E.6.11, Tables E.7.1 through E.7.11, and Tables E.8.1 through E.8.11, for NO_2, SO_2, PM_{10}, and $PM_{2.5}$, respectively. Direct project and cumulative impacts are compared to applicable PSD increments. Predicted direct project and cumulative impacts are added to representative background pollutant concentrations and are compared to applicable NAAQS and WAAQS. As shown in these tables there were no exceedances of the NAAQS or WAAQS within and nearby the PAPA resulting from year 2005 project source emissions. In addition there would be no exceedances of the NAAQS or WAAQS within and nearby the PAPA from project alternative field-wide project sources or cumulative sources. This analysis further supports the compliance demonstrations shown in Section 3.4 for maximum near-field impacts.

Predicted impacts resulting from year 2005 emissions are above the annual NO_2 PSD Class II increment and both the 24-hour and annual PM_{10} Class II increments. Predicted direct project and cumulative impacts resulting from project alternative emissions are above the annual NO_2 PSD Class II increment under the Alternative A (No Action), Alternative B (Proposed Action) and Alternative C (Phase 1 - mitigation to 2005 emissions levels) and below the NO_2 increment for all other analyzed alternatives. Predicted direct project and cumulative impacts resulting from Alternative A (No Action) project alternative emissions are above the annual and 24-hour PM_{10} PSD Class II increments, and predicted cumulative impacts under the Alternative C (Phase 1 - mitigation to 2005 emissions levels) are above the 24-hour PM_{10} PSD Class II increment. Predicted direct project and cumulative impacts are below the applicable PM_{10} increments for all other analyzed alternatives. Modeled direct project and cumulative impacts from all analyzed alternatives are below the applicable SO_2 increments. All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD Increment Consumption Analysis.

4.6.2 Deposition

Maximum predicted S and N deposition impacts were estimated for year 2005 PAPA impacts, project alternatives, and cumulative source scenario. The POSTUTIL utility was used to estimate total S and N fluxes from CALPUFF predicted wet and dry fluxes of SO_2, SO_4, NO_x, NO_3, and HNO_3. CALPOST was then used to summarize the annual S and N deposition values from the POSTUTIL program. Predicted direct project impacts were compared to the NPS deposition analysis thresholds (DATs) for total N and S deposition in the western U.S., which

are defined as 0.005 kilograms per hectare per year (kg/ha-year) for both N and S. Cumulative deposition impacts from project alternative and regional sources were compared to USDA-FS levels of concern, defined as 5 kg/ha-yr for S and 3 kg/ha-yr for N (Fox et al. 1989) below which no adverse impacts from atmospheric deposition are likely.

The maximum predicted N and S deposition impacts for each of the modeled scenarios are provided in Appendix E, Tables E.9.1 through E.9.11 (N deposition) and Tables E.10.1 through E.10.11 (S deposition). Model results for project year 2005 sources indicate N deposition impacts above the DAT at the Bridger, Fitzpatrick, Gros Ventre, Popo Agie Wilderness Areas and at Yellowstone National Park, and S deposition impacts above the DAT at the Bridger Wilderness Area. Modeling results for project sources under each alternative indicate that there would be no direct project S deposition impacts above the DAT, and that all cumulative N and S deposition impacts, including background N and S deposition values, would be well below the cumulative analysis levels of concern. Modeling results do indicate that for Alternative A (No Action) direct project N deposition impacts are above the DAT at the Bridger, Fitzpatrick, Gros Ventre, Popo Agie, Teton, and Washakie Wilderness Areas and at Grand Teton National Park and the Wind River Roadless Area. For Alternative B (Proposed Action) direct project N deposition impacts are above the DAT at the Bridger, Fitzpatrick, Gros Ventre, and Popo Agie Wilderness Areas and at Grand Teton National Park and the Wind River Roadless Area. Under Alternative C direct project N deposition impacts are above the DAT at the Bridger, Fitzpatrick, Gros Ventre, and Popo Agie Wilderness Areas and at the Wind River Roadless Area, and for Alternative C (Phase 2 - 80 percent drill rig mitigation) direct project N deposition impacts are above the DAT at the Bridger, and Popo Agie Wilderness Areas and at the Wind River Roadless Area.

4.6.3 Sensitive Lakes

The CALPUFF-predicted annual deposition fluxes of S and N at sensitive lake receptors listed in Section 4.2.3 were used to estimate the change in ANC. The change in ANC was calculated following the January 2000, USDA-FS Rocky Mountain Region's *Screening Methodology for Calculating ANC Change to High Elevation Lakes, User's Guide* (USDA Forest Service, 2000). The predicted changes in ANC are compared with the USDA Forest Service's Level of Acceptable Change (LAC) thresholds of 10% for lakes with ANC values greater than 25 microequivalents per liter (µeq/l) and 1 µeq/l for lakes with background ANC values of 25 µeq/l or less. Of the seven lakes listed in Table 4.5 and identified by the USDA-FS as acid sensitive, Upper Frozen and Lazy Boy lakes are considered extremely acid sensitive.

ANC calculations were performed for each of modeled source scenarios, with the results presented in Appendix E, Tables E.11.1 through E.11.11. The modeling results indicate that deposition impacts from year 2005 direct project sources, alternative sources, and cumulative sources would not exceed the LAC threshold for ANC at any of the sensitive lakes.

4.6.4 Visibility

The CALPUFF model-predicted concentration impacts at far-field PSD Class I and sensitive PSD Class II areas and at mid-field regional community locations were post-processed with CALPOST to estimate potential impacts to visibility (regional haze) for year 2005 PAPA source impacts and for each alternative and cumulative source scenario for comparison to visibility impact thresholds. CALPOST estimated visibility impacts from predicted concentrations of

PM_{10}, $PM_{2.5}$, SO_4, and NO_3. PM_{10} emissions from project traffic emissions were not included in the total estimated impacts (see Section 4.6.1), only the impacts to visibility from $PM_{2.5}$ were considered.

At the request of the BLM, WDEQ, and USDA-FS visibility impairment calculations for the PSD Class I and sensitive PSD Class II areas were performed using three separate methods using FLAG and IMPROVE background visibility data. Two methods which follow recent CALPUFF modeling guidance for Best Available Retrofit Technology (BART) analyses developed for the Visibility Improvement State and Tribal Association of the Southeast (VISTAS) RPO were also performed (VISTAS, 2006) for the PSD Class I and sensitive PSD Class II areas. For the mid-field, regional community locations visibility impairment was calculated with a method that used background visibility data determined from nephelometer data measured at Boulder (Table 4.4).

The BLM visibility calculation method uses CALPOST visibility method 6 (CALPOST model switch setting "MVISBK" set to 6) for computing light extinction change in combination with FLAG background data. The WDEQ visibility calculation method uses CALPOST visibility method 6 (MVISBK=6) in combination with IMPROVE background data. The two BART screening calculation procedures use CALPOST method 6 combined with background visibility conditions as provided in the *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule* (EPA, 2003b). Method 6 uses monthly averaged humidity factors, and it is not sensitive to synoptic weather events that lead to high extinction events and subsequent explanation as to why certain events should be discounted. The USFS visibility calculation method uses the FLAG background data in combination with hourly relative humidity data from the CALMET windfields (MVISBK=2).

For the FLAG method 6, estimated natural background visibility values as provided in Appendix .B of FLAG (2000), and monthly relative humidity factors as provided in the *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule* (EPA 2003b) were used. FLAG method 2 uses the natural background visibility conditions and hourly relative humidity data from surface observations in the CALMET wind field data. The natural background visibility data used with the FLAG visibility analysis for each area analyzed are shown in Table 4.9. Table 4.10 provides the relative humidity factors (f[RH]) that were used for the FLAG method 6 tests.

Table 4.9 FLAG Report Background Extinction Values.[1]

Site	Season	Hygroscopic (Mm^{-1})	Non-hygroscopic (Mm^{-1})
Bridger Wilderness Area (Will also be used for Popo Agie Wilderness Area and Wind River Roadless Area)	Winter	0.6	4.5
	Spring	0.6	4.5
	Summer	0.6	4.5
	Fall	0.6	4.5
Fitzpatrick Wilderness Area	Winter	0.6	4.5
	Spring	0.6	4.5
	Summer	0.6	4.5
	Fall	0.6	4.5
North Absaroka Wilderness Area	Winter	0.6	4.5
	Spring	0.6	4.5
	Summer	0.6	4.5
	Fall	0.6	4.5
Teton Wilderness Area	Winter	0.6	4.5
	Spring	0.6	4.5
	Summer	0.6	4.5
	Fall	0.6	4.5
Washakie Wilderness Area	Winter	0.6	4.5
	Spring	0.6	4.5
	Summer	0.6	4.5
	Fall	0.6	4.5
Grand Teton National Park (will also be used for Gros Ventre Wilderness Area)	Winter	0.6	4.5
	Spring	0.6	4.5
	Summer	0.6	4.5
	Fall	0.6	4.5
Yellowstone National Park	Winter	0.6	4.5
	Spring	0.6	4.5
	Summer	0.6	4.5
	Fall	0.6	4.5

1 FLAG (2000).
2 Mm^{-1} = inverse megameters

Table 4.10 Monthly f(RH) Factors from Regional Haze Rule Guidance.

IMPROVE Site	Quarter	Months	f(RH) Values
Bridger Wilderness Area[1]	1	Jan, Feb, Mar	2.5, 2.3, 2.3
	2	Apr, May, Jun	2.1, 2.1, 1.8
	3	Jul, Aug, Sep	1.5, 1.5, 1.8
	4	Oct, Nov, Dec	2.0, 2.5, 2.4
Fitzpatrick Wilderness Area	1	Jan, Feb, Mar	2.5, 2.3, 2.3
	2	Apr, May, Jun	2.1, 2.1, 1.8
	3	Jul, Aug, Sep	1.5, 1.5, 1.8
	4	Oct, Nov, Dec	2.0, 2.5, 2.4
Grand Teton National Park	1	Jan, Feb, Mar	2.5, 2.3, 2.2
	2	Apr, May, Jun	2.1, 2.1, 1.9
	3	Jul, Aug, Sep	1.7, 1.6, 1.8
	4	Oct, Nov, Dec	2.1, 2.4, 2.5
North Absaroka Wilderness Area	1	Jan, Feb, Mar	2.4, 2.2, 2.2
	2	Apr, May, Jun	2.1, 2.1, 1.9
	3	Jul, Aug, Sep	1.6, 1.5, 1.8
	4	Oct, Nov, Dec	2.0, 2.3, 2.4
Teton Wilderness Area	1	Jan, Feb, Mar	2.5, 2.3, 2.2
	2	Apr, May, Jun	2.1, 2.1, 1.9
	3	Jul, Aug, Sep	1.7, 1.6, 1.8
	4	Oct, Nov, Dec	2.1, 2.4, 2.5
Waskakie Wilderness Area	1	Jan, Feb, Mar	2.4, 2.2, 2.2
	2	Apr, May, Jun	2.1, 2.1, 1.9
	3	Jul, Aug, Sep	1.6, 1.5, 1.8
	4	Oct, Nov, Dec	2.0, 2.3, 2.4
Yellowstone National Park	1	Jan, Feb, Mar	2.5, 2.3, 2.2
	2	Apr, May, Jun	2.1, 2.1, 1.9
	3	Jul, Aug, Sep	1.7, 1.6, 1.8
	4	Oct, Nov, Dec	2.1, 2.4, 2.5

[1] Also used for Gros Ventre, and Popo Agie Wilderness Areas, Wind River Roadless Area, and regional communities.

The IMPROVE method uses the measured background conditions at the Bridger Wilderness Area, North Absaroka Wilderness Area and at the Yellowstone National Park site (see Table 4.3), and the monthly relative humidity factors as provided in EPA (2003b) (Table 4.10). Visibility data from the Bridger Wilderness Area IMPROVE site were used for the Bridger, Fitzpatrick, Gros Ventre, and Popo Agie Wilderness Areas and for the Wind River Roadless Area. Visibility data from the Yellowstone National Park IMPROVE site were used for the Teton Wilderness Area and for Grand Teton and Yellowstone National Parks. Data from the North Absaroka site were used for the North Absaroka and Washakie Wilderness Areas.

The two BART screening methods use the background visibility data provided in Appendix B of the *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule.* These

methods use CALPOST visibility method 6. The first test uses the "best days" background visibility condition and the second test uses the annual average background. These background data given in deciview (dv) units are shown in Table 4.11. The BART methods also utilize monthly relative humidity factors as provided in the *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule* (Table 4.10).

Table 4.11 Default Natural Conditions.[1]

Site	Annual Average (dv)	Best Days (dv)
Bridger Wilderness[2]	4.52	1.96
Fitzpatrick Wilderness	4.53	1.97
North Absaroka Wilderness	4.53	1.97
Teton Wilderness	4.53	1.97
Washakie Wilderness	4.53	1.97
Grand Teton National Park	4.53	1.97
Yellowstone National Park	4.56	2.00

1 Default natural conditions from Appendix B (EPA, 2003b).
2 Also used for Gros Ventre and Popo Agie Wilderness Areas, and Wind River Roadless Area

For the Wyoming regional community locations (Boulder, Cora, and Pinedale) adjusted nephelometer data collected at Boulder (see Table 4.4) were used to estimate visibility impairment. This visibility test uses CALPOST method 6 with quarterly averaged background visibility data and monthly averaged relative humidity factors to estimate the change in light extinction from CALPUFF modeled impacts. Relative humidity data factors for the Bridger Wilderness Area (EPA, 2003b) were used.

Change in atmospheric light extinction relative to background conditions is used to measure regional haze. Analysis thresholds for atmospheric light extinction are set forth in FLAG (2000), with the results reported in percent change in light extinction and change in dv. The thresholds are defined as 5% and 10% of the reference background visibility or 0.5 and 1.0 dv for project sources alone and cumulative source impacts, respectively. FLAG (2000) also identifies a goal that any specific project combined with cumulative new source growth will have 0 days of visibility impairment at or above 1.0 dv in any PSD Class I area. The BLM considers a 1.0 dv change as a perceptible significance threshold; however, there are no applicable local, state, tribal, or federal regulatory visibility standards. It is the responsibility of the Federal Land Manager or Tribal government responsible for that land to determine when adverse impacts are significant or not, and these may differ from BLM levels for significant adverse impacts (e.g., the USDA-FS considers a 0.5 dv change as a threshold in order to protect visibility in sensitive areas). The BLM recognizes that other federal agencies may use alternative methods to calculate visibility impairment.

Visibility impact assessments following FLAG guidance are typically based on the maximum predicted daily (24-hour) visibility impacts on an annual basis. The maximum number of days above threshold values and the maximum predicted impacts are reported. Visibility impact assessments following EPA's regional haze rule guidance (EPA, 2005d) use the annual 98th

percentile maximum predicted daily values (8th highest daily value) for assessing visibility impacts.

Far-Field Results

The maximum predicted far-field visibility impacts for each of the modeled scenarios are provided in Appendix E, Tables E.12.1 through E.12.11 (FLAG Method 6 test), Tables E.13.1 through E.13.11 (IMPROVE data test), Tables E.14.1 through E.14.11 (FLAG Method 2 test), Tables E.15.1 through E.15.11 (BART Regional Haze Rule Best Days test), and Tables E.16.1 through E.16.11 (BART Regional Haze Rule Average Days test). For each PSD Class I and sensitive PSD Class II area the predicted change in dv and the estimated number of days per year that could potentially exceed 0.5 and 1.0 dv thresholds are provided. For the FLAG and IMPROVE visibility tests the maximum visibility impact and the maximum number of days per year that could potentially exceed the 0.5 and 1.0 dv thresholds are reported. For the two BART visibility tests, the impacts reported are the 98th percentile values. The maximum predicted change in dv represents the 8th highest value in any of the modeling years, and the number of days per year reported that could potentially exceed the 0.5 and 1.0 dv thresholds exclude 7 events, i.e., these values represent the additional number of days above the 8th highest values that are above the thresholds.. The largest number of days of visibility impairment from both direct project sources and from cumulative sources were predicted to occur at Bridger Wilderness Area, under the Proposed Action Alternative (Alternative B).

Mid-Field Results

The maximum predicted mid-field visibility impacts for each of the modeled scenarios are provided in Appendix E, Tables E.17.1 through F.17.11. The maximum predicted visibility impacts (change in dv) at regional communities and the estimated number of days per year that could potentially exceed the 1.0 dv threshold are provided for each community location. The highest frequency of predicted visibility impacts from direct project and cumulative sources occurred at Boulder under the Proposed Action Alternative (Alternative B) where there were 138 days per year (direct project) and 153 days per year (cumulative) predicted to be above the 1.0 dv threshold (Table E.17.3).

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Appendix A

Air Quality Impact Analysis Protocol

Air Quality Impact Analysis Protocol

Draft Supplemental
Pinedale Anticline Oil and Gas Exploration and Development Environmental Impact Statement

Prepared for

Bureau of Land Management
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August 2006

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ATTACHMENT A Sample CALMET and CALPUFF Input Control Files

LIST OF ACRONYMS AND ABBREVIATIONS

ANC	Acid neutralizing capacity
Anschutz	Anschutz Pinedale Corporation
APD	Application for Permit to Drill
AQD	Air Quality Division
AQRV	Air Quality Related Value
AR	Atlantic Rim
ASU	Anschutz, Shell and Ultra
BACT	Best Available Control Technology
BLM	Bureau of Land Management
CASTNET	Clean Air Status and Trends Network
C.F.R.	Code of Federal Regulations
CDPHE/APCD	Colorado Department of Public Health and Environment/Air Pollution Control Division
CO	Carbon monoxide
COGCC	Colorado Oil and Gas Conservation Commission
DEM	Digital Elevation Model
dv	Deciview
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FLAG	Federal Land Managers' Air Quality Related Values Workgroup
FLM	Federal Land Managers
GRI	Gas Research Institute
HAP	Hazardous air pollutant
HNO_3	Nitric acid
Hp	Horsepower
IDEQ	Idaho Division of Environment Quality
IDLH	Immediately Dangerous to Life or Health
IMPROVE	Interagency Modeling of Protected Visual Environment
IOGCC	Idaho Oil and Gas Conservation Commission
IWAQM	Interagency Workgroup on Air Quality Modeling
JIDP	Jonah Infill Drilling Project
kg/ha/yr	Kilograms per hectare per year
km	Kilometer
LAC	Level of Acceptable Change
LOP	Life of Project
LULC	Land Use Land Cover
m	Meter
MEI	Maximally Exposed Individual
MLE	Most Likely Exposure
Mm^{-1}	Inverse Megameters

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

N	Nitrogen
NAAQS	National Ambient Air Quality Standards
NADP	National Acid Deposition Program
NCDC	National Climate Data Center
NEPA	National Environmental Policy Act
NIOSH	National Institute for Occupational Safety and Health
NO_2	Nitrogen dioxide
NO_3	Nitrate
NO_x	Oxides of nitrogen
NPS	National Park Service
NSR	New Source Review
NTN	National Trends Network
NWS	National Weather Service
O_3	Ozone
Operators	Shell Exploration & Production Company, Ultra Resources, Inc., Questar Exploration & Production Company, Anschutz Pinedale Corporation and other others
PAPA	Pinedale Anticline Project Area
PFO	Pinedale Field Office
PM_{10}	Particulate matter less than or equal to 10 microns in size
$PM_{2.5}$	Particulate matter less than or equal to 2.5 microns in size
ppb	Parts per billion
Project	Pinedale Anticline Project
Protocol	Air Quality Impact Assessment Protocol
PSD	Prevention of Significant Deterioration
QA/QC	Quality Assurance/Quality Control
QGM	Questar Gas Management
Questar	Questar Exploration & Production Company
REL	Reference exposure level
RfC	Reference Concentrations for Chronic Inhalation
RFD	Reasonably foreseeable development
RFFA	Reasonably foreseeable future actions
RMP	Resource Management Plan
ROD	Record of Decision
RPO	Regional Planning Office
S	Sulfur
SEIS	Supplemental Environmental Impact Statement
Shell	Shell Exploration & Production Company
SO_2	Sulfur dioxide
SO_4	Sulfate
tpy	Tons per year

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

TRC	TRC Environmental Corporation
UDEQ-AQD	Utah Department of Environmental Quality-Air Quality Division
UDNR-DOGM	Utah Department of Natural Resources-Division of Oil, Gas, and Mining
Ultra	Ultra Resources, Inc.
URF	Unit risk factor
USFS	United States Forest Service
USGS	United States Geological Survey
VOC	Volatile organic compound
WAAQS	Wyoming Ambient Air Quality Standards
WAQSR	Wyoming Air Quality Standards and Regulations
WDEQ	Wyoming Department of Environmental Quality
WOGCC	Wyoming Oil and Gas Conservation Commission
WRAP	Western Regional Air Partnership
µeq/l	Microequivalents per liter
$\mu g/m^3$	Micrograms per cubic meter

1.0 INTRODUCTION

This Air Quality Impact Assessment Protocol (Protocol) identifies the methodologies for quantifying potential air quality impacts from the continued developed in the Pinedale Anticline Project Area (PAPA), herein referred to as the Project. These methodologies are being provided prior to study initiation to ensure that the approach, input data, and computation methods are acceptable to the Bureau of Land Management (BLM) and other air quality stakeholders, and that all air quality stakeholders have the opportunity to review the Protocol and provide input before the study is initiated. The location of the Project in west-central Wyoming requires the examination of Project and cumulative source impacts within the study area shown on Map 1.1 from emission sources in Wyoming, northwestern Colorado, northeastern Utah, and southeastern Idaho.

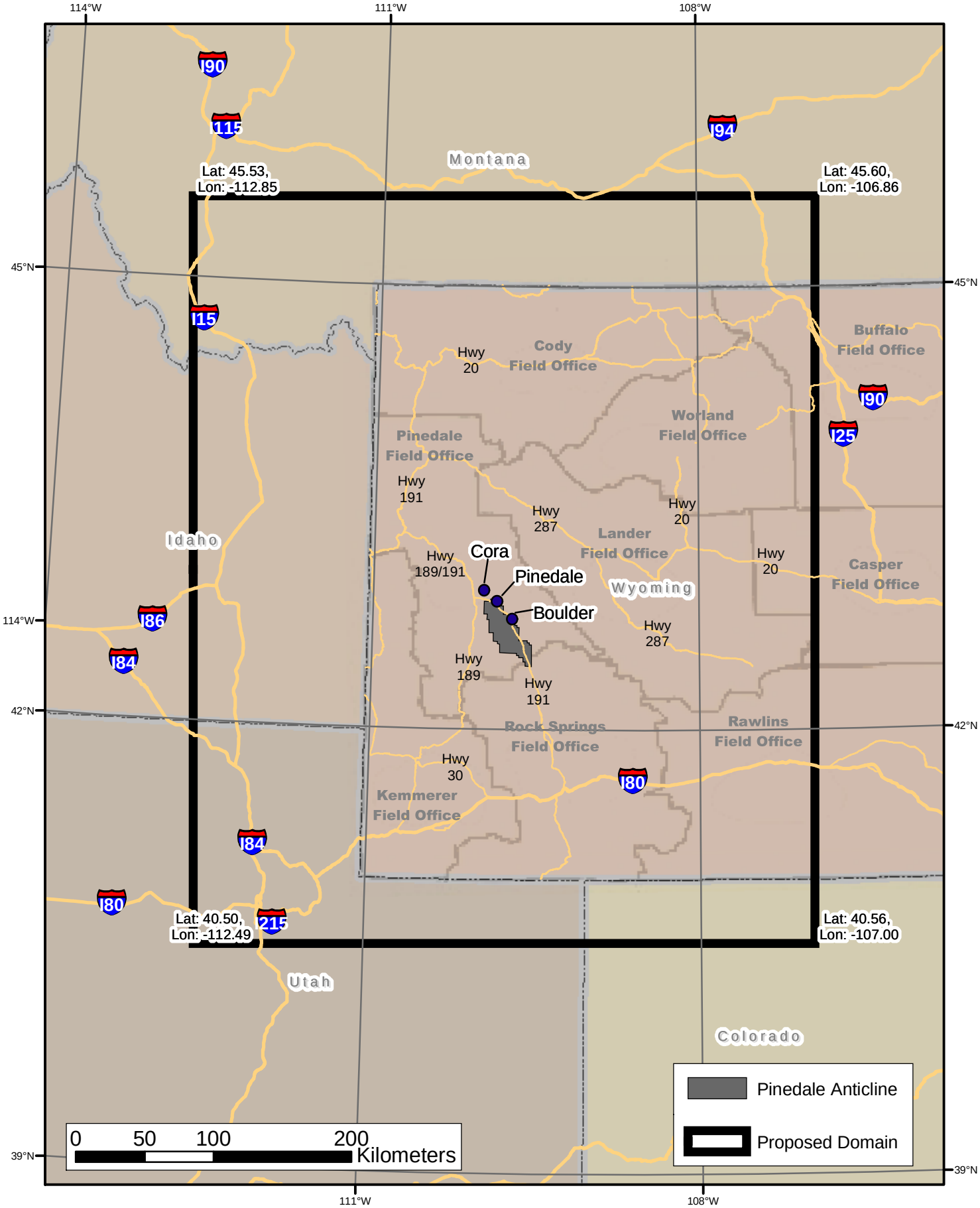
The analysis described in this Protocol differs significantly from previous natural gas development air quality analyses performed in western Wyoming. The study area has been enlarged to the north to include all of Yellowstone National Park and dimensioned in accordance with Interagency Workgroup on Air Quality Modeling (IWAQM) guidance (IWAQM, 1998) to ensure adequate wind flow characterization around each analyzed sensitive area. The analysis will utilize ambient air background data collected in Sublette County since early 2005, and the regional emissions inventory start-date is updated to reflect the use of this recent and representative data. Finally, the far-field modeling analysis utilizes the CALMET/CALPUFF modeling system with 3 years of mesoscale model (MM5 model) meteorological data in accordance with 40 CFR 51 Appendix W, Guideline on Air Quality Models (EPA, 2005a), supplemented with regional NWS meteorological data. The MM5 data are national data sets for years 2001-2003, and are the most current consecutive 3 years that are readily available for CALMET model simulations. These differences from previous analyses will result in an updated analysis that reflects current science and analysis methodologies.

1.1 PROJECT DESCRIPTION

Jointly referred to as the Operators, Ultra Resources, Inc. (Ultra), Shell Exploration & Production Company (Shell), Questar Market Resources including Wexpro Company (Questar), BP America Production Company, Stone Energy Corporation, Yates Petroleum Corporation, and others who agree to participate, have notified the BLM Pinedale Field Office (PFO) that they propose a new long-term development plan that includes limited year-round drilling and completions of natural gas wells within their leaseholdings in the PAPA.

As of December 31, 2005, there were approximately 322 producing well pads and 457 producing wells in the PAPA. An additional 26 pads and 205 producing wells are proposed by the Operators in 2006. The Proposed Action consists of drilling approximately 4,400 new wells (in addition to the 662 wells drilled through 2006) within the PAPA, beginning in 2007. As part of the Proposed Action, there would be up to 48 drilling rigs operating in the PAPA after 2007. The Operators propose to install emissions controls to achieve Tier 2 equivalent emissions on approximately 60 percent of the drilling rig engines by 2009. Questar has previously committed (BLM, 2005a) to install Tier 2 equivalent emission controls on all year-round drilling rigs by 2008. In 2005, a liquids (condensate and produced water) gathering system was installed in the northern leaseholds in the PAPA, reducing overall emissions through reduction in truck traffic.

Map 1.1 - Project Location and Study Area



As part of the Proposed Action, the Operators propose to install a liquids gathering system in the central and southern portions of the PAPA. Operation of the liquids gathering system would require installation of central gathering facilities within the PAPA which would have associated emissions. Condensate would be gathered within the PAPA and the crude petroleum would be transported via pipeline to processing facilities in southwest Wyoming. Produced water would be gathered and trucked from a central location within the PAPA. Operators are currently investigating options for produced water disposal both within and outside of the PAPA. Questar Gas Management (QGM) is proposing to install an additional 7,440 horsepower (hp) of compression at the Pinedale/Gobblers Knob Compressor Station within the PAPA in 2006. QGM also intends to install an additional 31,000 hp in 2009 and 15,500 hp in 2015 at the Pinedale/Gobblers Knob Compressor Station. Jonah Gas Gathering Company (JGGC) is proposing to install an additional 184,000 hp of compression at the Paradise Compressor Station, an additional 37,366 hp at the Falcon Compressor Station and 14,672 hp at the Bird Canyon Compressor Station (outside of the PAPA) all in 2011 as part of the Proposed Action. One 30-inch gas sales pipeline (the Rendezvous Phase 6 – R6) is proposed by Rendezvous Gas Services (RGS) to transport natural gas from the PAPA to the Granger and Blacks Fork processing plants in southwest Wyoming. JGGC is proposing the 36-inch (Paradise to Bird Canyon or PBC Pipeline) and a connecting 45.5-mile long, 30-inch pipeline (Opal Loop III Pipeline) which would transport gas from the PAPA to the Opal and Pioneer gas processing plants. In conjunction with the proposed R6 Pipeline Project, RGS proposes to expand the existing 33.6-acre Granger Gas Processing Plant by 86.4 acres, for a total of 120 acres on BLM-administered federal lands in Section 16, T. 18 N., R. 111 W. The purpose of the proposed expansion is to construct and operate additional natural gas processing facilities to sufficiently increase processing capacity for an anticipated increased input of 600 million standard cubic feet per day (MMSCF/D) of natural gas and crude petroleum. The current Granger Gas Processing Plant capacity is 600 MMSCF/D. The expansion would represent a 100 percent increase in treatment capacity.

BLM will be analyzing the No Action Alternative (Alternative A) in addition to the Proposed Action Alternative (Alternative B) and a third alternative (Alternative C). The No Action Alternative is defined as continued development of the PAPA under current BLM management practices. The Operators have provided estimates of new pads, expansion pads and proposed number of wells that would be drilled under the No Action Alternative with continued management practices under the PAPA ROD. However, at some point, the limits of the PAPA Record of Decision (BLM, 2000b) would be reached for maximum allowed well pads within specific Management Areas and further NEPA (National Environmental Policy Act) analysis will be required for continued development. The liquids gathering systems in the southern and central portions of the PAPA would not be installed under the No Action Alternative. The R6, PBC, and Opal Loop III pipelines would be constructed under the No Action Alternative.

A third alternative will be analyzed (for all resources), as determined by BLM, and would include provisions for concentrating development activities to allow for maintenance of wildlife habitat, seasonal wildlife stipulations, and other environmental impacts. All components included in the Proposed Action Alternative are also a part of Alternative C, and therefore, emissions and associated impacts for the two alternatives would be similar.

1.2 RELATIONSHIP TO EXISTING PLANS AND DOCUMENTS

Potential impacts to air quality resulting from exploration and development of natural gas within the PAPA was previously analyzed in the Pinedale Anticline Oil and Gas Exploration and Development Environmental Impact Statement (PAPA EIS) (BLM, 2000a).

In 2004, Questar submitted a proposal to BLM for limited year-round drilling within their lease holdings in the PAPA. As part of their proposal for mitigation, Questar would install a gathering system to remove condensate and water from the PAPA (reducing truck traffic) and utilize Tier 2 compliant engines or alternate fuels on all drilling rig engines by 2007. In November 2004, BLM issued a Decision Record (BLM, 2004) approving Questar's limited year-round drilling proposal. Although potential emissions from the proposal were disclosed, a complete air quality impact analysis was not conducted because the operator-committed mitigation would cause the impacts to be reduced. In 2005, BLM issued a Decision Record (BLM, 2005a) which allowed for modification of the proposed condensate pipeline route and extended the requirement for the drilling rig engines to become Tier 2 compliant to 2008. Again, potential emissions were disclosed but a complete air quality impact analysis was not conducted.

Also in 2005, Anschutz, Shell and Ultra (ASU) submitted a proposal to BLM for a year-round demonstration project within the PAPA. In September, 2005, BLM issued a Decision Record (BLM, 2005b) that allowed each operator to have two drill rigs on one pad each within crucial winter range during the winter of 2005-2006. For mitigation of the air quality impacts, the operators committed to reduce emissions by testing selective catalytic reduction on two of the drill rigs and testing bi-fuel technology on the other four drilling rigs. Because the proposal represented an overall reduction in emissions (the rigs would have operated in the PAPA outside of crucial winter range if the proposal were not approved), potential emissions were disclosed but a complete air quality impact analysis was not conducted.

In November of 2005, BLM issued a Decision Record (BLM, 2005c) that allowed Questar to have one additional winter drill rig. Four winter completions and one drill rig move were also approved.

Since the PAPA ROD (BLM, 2000b) was issued in July 2000, natural gas development within the PAPA has occurred at a pace greater than was analyzed in the PAPA DEIS as disclosed in the subsequent NEPA documents. The PAPA ROD authorized the development of 700 producing wells and/or well pads, however, the ROD was ambiguous at to whether the limit was wells or well pads. The air quality impact analysis for the PAPA DEIS assumed 700 producing wells and up to eight drilling rigs operating in the PAPA at any one time. As of December 2005, there were approximately 457 producing wells in the PAPA with an additional 205 wells projected for 2006. Twenty-nine of the existing wells were drilled prior to the PAPA ROD, therefore, there would be potentially 633 producing wells by the end of 2006. The PAPA ROD also set an analysis threshold of 376.59 tpy NO_x emissions from compression and 693.5 tpy of NO_x emissions from all sources in the field. The PAPA ROD stated that additional environmental analysis would be conducted if the analysis threshold were exceeded. Even though the limit of 700 producing wells and/or well pads has not been exceeded, the NO_x emissions from all sources in the PAPA currently exceeds the 693.5 tpy analysis limit specified

in the PAPA ROD. For this reason, and to analyze the current proposal, BLM has determined that it is necessary to prepare a Supplemental Environmental Impact Statement (SEIS) which includes a complete and accurate air quality impact analysis.

The BLM Pinedale Resource Management Plan (RMP) (BLM, 1988) issued in 1988, amended in 2000, and currently under revision, directs the management of BLM administered lands within the PAPA. Management of oil and gas resources, as stated in the RMP, provides for leasing, exploration, and development of oil and gas while protecting other resource values. According to the RMP, all public lands in the PAPA are suitable for oil and gas leasing and development, subject to certain stipulations.

The most recent EIS completed in Sublette County is the Final EIS, Jonah Infill Drilling Project (JIDP), Sublette County, Wyoming (BLM, 2006). This Protocol represents a new and separate analyses from that performed for the JIDP EIS. With the exception of shared methodologies common to many regional modeling analyses, no portions of the JIDP air quality analysis were utilized in this study.

The BLM is currently developing a state-wide cumulative air quality analysis deemed the BLM State of the Atmosphere air quality analysis. That study is in the early development stages, and will utilize a 1-year 2002 Western Regional Air Partnership (WRAP) meteorological dataset and a separate inventory that is not yet available. No portions of the BLM State of the Atmosphere air quality analysis will be utilized in this analysis.

1.3 PROPOSED WORK TASKS

The air quality analysis will address the impacts on ambient air quality and Air Quality Related Values (AQRVs) from: 1) air emissions that have resulted from development and production activities within the PAPA during 2005; 2) potential air emissions from development and production with the PAPA after 2005 that could occur under the Proposed Action and Alternative C; 3) potential air emissions after 2005 resulting from continued development and production activities under the No Action Alternative; and 4) air emissions from other documented regional emissions sources within the study area. Ambient air quality impacts will be quantified and compared to applicable state and federal standards, and AQRV impacts (impacts on visibility [regional haze], acid deposition, and potential increases in acidification to acid sensitive lakes) will be quantified and compared to applicable thresholds as defined in the Federal Land Managers' (FLMs') Air Quality Related Values Workgroup (FLAG), IWAQM guidance documents (FLAG, 2000 and IWAQM, 1998), and other state and federal agency guidance. Impact assessment criteria are discussed in further detail in Section 5.0 of this Protocol.

The assessment of impacts will include the completion of the following tasks:

- Generate Project development and production emissions inventories (see Section 2.1).
- Compile a regional emissions inventory including specified permitted sources, reasonably foreseeable development (RFD), and reasonably foreseeable future actions (RFFA) (see Section 2.2).

- Assess near-field ambient impacts from Project emissions sources (see Sections 3.0 and 5.1).
- Assess far-field ambient direct project (Project emissions sources) and cumulative impacts (Project plus regional emissions sources), including pollutant concentration, visibility and acid deposition impacts, and potential increases in acidification to acid sensitive lakes, within the modeling domain and at PSD Class I and other sensitive areas (see Sections 4.0 and 5.2).

2.0 EMISSIONS INVENTORY

The Proposed Action for the project includes the development of approximately 4,400 additional natural gas wells within the PAPA beginning in 2007. The No Action Alternative includes continued development under current BLM field authorizations. Under the Proposed Action, drilling would continue for approximately 17 years, with an approximate 60-year life of project (LOP). Production facilities at each well/pad site would include dehydration units, separators, gathering pipelines, and blowdown tanks, with centralized condensate collection facilities (central gathering facilities) at several locations within the PAPA. Ancillary facilities would include new compressor engines at existing compressor stations inside and outside the PAPA.

An emission inventory of oxides of nitrogen (NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), particulate matter less than or equal to 10 microns in size (PM_{10}), particulate matter less than or equal to 2.5 microns in size ($PM_{2.5}$), volatile organic compounds (VOC), and hazardous air pollutants (HAPs) (benzene, toluene, ethyl benzene, xylene, n-hexane, and formaldehyde) will be developed for well development activities, production activities, and ancillary facilities planned as part of the Project. Lead emissions will be considered negligible and not calculated in the inventory. The emissions inventory will be developed based on the Proposed Action and field operations data provided by the Operators. The inventory will be developed using field-specific emission test results, manufacturer's emissions data, AP-42 (EPA, 1995), Gas Research Institute (GRI) emission factors, and other accepted engineering methods as described in this section.

2.1 PROJECT EMISSIONS

2.1.1 Field Development Emissions

Emissions-generating activities during field development include: well pad and access road construction; drilling; frac/completion; vehicle travel during the drilling and completion phase; and construction and vehicle travel during installation of the condensate and water gathering system and natural gas pipeline installation. Emission calculations for these and other potential emissions-generating activities will utilize 2005 annual operator emissions reports submitted to the Wyoming Department of Environmental Quality, Air Quality Division (WDEQ-AQD) whenever possible, depending upon availability and applicability by individual emissions source. Drilling engine emissions will be calculated using the following methods, presented in order of preference: field-specific stack test results, EPA Tier emission factors (EPA 2006), or AP-42 emission factors (EPA 1995). AP-42 emission factors will utilize AP-42 Table 3.3-1 for engines less than 600 hp in size and Table 3.4-1 for engines greater than 600 hp in size. Emissions estimates will consider operator-committed emission control devices. An engine usage and operating load factor of 0.42, as used in previous EIS analyses, will be applied for drilling engines. Fugitive particulate emissions from vehicle travel and construction activities and wind erosion emissions from areas disturbed during construction will be calculated using AP-42 emission factors. HAP emissions from combustion sources will be calculated using GRI-HAPCalc® (GRI, 1999) if no manufacturer’s or testing data is available. Fugitive dust control efficiencies will be utilized for any watering or dust suppressants applied.

2.1.2 Production Emissions

Sources of pollutant emissions during field production include combustion emissions from wells and compressor engines, and VOC and HAP emissions from gas transmission operations. Fugitive particulate emissions from unpaved road travel and from wind erosion on disturbed areas (such as well pads) will also occur. Emission rates will be developed in accordance with WDEQ-AQD oil and gas permitting guidance (WDEQ, 2001, WDEQ, 2004) where applicable guidance exists.

Combustion equipment emissions will be calculated using EPA Tier emission factors, Best Available Control Technology (BACT) emission rates, manufacturer emission factors, and/or GRI emission factors. Fugitive dust from unpaved roads and wind erosion emissions from disturbed areas will be calculated using AP-42 emission factors. VOC and HAP emissions from production (aside from those arising from combustion sources) will be generated by well-site dehydrators, fugitive leaks, and flashing emissions from liquids stored at Centralized Gathering Facilities. Both fugitive and flashing emissions will be calculated using representative constituent analyses of natural gas and stored liquids. A discussion of BACT applicability and requirements will be included for emissions sources as appropriate, in accordance with WDEQ-AQD oil and gas permitting guidance (WDEQ, 2001 and WDEQ, 2004).

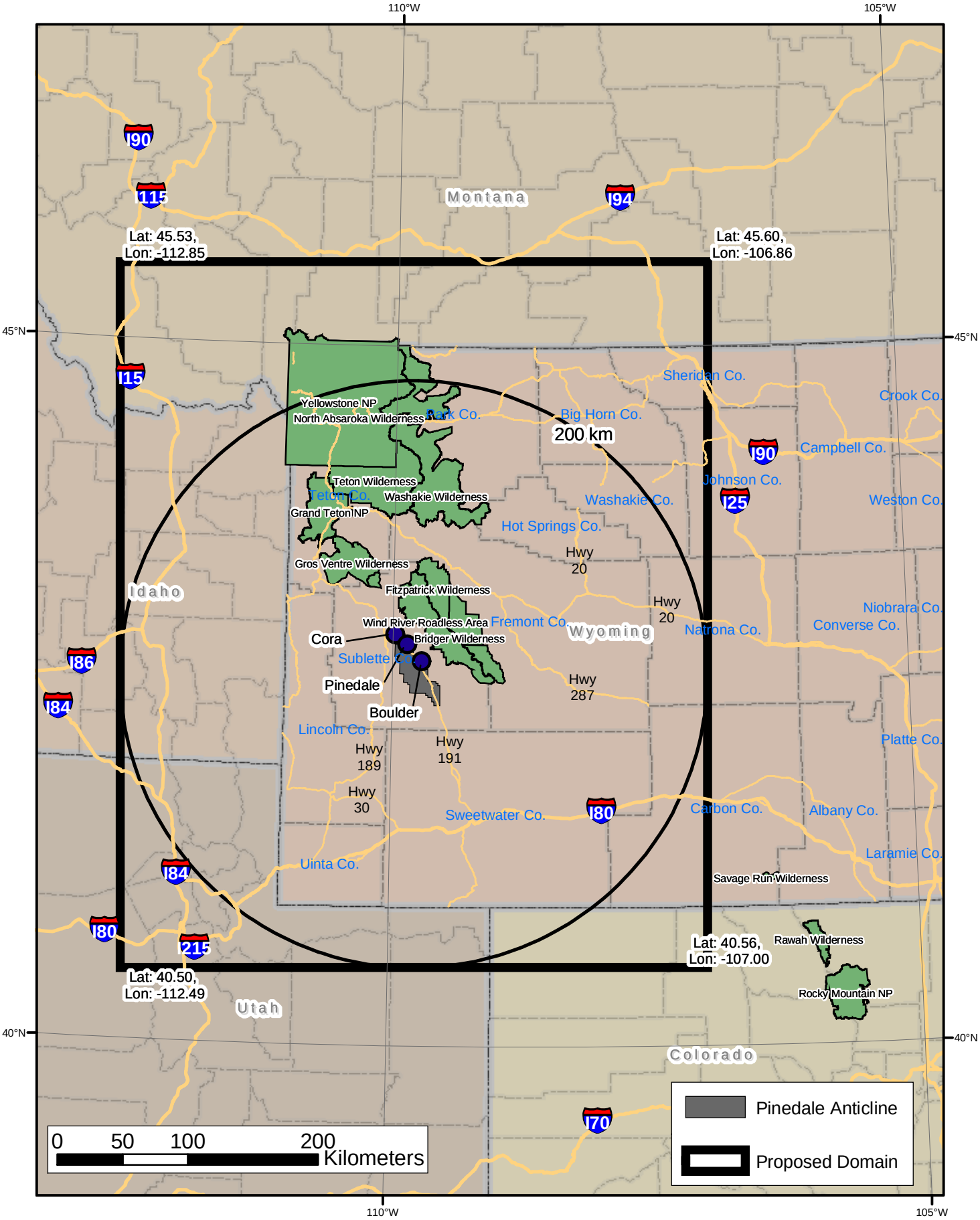
2.2 REGIONAL EMISSIONS INVENTORY

An inventory of existing and proposed emissions sources within a defined area and meeting defined criteria will be conducted and will include the identification of permitted sources, permitted oil and gas wells, RFD, and RFFA. The inventory will be developed using data obtained from WDEQ-AQD, Wyoming Oil and Gas Conservation Commission (WOGCC), Colorado Department of Public Health and Environment/Air Pollution Control Division (CDPHE/APCD), Colorado Oil and Gas Conservation Commission (COGCC), Utah Department of Environmental Quality-Air Quality Division (UDEQ-AQD), Utah Department of Natural Resources-Division of Oil, Gas, and Mining (UDNR-DOGM), Idaho Division of Environmental Quality (IDEQ), Idaho Oil and Gas Conservation Commission (IOGCC), BLM, and other agencies as required.

The inventory period proposed in this Protocol has been selected to be consistent with the availability of recent (2005/2006) ambient background data collected in Sublette County, Wyoming. The inventory is proposed to begin on January 1, 2005 and end on February 1, 2006 - 13 months. Due to a typical 30-day lag in availability of permitted source data at state agencies, this end-date will ensure that the data collection can be completed by February 28 to allow timely progression of the dispersion modeling analysis. Some overlap between emission sources which began operating in 2005 and background data monitored during 2005 will exist.

Sources of PM_{10}, $PM_{2.5}$, NO_X, and SO_2 emissions within the study area (the CALPUFF/CALMET modeling domain), will be inventoried. The study area is shown in Map 2.1.

Map 2.1 - CALPUFF/CALMET Modeling Domain and Major/Minor Source Inventory Area



2.2.1 Existing Inventories

No overlap exists between the inventory timeframe for this Project and the emissions inventories performed for either the JIDP EIS or the Atlantic Rim Natural Gas Development Project EIS (AR EIS), the most recent regional emissions inventories developed in southwest Wyoming. As a result, no portions of the inventories developed for the JIDP EIS or the AR EIS are proposed to be utilized.

A Prevention of Significant Deterioration (PSD) Increment Analysis for NO_2 has been completed by WDEQ-AQD for Sublette County and is currently being performed by WDEQ-AQD for a 300 kilometer radius of the Bridger and Fitzpatrick Wilderness Area. The emissions inventory data compiled by WDEQ-AQD as part of this analysis will not be of use in this inventory effort due to differences in increment inventory requirements and the methodologies set forth in the Protocol.

2.2.2 State Agency Permitted Sources

The regional emissions inventory for the Project will include:

- Major sources located within the inventory area;
- Minor sources located within the inventory area;
- Sources that emit NO_x, SO_2, or $PM_{10}/PM_{2.5}$;
- Sources that began operation on or after January 1, 2005;
- Sources that began operation or were permitted before February 1, 2006; and
- Sources that were permitted within 18 months of January 1, 2005, but are not yet operating (will be inventoried and included as RFFA [see Section 2.2.4]).

The major source inventory area is proposed to be comprised of a 200 kilometer (km) radius from the Project Area, as shown in Map 2.1. The 200 km radius proposed reflects current FLM New Source Review (NSR) regional analysis guidance which requests PSD Class I AQRV analysis for major sources within 200 km of a PSD Class I area. Major sources are defined as those considered major under PSD regulations; i.e., emissions of any one pollutant greater than 250 tpy, or emissions of any pollutant greater than 100 tpy if the source meets certain criteria as outlined in 40 CFR 52.21 or Wyoming Air Quality Standards and Regulations (WAQSR) Chapter 6, Section 4. All increases or decreases in NO_x, SO_2, or $PM_{10}/PM_{2.5}$ at the major sources within this area would be inventoried. In addition, a request would be made to state agencies to indicate any additional major sources outside of the inventory area that may have had large changes in permitted emissions during the inventory period, and these changes would be researched and included in the regional inventory.

The minor source inventory area is proposed to encompass a 200 km radius from the Project Area, as shown in Map 2.1. Minor sources are defined as those sources considered minor under NSR regulations outlined in 40 CFR 52.21. Therefore, the analysis proposed further ensures that regional non-background emissions will be analyzed.

Potential-to-emit (maximum permitted) emission rates will be inventoried. Actual emissions will not be inventoried because work on the regional emissions inventory has indicated that actual

emissions are not readily available for most state-permitted sources. In addition, for those sources required to submit them to the permitting agency, actual emissions would not be available immediately following close of the calendar year. Permitted emissions decreases will be included only if the decrease occurs at a PSD major source and if the decrease is verifiable by appropriate state air regulatory authority (WDEQ-AQD, IDEQ, UDEQ-AQD, or CDPHE-APCD). Sources operating under permit waivers not related to oil and gas production will not be inventoried due to their insignificant nature, and a qualitative discussion of waivers will be presented in the Technical Support Document. Waivers issued to oil and gas wells or production sites will be examined based on emission threshold criteria and will either be included as a production site (>3 tpy total emissions) or assumed to be included in permitted well totals obtained from the oil and gas permitting authority. Mobile source emissions not directly resulting from the Proposed Action, biogenic sources, urban sources, and other non-industrial emission sources are assumed to be included in monitored background concentrations and are not specifically included in this inventory.

A list of well drilling permits issued between January 1, 2005, and February 1, 2006, will be compiled using permit data obtained from the appropriate oil and gas permitting authority (WOGCC, COGCC, UDNR-DOGM, or IOGCC). Information regarding well type and equipment, and historic and current field production will be used to create a representative emission factor in pounds per well for all emitted pollutants. This average emission factor will be multiplied by the number of wells installed during the study period in each county within the study area to calculate total well emissions by county.

2.2.3 RFD

An inventory of RFD sources will be performed for inclusion in the cumulative dispersion modeling. RFD is defined as 1) air emissions from the undeveloped portions of authorized NEPA projects, and 2) air emissions from not-yet-authorized NEPA projects (if emissions are quantified when modeling commences). RFD information from not-yet-authorized projects will be obtained from contractors working on ongoing air quality analyses for NEPA projects. RFD information for authorized development will be obtained from final NEPA documents that have been submitted to BLM for planned project development, specifically, from the air quality analyses performed for these projects. Undeveloped portions of projects within the PFO will be obtained from BLM PFO project development tracking. For other field offices, total wells or other equipment yet undeveloped will be determined based on plotting state-agency permitted sources spatially and subtracting from authorized totals the number of developed wells and/or total horsepower or emissions from permitted compression that are plotted within each project area. These calculated values will be submitted to BLM for a review of reasonableness prior to use in the modeling analysis.

As an example how RFD would be determined, in an authorized gas field development area for which 2,000 wells were projected and analyzed but only 250 wells have been developed as of the inventory end-date of this study, the 250 developed wells would be included under the permitted source inventory and the remaining 1,750 would be considered RFD. No authorized development would be excluded unless it was permitted and operating outside of the inventory dates outlined in Section 2.1.

Full development of proposed projects inventoried as RFD may or may not coincide with full development of the Project. As a result, the assumption that all RFD are fully developed during the maximum year of Project development may result in some conservatism in the cumulative impact analysis. A preliminary listing of RFD projects which may be examined in this study, as defined in the paragraph above, is presented in Table 2.1. All development areas will be reviewed for inclusion, and those projects generating pollutant emissions during production activities will be included as RFD. The BLM will be consulted to determine the existence of additional NEPA-authorized projects.

More detailed development and operations data will be compiled for all RFD and presented in the Technical Support Document. To ensure a timely, complete modeling analysis, only development authorized through the inventory end-date of February 1, 2006, or for which emissions have been quantified as of the beginning of the modeling analysis, will be included in this analysis. RFD quantified after the inventory end-date will be acknowledged with a qualitative discussion describing the proposed development(s). Similarly, a qualitative discussion and link to the appropriate BLM website will be presented for development currently proposed in the Powder River Basin Coalbed Methane Development Project, located outside of the study domain in northeast Wyoming's Powder River Basin.

2.2.4 RFFA

An inventory of RFFA sources will be performed for inclusion in the cumulative dispersion modeling. For the purposes of this project, RFFA is defined as a source which possesses an unexpired air permit issued on or after July 1, 2003 (18 months prior to January 1, 2005), but the source is not yet operating. The primary source of RFFA information will be state permit records obtained through a file data search.

Table 2.1 Potential RFD in the Study Area.

Atlantic Rim	Jonah II
Big Piney-LaBarge	Jonah Infill
Bird Canyon	Kennedy Oil Pilot
Bird-Opal Loop Pipeline	Merna Pipeline
Black Butte Mine Pit 14	Monnell Oil Recovery
BTA Bravo	Moxa Arch
Burley	Moxa Arch Infill
Castle Creek	Mulligan Draw
Continental Divide/Wamsutter II	Opal Loop Pipeline
Continental Divide/Creston	Pappy Draw
Copper Ridge	Piceance Basin
Creston-Blue Gap	Pinedale Anticline
Desolation Flats	Pioneer Gas Plant
Dripping Rock/Cedar Breaks	Riley Ridge
East LaBarge	Riverton Dome
Essex Mountain	Road Hollow
Fontenelle II	Seminoe Road
Hanna Draw	Sierra Madre
Hanna Draw Pilot	Soda Unit
Hay Reservoir	South Baggs
Hay Reservoir Pilot	South Piney
Hickey-Table Mountain	Stagecoach
Horse Trap	Vermillion Basin
Jack Morrow Hills	Wind River

3.0 NEAR-FIELD ANALYSIS

3.1 MODELING METHODOLOGY

The near-field ambient air quality impact assessment will be performed to quantify maximum pollutant impacts in the vicinity of the Project resulting from development and production emissions. EPA's guideline model, AERMOD (version 04300), will be used to assess these near-field impacts. Regulatory model settings will be utilized with the exception of the non-regulatory setting MSGPRO, which is necessary to handle missing data in the meteorological dataset. Flat terrain will be utilized in the near-field analysis.

One year of meteorological data will be used that includes hourly surface meteorology data (wind speed, wind direction, standard deviation of wind direction [sigma theta], and temperature) collected in the Jonah Field from January 1999 through January 2000, consistent with current WDEQ-AQD permit modeling analysis guidance. A wind rose for these data is presented in Figure 3.1.

The AERMOD preprocessor AERMET will be used to process the Jonah Field meteorological data into a dataset compatible with the AERMOD dispersion model. AERMET will be used to combine the Jonah Field surface measurements with twice daily sounding data from the Riverton, Wyoming NWS site, cloud cover data collected at the Big Piney, Wyoming NWS ASOS site, and solar radiation measurements collected at the Pinedale, Wyoming CASTNET site. Seasonal values for albedo, Bowen ratio and surface roughness length, for land use type “desert shrubland”, selected from tables in the AERMET user’s guide, will be used in processing the meteorological data.

3.2 BACKGROUND DATA

Background pollutant concentrations are used as an indicator of existing conditions in the region, and are assumed to include emissions from industrial emission sources in operation and from mobile, urban, biogenic, and other non-industrial emission sources. These background concentrations are added to modeled near-field Project impacts to calculate total ambient air quality impacts.

Ambient air monitoring is currently being conducted at several locations in Sublette County. Monitoring sites in the Jonah Field and near Boulder and Daniel collect varying ambient concentration, visibility, and meteorological data parameters. Data from one or more of these sites are proposed to replace data collected at the Green River Basin Visibility Study site through 2001 because the Sublette County data are not only more current, but are more representative of conditions in and near the Pinedale Anticline field.

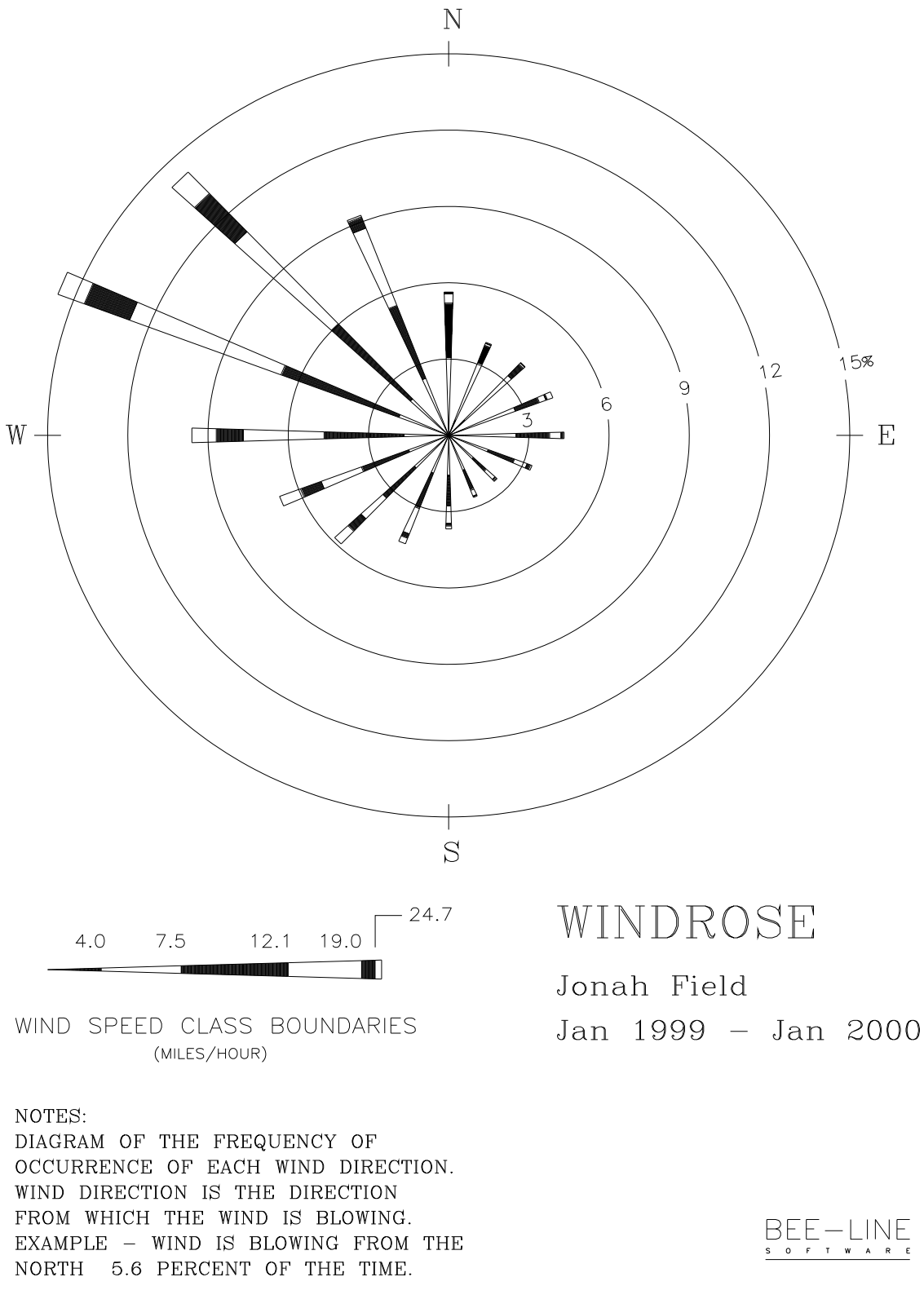


Figure 3.1 Jonah Meteorological Data Windrose

Table 3.1 summarizes the locations, date of start-up, and pollutants monitored for each monitoring site. Monitor locations are shown in relation to the Pinedale Anticline natural gas field in Map 3.1.

Table 3.1 Sublette County Ambient Monitoring Summary.

Monitor	Location	Operator	Start Date	Parameters Monitored
Jonah	Jonah Field	EnCana	1/15/05	PM_{10}, O_3, NO_2, Met, Camera
Boulder	5 mi S and W of Boulder	Shell/WDEQ	2/06/05	PM_{10}, O_3, NO_2, Met, Camera, Nephelometer
Daniel	5 mi S of Daniel	WDEQ	7/01/05	PM_{10}, O_3, NO_2, Met, Camera

As of the date this Protocol was prepared, none of the sites listed in Table 3.1 had available a full year of QA/QC'd data. For review purposes, these limited datasets, representing the data available at this time, are given in this Protocol. Table 3.2 shows ambient concentrations reported for these monitoring sites on the EPA AIRS website on June 8, 2006. WDEQ is developing recommendations for the background site(s) to utilize for this modeling analysis, and the site(s) selected and basis for that selection will be included in the AQTSD. All available monitored data will be reported in Chapter 3 (Affected Environment) of the SEIS.

Map 3.1 - Sublette County Monitoring Site Locations

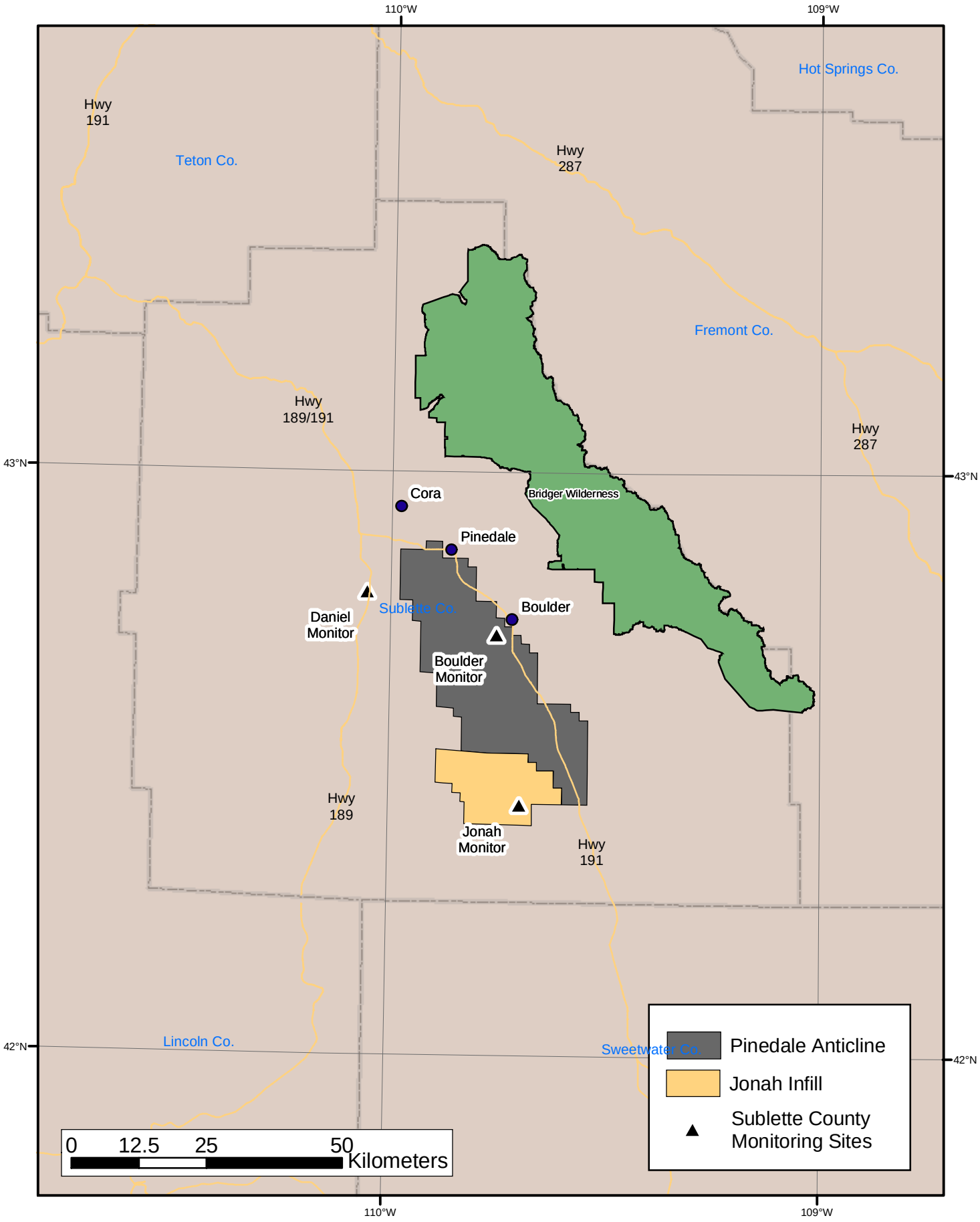


Table 3.2 Ambient Concentrations, Sublette County Monitoring Stations.

Site	Pollutant	Averaging Period	Monitored Concentration ($\mu g/m^3$)
Jonah [1]	NO_2	Annual	19.1
	O_3	1-Hour[2]	214
		8-Hour[2]	152
	PM_{10}	Annual	10
		24-Hour[3]	51
Boulder [4]	NO_2	Annual	7.6
	O_3	1-Hour[2]	186
		8-Hour[2]	158
	PM_{10}	Annual	11
		24-Hour[3]	32
Daniel [5]	NO_2	Annual	5.7
	O_3	1-Hour[2]	138
		8-Hour[2]	132
	PM_{10}	Annual	11
		24-Hour[3]	23
Ryckman Creek [6]	CO	8-Hour[7]	1,381
		1-Hour[3]	3,336
Craven Creek [8]	SO_2	Annual	9
		24-Hour[3]	43
		3-Hour[3]	132

1 Data reflects partial year 2005 (Jan 15-Dec 31). Monitor located in Jonah Field, 40 mi NW of Farson, WY.
2 Highest, fourth highest monitored value.
3 Highest, second highest monitored value.
4 Data reflects quarters 2, 3 and 4, 2005. Monitor 5 mi S and W of Boulder, WY.
5 Data reflects quarters 3 and 4 2005. Monitor 5 mi south of Daniel, WY off Hwy. 18.
6 Data collected by Amoco at Ryckman Creek site for 8-month period 1978-1979, from Riley Ridge EIS (BLM 1983).
7 Second-highest non-overlapping average.
8 Data collected at LaBarge Study Area, Northwest Pipeline Craven Creek Site 1982-1983.

3.3 CRITERIA POLLUTANT IMPACT ASSESSMENT

Criteria pollutants PM_{10}, $PM_{2.5}$, NO_x, SO_2, and CO will be modeled with AERMOD. Ozone (O_3) formation and impacts will not be modeled using AERMOD; rather, ozone impacts will be estimated from a screening methodology using VOC and NO_x screening tables developed by Scheffe (1988). Ozone models are designed for urban areas, are very expensive and time-consuming to implement, and are not applicable for use in rural areas such as southwest Wyoming. The VOC/NO_x screening tables have been used in other EIS analyses and the BLM supports their use in this application. In recognition of the importance of ozone concentrations, monitoring programs have been implemented by WDEQ-AQD in several areas of Sublette County. The VOC/NO_x screening tables will be used to evaluate potential ozone impacts from various maximum emissions activities that could occur within the PAPA.

Emissions of each pollutant analyzed will be examined to determine 1) the maximum emissions phase during well/field development and 2) the maximum emissions phase during production, and it will be these scenarios that will be modeled to determine near-field project impacts. Based on previous analyses performed for the Jonah Infill Project, Atlantic Rim Project, and Continental Divide Project, it is expected that road construction will generate the greatest PM_{10} and $PM_{2.5}$, and drilling will generate the greatest NO_x, CO, and SO_2 emissions during development. It is anticipated that compressor stations in the field will generate the greatest NO_x, CO, and SO_2 emissions during production. No PM_{10} and $PM_{2.5}$ will be modeled in the near-field analysis for a single pad during production unless it is determined that unpaved road emissions during production are greater than those from a single pad during development.

For development activities, a representative well pad and resource/access road will be developed for modeling. Hourly emission rate adjustment factors will be applied to sources emitting only during specific diurnal periods. For PM_{10} and $PM_{2.5}$ this layout will be modeled, using the meteorological data described above, 36 times, once at each of 36 10º rotations to ensure that impacts from all directional layout configurations and meteorological conditions are assessed. In accordance with averaging periods for which ambient standards exist, PM_{10} and $PM_{2.5}$ concentrations will be calculated for 24-hour and annual averaging periods. Representative sections of drilling engine operations will be modeled at maximum Project Alternative projected pad and drill rig densities. NO_2 concentrations will be calculated for annual averaging periods, CO concentrations for 1-hour and 8-hour averaging periods, and SO_2 concentrations for 3-hour, 24-hour, and annual averaging periods.

One production scenario will be analyzed representing one section of producing wells centered on one compressor station. The compressor station will be modeled equal to the largest station anticipated to operate in the field during the LOP. For the production scenario, annual average nitrogen dioxide (NO_2) concentrations, 1-hour and 8-hour CO concentrations, and SO_2 concentrations for 3-hour, 24-hour, and annual averaging periods will be predicted.

Point sources will be used for modeling emissions from compressors, well-site combustion equipment, and drilling rigs. Volume sources will be used for modeling PM_{10} and $PM_{2.5}$ emissions from road travel and wind erosion during development activities. Model receptors will be located a minimum of 100 meters (m) from development emission sources at 100-m grid

spacing. Following WDEQ-AQD compressor modeling guidance, model receptors will be placed at 25-m intervals along anticipated compressor facility fencelines. Compressor stack heights will be set at actual or proposed heights but no greater than 1.5 times compressor building heights. Receptors beyond the compressor facility fenceline will be placed at 100-m intervals or at intervals appropriate to decreased well spacing.

3.4 HAP IMPACT ASSESSMENT

Near-field HAP concentrations will be calculated for assessing impacts both in the immediate vicinity of Project area emission sources for short-term (acute) exposure assessment and at greater distances for calculation of long-term risk. HAPs emissions are expected to include those from well-site fugitives, Central Gathering Facilities and natural gas combustion at compressor stations. Because HAPs will be emitted predominantly during the production phase, only HAP emissions from production will be analyzed.

The modeling methodology for the short-term and long-term HAP impact assessments is nearly identical to the methodology outlined in Section 3.1. Volume sources will be used for modeling well-site fugitive HAP emissions during production, and point sources will be used to represent compressor engine emissions. A maximum emissions case will be developed for each HAP and that case modeled. A single section of wells under development, or a single section of producing wells centered on a compressor station, whichever produces maximum emissions, is expected to be analyzed. If following emission inventory development another scenario during development or production results in greater total emissions, that scenario will be analyzed.

Receptors will be placed a minimum of 100 m from production wells and at 100-m spacing beyond. Receptors will be placed at 25-m intervals along compressor fence lines and at 100-m spacing beyond. The short-term HAP assessment will consist of modeling formaldehyde emissions from a representative natural gas-fired compressor station and modeling all other natural gas constituent-based HAPs in the representative area developed for the criteria pollutant modeling as described in Section 3.3. For the long-term assessment, receptors will be placed on a polar grid at 10° intervals equidistant from the emissions source and the nearest residence or expected residence.

Short-term (1-hour) HAP concentrations will be compared to acute Reference Exposure Levels (RELs), shown in Table 3.3. RELs are defined as concentrations at or below which no adverse health effects are expected. No RELs are available for ethylbenzene and n-hexane; instead, the available Immediately Dangerous to Life or Health divided by 10 (IDLH/10) values are used. These IDLH values are determined by the National Institute for Occupational Safety and Health (NIOSH) and were obtained from EPA's Air Toxics Database (EPA, 2005b). These values are approximately comparable to mild effects levels for 1-hour exposures.

Long-term exposure to HAPs emitted by the Proposed Action will be compared to Reference Concentrations for Chronic Inhalation (RfCs). An RfC is defined by EPA as the daily inhalation concentration at which no long-term adverse health effects are expected. RfCs exist for both non-carcinogenic and carcinogenic effects on human health (EPA, 2005c). Annual modeled

HAP concentrations for all HAPs emitted will be compared directly to the non-carcinogenic RfCs shown in Table 3.4.

Table 3.3 Acute RELs.

HAP	REL (mg/m^3)
Benzene	1.3 [1]
Toluene	37 [1]
Ethylbenzene	350 [2]
Xylene	22 [1]
n-Hexane	390 [2]
Formaldehyde	0.094 [1]

[1] EPA Air Toxics Database, Table 2 (EPA, 2005b).
[2] No REL available for these HAPs. Values shown are from Immediately Dangerous to Life or Health (IDLH/10), EPA Air Toxics Database, Table 2 (EPA, 2005b).

Table 3.4 Non-Carcinogenic HAP RfCs. [1]

HAP	Non-Carcinogenic RfC [1] ($\mu g/m^3$)
Benzene	30
Toluene	400
Ethylbenzene	1,000
Xylenes	100
n-Hexane	200
Formaldehyde	9.8

[1] EPA Air Toxics Database, Table 1 (EPA, 2005c).

RfCs for suspected carcinogens benzene and formaldehyde are expressed as unit risk factors, shown in Table 3.5. Accepted methods for risk assessment will be used to evaluate the incremental cancer risk for these pollutants.

Annual modeled concentrations will be multiplied by EPA's unit risk factors (URF) (based on 70-year exposure) for those pollutants, and then the product will be multiplied by an adjustment factor which represents the ratio of projected exposure time to 70 years. The adjustment factors represent two scenarios: a most likely exposure (MLE) scenario and one reflective of the maximally exposed individual (MEI).

Table 3.5 Carcinogenic HAP RfCs and Exposure Adjustment Factors.

Analysis[1]	HAP Constituent	Carcinogenic RfC (Risk Factor)[2] 1/(μg/m^3)	Exposure Adjustment Factor
MLE	Benzene	7.8×10^{-6}	0.0949
MLE	Formaldehyde	5.5×10^{-9}	0.0949
MEI	Benzene	7.8×10^{-6}	0.86
MEI	Formaldehyde	5.5×10^{-9}	0.86

1 MLE = most likely exposure; MEI = maximally exposed individual.
2 EPA Air Toxics Database, Table 1 (EPA, 2005c).

The MLE duration will be assumed to be 9 years, which corresponds to the mean duration that a family remains at a residence (EPA, 1993). This duration corresponds to an adjustment factor of 9/70 = 0.13. The duration of exposure for the MEI is assumed to be 60 years (i.e., the LOP), corresponding to an adjustment factor of 60/70 = 0.86.

A second adjustment will be made for time spent at home versus time spent elsewhere. For the MLE scenario, the at-home time fraction is 0.64 (EPA, 1993), and it will be assumed that during the rest of the day the individual would remain in an area where annual HAP concentrations would be one quarter as large as the maximum annual average concentration. Therefore, the MLE adjustment factor will be (0.13) x [(0.64 x 1.0) + (0.36 x 0.25)] = 0.0949. The MEI scenario assumes that the individual is at home 100% of the time, for a final adjustment factor of (0.86 x 1.0) = 0.86. EPA unit risk factors and adjustment factors are shown in Table 3.5.

4.0 MID-FIELD AND FAR-FIELD ANALYSIS

The purpose of the mid-field and far-field analysis is to quantify potential air quality impacts to both ambient air concentrations and AQRVs from air pollutant emissions of NO_x, SO_2, PM_{10}, and $PM_{2.5}$ expected to result from the development of the project. Ambient air quality impacts beyond the immediate project area and throughout the study area will be analyzed and AQRVs will be analyzed at PSD Class I and sensitive PSD Class II areas. Cumulative impacts also will be quantified by including in the analysis other documented sources of air pollutant emissions within a defined study area. The analyses will be performed using the EPA-approved CALMET/CALPUFF modeling system to predict air quality direct and cumulative impacts at far-field PSD Class I and sensitive PSD Class II areas, and at several mid-field PSD Class II areas including locations within the PAPA. The PSD Class I areas and sensitive PSD Class II areas to be analyzed are shown on Map 2.1 and include the following:

- Bridger Wilderness Area (Class I);
- Fitzpatrick Wilderness Area (Class I);
- Gros Ventre Wilderness Area (Class II);
- Popo Agie Wilderness Area (Class II);
- Wind River Roadless Area (Class II);
- Grand Teton National Park (Class I);
- Teton Wilderness Area (Class I);
- North Absaroka Wilderness Area (Class I);
- Yellowstone National Park (Class I); and
- Washakie Wilderness Area (Class I).

In addition, analyses will be performed for seven lakes designated as acid sensitive located within the sensitive PSD Class I and Class II wilderness areas to assess potential lake acidification from atmospheric deposition impacts. These lakes include the following:

- Deep Lake in the Bridger Wilderness Area;
- Black Joe Lake in the Bridger Wilderness Area;
- Hobbs Lake in the Bridger Wilderness Area;
- Upper Frozen Lake in the Bridger Wilderness Area;
- Lazy Boy Lake in the Bridger Wilderness Area;
- Ross Lake in the Fitzpatrick Wilderness Area; and
- Lower Saddlebag Lake in the Popo Agie Wilderness Area.

The proposed mid-field analysis will assess direct project and cumulative air quality impacts at in-field locations within the PAPA and at other mid-field locations defined as Class II areas (Wyoming regional communities). Mid-field locations to be analyzed were identified by air quality stakeholders group members, and include the Wyoming communities of:

- Boulder;
- Cora; and
- Pinedale.

Air emissions of NO_x, SO_2, PM_{10}, and $PM_{2.5}$ from proposed wells and their associated development activity, as well as from regional emissions as described in Section 2.2, will be modeled. A description of the emissions inventory procedures to be implemented is included in Section 2.0 of this Protocol. The idealization of these emissions sources for input to the CALPUFF model is described in Section 4.3.

CALPUFF results will be post-processed with POSTUTIL and CALPOST to derive air concentrations for comparison to ambient air standards, significance thresholds, and Class I and II Increments; AQRV impacts due to deposition rates for comparison to sulfur (S) and nitrogen (N) deposition thresholds and to calculate acid neutralizing capacity (ANC) for sensitive water bodies; and AQRV impacts due to light extinction change for comparison to visibility impact thresholds in Class I and other sensitive areas. A discussion of the post-processing methodology to be used is provided in Section 4.5 of this Protocol.

4.1 MODELING METHODOLOGY

The most recent versions of the EPA approved CALMET/CALPUFF modeling system (CALMET Version 5.53b and CALPUFF Version 5.711b dated December 16, 2005) will be used to develop windfields and calculate both ambient concentrations and AQRV impacts. The CALMET meteorological model will be used to develop windfields for 3 years of meteorological data (2001, 2002, and 2003) and the CALPUFF dispersion model will be used to combine these windfields with project-specific and regional emissions inventories of SO_2, NO_x, PM_{10}, and $PM_{2.5}$ to estimate ambient concentrations and AQRV impacts at mid-field and far-field receptor locations. The study area is shown in Map 1.1

The CALMET and CALPUFF models will be used in this analysis following the methods described herein and the following guidance sources:

- *Guideline on Air Quality Models*, 40 *Code of Federal Regulations* (C.F.R.), Part 51, Appendix W (EPA, 2003a);
- *Interagency Work Group on Air Quality Modeling (IWAQM) Phase 2 Summary Report and Recommendations for Modeling Long Range Transport Impacts*, EPA-454/R-98-019, Office of Air Quality Planning and Standards, December 1998 (IWAQM, 1998); and
- *Federal Land Managers - Air Quality Related Values Workgroup (FLAG), Phase I Report*, December 2000 (FLAG, 2000).

4.2 METEOROLOGICAL MODEL INPUT AND OPTIONS

The CALMET model will be used to develop windfields for the study area shown in Map 1.1. The model domain extent was selected following a 200-km radius criteria (see Map 2.1), centered around the PAPA, for inclusion of PSD Class I and sensitive PSD Class II wilderness areas in the air quality analyses. The proposed modeling domain covers the PAPA and Class I and other sensitive areas within 200-km of the PAPA with a sufficient buffer zone to allow for potential recirculation or flow reversal effects to be evaluated. The selection of a 200-km radius is consistent with other NEPA regional analyses performed for southwest Wyoming and current FLM recommendations for PSD Class I area analyses. The proposed modeling domain follows

IWAQM guidance that recommends that the horizontal domain of the model grid extend 50 to 80 km beyond the receptors and sources being modeled, for modeling potential recirculation wind flow effects. All model inputs will be based on a Lambert Conformal Projection given the size of the proposed domain.

Following current EPA modeling guidance and at the request of the BLM, 3 years of windfield data will be developed and used for the modeling analysis. The selected years are 2001, 2002, and 2003, based on the availability of representative MM5 mesoscale model data for the analysis. The 2001, 2002 and 2003 MM5 data were developed for EPA or for a Regional Planning Organization (RPO), have undergone significant QA/QC verification and peer review, and are the most recent available consecutive 3 years of prognostic data that are available. The MM5 data sets that will be used for the analysis include year 2001 data processed at 36-km spacing for EPA (Alpine Geophysics, LLC, 2003), year 2002 data processed at 36-km spacing for WRAP (ENVIRON, 2005) and year 2003 data processed at 36-km spacing for the Midwest RPO (Baker, 2005).

The MM5 data will be used to provide an initial guess field in CALMET. These data will be further processed to 4-km resolution by CALMET to produce a step 1 windfield. Ten vertical layers will be used. Surface meteorology data for observation sites throughout the modeling domain available from National Climatic Data Center (NCDC) integrated surface observation data sets, Clean Air Status and Trends Network (CASTNET) sites, and from onsite data collected by BP America Production Company in the Jonah Field will be incorporated into the windfields. In addition, upper air rawinsonde meteorology data, and precipitation data for applicable observation sites throughout the modeling domain have been obtained from NCDC and will be included in the analysis. USGS 1:250,000-Scale Land Use and Land Cover (LULC) data, and USGS 1º DEM data will be used for land use and terrain data in the development of the CALMET windfields. The CALMET model control switch settings will follow IWAQM guidance. A sample CALMET input control file is included in Attachment A.

Windfields developed for years 2001, 2002 and 2003, at a 4-km grid spacing, will be used to assess impacts from project sources and regional sources at all PSD Class I and sensitive PSD Class II areas and at mid field locations.

4.3 DISPERSION MODEL INPUT AND OPTIONS

CALPUFF will be used to model project-specific and regional emissions of NO_x, SO_2, PM_{10}, and $PM_{2.5}$. The CALPUFF model will be run for each year of CALMET windfields (2001, 2002, and 2003) following IWAQM-recommended default switch settings. A sample CALPUFF input control file is included in Attachment A. Chemical transformations will be modeled based on the MESOPUFF II chemistry mechanism for conversion of SO_2 to sulfate (SO_4) and NO_x to nitric acid (HNO_3) and nitrate (NO_3). Each of these pollutant species will be included in the CALPUFF model runs. NO_x, HNO_3, and SO_2 will be modeled with gaseous deposition, and SO_4, NO_3, PM_{10}, and $PM_{2.5}$ will be modeled using particle deposition. The PM_{10} emissions input to CALPUFF will include only the PM_{10} emissions greater than the $PM_{2.5}$ (i.e., modeled PM_{10} = PM_{10} emission rate – $PM_{2.5}$ emission rate) since $PM_{2.5}$ is modeled as a separate species. Total

PM_{10} impacts will be determined in the post-processing of modeled impacts, as discussed in Section 4.5.

4.3.1 Chemical Species

The CALPUFF chemistry algorithms require hourly estimates of background ammonia and ozone concentrations for the conversion of SO_2 and NO/NO_2 to sulfates and nitrates, respectively. A review of background ozone monitoring data available for the three years proposed for analysis has indicated that data from the following sites are available for years 2001, 2002, and 2003:

- Pinedale, Wyoming;
- Centennial, Wyoming;
- Yellowstone National Park, Wyoming;
- Craters of the Moon National Park, Idaho; and
- Highland, Utah.

Hourly ozone data sets will be developed from these stations and will be included in the CALPUFF modeling. A representative default value will be determined from data statistics upon review of these data sets and used for missing hours. A background ammonia concentration of 1.0 ppb, as suggested in IWAQM for "arid lands", will be used.

4.3.2 Receptors

Model receptors will be input to CALPUFF, at which concentration, deposition, and other impacts will be calculated. Receptors at a 2-km grid resolution will be placed throughout the PAPA to calculate in-field cumulative ambient air impacts. Receptors will also be placed at 10-km grid resolution extending out 100 km from the PAPA to calculate cumulative ambient air impacts. At the PSD Class I, and other sensitive PSD Class II areas located within the modeling domain, ambient air and AQRV impacts will be determined. The PSD Class I areas within the modeling domain to be evaluated include:

- Bridger Wilderness Area,
- Fitzpatrick Wilderness Area,
- Teton Wilderness Area,
- Washakie Wilderness Area,
- Grand Teton National Park,
- Yellowstone National Park, and
- North Absaroka Wilderness Area.

Receptor sets available from the National Park Service for PSD Class I areas will be used as a basis for determining modeling receptors for all of these Class I areas. The complete National Park Service receptor set will be used for modeling the nearby Bridger Wilderness Area, however the receptor grid densities will be thinned at the more distance Class I areas, while maintaining adequate area coverage, for consideration of model run times. For the three sensitive PSD Class II areas located within the modeling domain (Gros Ventre and Popo Agie Wilderness Areas, and Wind River Roadless Area), receptor sets will be developed using 2-km spacing

along the Wilderness area boundaries and at 4-km spacing within each area. Receptor elevations for the sensitive Class II area receptors and for the receptors within the PAPA and extending outward 100 km will be determined from 1:250,000 scale USGS DEM data.

Discrete receptors will be placed at the seven lakes identified as sensitive to acid deposition. Elevations for the sensitive lake receptors will be derived from 7.5-minute USGS maps. In addition, for the Wyoming regional community locations of Boulder, Pinedale and Cora, receptors will be placed using 3 x 3, 1-km grids for analyses of visibility (AQRV) impacts. At these mid-field Wyoming community locations impacts to visibility (regional haze) will be assessed although these communities are classified as PSD Class II areas where no visibility protection exits under local, state, or federal law. Elevations for the regional community locations will be determined from 1:250:000 scale USGS DEM data. The proposed CALPUFF model receptors are shown in Figure 4.1.

4.3.3 Source Parameters

4.3.3.1 Project Emissions

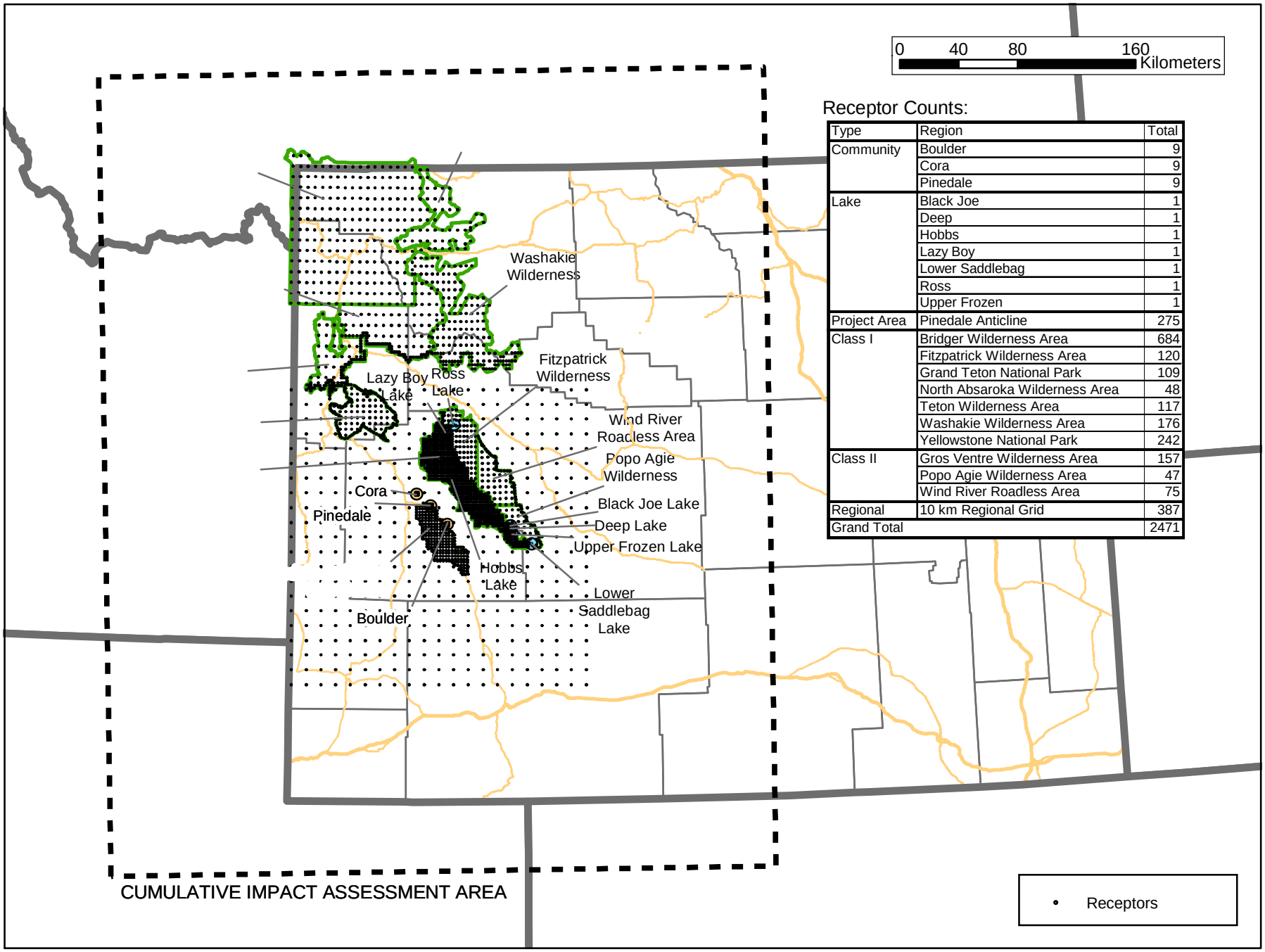
Pollutant emission rates estimated as described in Section 2.0 will be input to CALPUFF to predict air quality impacts from the Project. Emissions scenarios for year 2005 (current conditions), the Proposed Action and No Action Alternatives will be developed and modeled. Emissions for the Proposed Action from both the development phase and well production (field operation) phase will be modeled. For the Proposed Action and No Action alternatives, project emissions after 2005 that could occur from development and production activities over the LOP will be examined to determine an annual period representing a maximum combination of production and development. An additional emissions scenario representing the Proposed Action at maximum production (full field operation) will be modeled. Based upon model results of the modeled maximum emissions scenarios, alternative emissions scenarios considering possible mitigation techniques will be developed and modeled.

Hourly emission-rate adjustment factors will be applied to emissions that occur only during specific diurnal periods, such as travel on unpaved roads. Seasonal adjustment factors will be applied to compensate for increased gas well-heater use in the winter months. Well locations will be modeled as area sources within the specific area of the PAPA they are projected to be located in, on a rectangular grid not exceeding 4 x 4 km spacing and possessing a total area not exceeding the total area of the PAPA.

The analysis will include future compression requirements projected by the Operators. Compressor engine emissions will be input as point sources with actual expected stack parameters at their anticipated locations.

Due to the close proximity and physical alignment of the PAPA to the Bridger Wilderness sensitivity “zone” modeling will be performed for Project source emissions to determine whether there are any areas within the PAPA that could potentially result in much greater impacts at the Bridger Wilderness. The PAPA will be divided into 3 distinct zones, south, north, and central with emissions spread evenly throughout each area, for these sensitivity runs. Emissions from

Figure 4.1: CALPUFF Model Receptors



Receptor Counts:

Type	Region	Total
Community	Boulder	9
	Cora	9
	Pinedale	9
Lake	Black Joe	1
	Deep	1
	Hobbs	1
	Lazy Boy	1
	Lower Saddlebag	1
	Ross	1
	Upper Frozen	1
Project Area	Pinedale Anticline	275
Class I	Bridger Wilderness Area	684
	Fitzpatrick Wilderness Area	120
	Grand Teton National Park	109
	North Absaroka Wilderness Area	48
	Teton Wilderness Area	117
	Washakie Wilderness Area	176
	Yellowstone National Park	242
Class II	Gros Ventre Wilderness Area	157
	Popo Agie Wilderness Area	47
	Wind River Roadless Area	75
Regional	10 km Regional Grid	387
Grand Total		2471

each zone will be modeled separately and the predicted impacts from each will be compared to determine whether there are any significant differences.

4.3.3.2 Regional Source Emissions

Regional sources, including permitted sources, RFD, and RFFA inventoried according to the methodology described in Section 2.2, will be input to the CALPUFF model as point sources or area sources as appropriate. As part of the emissions inventory, source location and exit parameter data will be obtained.

Pollutant emissions from stacks will be modeled as point sources in the CALPUFF model. Multiple stacks within single facilities will be combined into a single, representative stack to reduce model run-time. This procedure was followed in the Pinedale Anticline Oil and Gas Exploration and Development EIS and other EIS regional source inventories. Stack parameters will be selected based on the potential for the greatest long-range impacts (i.e., greater stack height, greater exhaust flow rate).

Fugitive emissions (i.e., well heaters, surface mines, gravel pits, etc.) will be aggregated into area sources in the model, either source location-specific or regional, depending upon the nature of the fugitive emissions sources. The locations of area sources input to the model will be documented in the technical support document. Regional paved and unpaved roadway travel, urban, biogenic, and other non-industrial sources are considered to be included in the ambient air background concentrations described in this Protocol; therefore, those fugitive sources will not be modeled.

4.4 BACKGROUND DATA

4.4.1 Criteria Pollutants

Background values for criteria pollutants will be used as described in Section 3.2.

4.4.2 Visibility

The proposed analysis differs from previous Wyoming NEPA cumulative air quality impact studies in its update of visibility background to include the most current data available at the time of this Protocol. The proposed analysis also uses representative monitoring data collected from the Interagency Modeling of Protected Visual Environment (IMPROVE) network for the time period (2000 to 2004) which coincides with the time period that will be used to establish “baseline conditions” under the EPA Regional Haze Rule (EPA, 2003a). Monitored visibility background data that have undergone QA/QC are currently available through December 31, 2004.

CALPOST will be used to estimate change in light extinction from CALPUFF model concentration results. At the request of the BLM, WDEQ, and USFS three separate methods are proposed for this analysis using FLAG and IMPROVE background visibility data. Two methods which follow recent CALPUFF modeling guidance for Best Available Retrofit Technology

(BART) analyses developed for the Visibility Improvement State and Tribal Association of the Southeast (VISTAS) RPO are also proposed (VISTAS, 2006). An additional visibility test using background visibility data determined from nephelometer data measured at Boulder will be performed. The BLM visibility calculation method will utilize CALPOST visibility method 6 (CALPOST model switch setting "MVISBK" set to 6) for computing light extinction change in combination with FLAG background data. The WDEQ visibility calculation method will utilize CALPOST visibility method 6 (MVISBK=6) in combination with IMPROVE background data. The two BART screening calculation procedures will also use CALPOST method 6 combined with background visibility conditions as provided in the *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule* (EPA, 2003b). Method 6 uses monthly averaged humidity factors, and it is not sensitive to synoptic weather events that lead to high extinction events and subsequent explanation as to why certain events should be discounted. The USFS visibility calculation method will use the FLAG background data in combination with hourly relative humidity data from the CALMET windfields (MVISBK=2).

The FLAG method 6 uses seasonal natural background visibility conditions and relative humidity factors at Class I areas. FLAG method 2 uses the seasonal natural background visibility conditions and hourly relative humidity data from surface observations in the CALMET wind field data. For the FLAG methods proposed for this analysis, estimated natural background visibility values as provided in Appendix 2.B of FLAG (2000) will be used. For FLAG method 6, monthly relative humidity factors as provided in the *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule* (EPA, 2003b) will be used. Because natural background data are provided for PSD Class I areas only, data from the nearest PSD Class I area will be used for the sensitive PSD Class II areas. The natural background visibility data, in units of inverse megameters (Mm^{-1}), that will be used with the FLAG visibility analysis for each area analyzed are shown in Table 4.1.

The IMPROVE method as requested by the WDEQ uses reconstructed IMPROVE aerosol total extinction data. The IMPROVE background visibility data are provided as reconstructed aerosol total extinction data, based on the quarterly mean of the 20% cleanest days measured at the Bridger and North Absaroka Wilderness Areas and Yellowstone National Park IMPROVE sites for the 5-year period, years 2000 through 2004, as shown in Table 4.2. These 5 years are defined as "baseline conditions" years for tracking progress under EPA Regional Haze Rule guidance (EPA, 2003a). The IMPROVE method will also utilize monthly relative humidity factors as provided in the *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule*.

Table 4.1 FLAG Report Background Extinction Values.[1]

Site	Season	Hygroscopic (Mm^{-1})	Non-hygroscopic (Mm^{-1})
Bridger Wilderness Area (Will also be used for Popo Agie Wilderness Area and Wind River Roadless Area)	Winter	0.6	4.5
	Spring	0.6	4.5
	Summer	0.6	4.5
	Fall	0.6	4.5
Fitzpatrick Wilderness Area	Winter	0.6	4.5
	Spring	0.6	4.5
	Summer	0.6	4.5
	Fall	0.6	4.5
North Absaroka Wilderness Area	Winter	0.6	4.5
	Spring	0.6	4.5
	Summer	0.6	4.5
	Fall	0.6	4.5
Teton Wilderness Area	Winter	0.6	4.5
	Spring	0.6	4.5
	Summer	0.6	4.5
	Fall	0.6	4.5
Washakie Wilderness Area	Winter	0.6	4.5
	Spring	0.6	4.5
	Summer	0.6	4.5
	Fall	0.6	4.5
Grand Teton National Park (will also be used for Gros Ventre Wilderness Area)	Winter	0.6	4.5
	Spring	0.6	4.5
	Summer	0.6	4.5
	Fall	0.6	4.5
Yellowstone National Park	Winter	0.6	4.5
	Spring	0.6	4.5
	Summer	0.6	4.5
	Fall	0.6	4.5

[1] FLAG (2000).

Table 4.2 IMPROVE Background Aerosol Extinction Values.[1]

IMPROVE Site	Quarter	Hygroscopic (Mm^{-1})	Non-hygroscopic (Mm^{-1})
Bridger	1	0.775	1.233
	2	1.565	3.283
	3	1.791	4.965
	4	0.704	1.192
North Absaroka	1	0.774	1.565
	2	1.326	2.249
	3	1.360	4.931
	4	0.600	1.368
Yellowstone	1	1.104	1.588
	2	1.453	2.983
	3	1.550	5.414
	4	0.738	1.544

[1] Cooperative Institute for Research in the Atmosphere (2006).

Visibility data from the Bridger Wilderness Area IMPROVE site will be used for the Bridger, Fitzpatrick, Gros Ventre, and Popo Agie Wilderness Areas and for the Wind River Roadless Area. Visibility data from the Yellowstone National Park IMPROVE site will be used for the Teton Wilderness Area and for Grand Teton and Yellowstone National Parks. Data from the North Absaroka site will be used for the North Absaroka and Washakie Wilderness Areas. Monthly relative humidity factors are available for the Bridger, Fitzpatrick, Teton, and Washakie Wilderness Areas, and for Grand Teton and Yellowstone National Parks. Relative humidity data for the Bridger Wilderness Area will also be used for the Gros Ventre and Popo Agie Wilderness Areas and for the Wind River Roadless Area analyses.

The two BART screening methods will use the background visibility data provided in Appendix B of the *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule.* These methods use CALPOST visibility method 6. The first test will use the "best days" background visibility condition and the second test will use the annual average background. These background data given in deciview (dv) units are shown in Table 4.3. The BART methods will also utilize monthly relative humidity factors as provided in the *Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule*. Because the background visibility and relative humidity data are provided for PSD Class I areas only, data from the nearest PSD Class I area will be used for the sensitive PSD Class II areas.

Table 4.3 Default Natural Conditions.[1]

Site	Annual Average (dv)	Best Days (dv)
Bridger Wilderness	4.52	1.96
Fitzpatrick Wilderness	4.53	1.97
North Absaroka Wilderness	4.53	1.97
Teton Wilderness	4.53	1.97
Washakie Wilderness	4.53	1.97
Grand Teton National Park	4.53	1.97
Yellowstone National Park	4.56	2.00

1 Default natural conditions from Appendix B (EPA, 2003b).

Background visibility data for the Wyoming regional community locations (Boulder, Cora, and Pinedale) were determined from current nephelometer visibility data collected at Boulder and from transmissometer extinction data and IMPROVE aerosol data collected at the Bridger Wilderness Area (ARS, 2006), since there are no applicable aerosol extinction data collected at these community locations. Quarterly averages of the average days and cleanest 20th percent days were developed from daily averaged extinction measurements for the 1-year period, March 1, 2005 through February 28, 2006. These data are shown in Table 4.4. Relative humidity data factors for the Bridger Wilderness Area will be used for the regional community locations.

Table 4.4 Boulder Background Extinction Data.

Quarter	Annual Average (Mm-1)	20th Cleanest Days (Mm-1)
1	25.6	14.0
2	21.2	14.7
3	24.3	19.0
4	21.4	14.3

4.4.3 Deposition

Background total sulfur (S) and nitrogen (N) deposition data (expressed in kilograms per hectare per year [kg/ha-yr]) collected at National Acid Deposition Program (NADP) National Trends

Network (NTN) and CASTNET station monitoring locations near Pinedale, Wyoming and in Yellowstone National Park are provided in Table 4.5. These background S and N deposition data will be added to modeled cumulative (project alternative and regional sources) deposition impacts to estimate total S and N deposition impacts.

Table 4.5 Background N and S Deposition Values (kg/ha-yr).

Site Location	Nitrogen Deposition	Sulfur Deposition	Year of Monitoring
Pinedale	1.4	0.74	2004
Yellowstone National Park	1.3	0.70	2003

4.4.4 Lake Chemistry

The most recent lake chemistry background ANC data have been obtained from the FLMs for each sensitive lake listed in Section 4.0. The 10th percentile lowest ANC values were calculated for each lake following procedures provided from the USFS. The ANC values proposed for use in this analysis, and the number of samples used in the calculation of the 10th percentile lowest ANC values, are provided in Table 4.6. Of the seven lakes listed in Table 4.6, two lakes (Lazy Boy and Upper Frozen) are considered by the USFS as extremely sensitive to acid deposition since the background ANC values are less than 25 microequivalents per liter (µeq/l).

Table 4.6 Background ANC Values for Acid Sensitive Lakes[1]

Wilderness Area	Lake	Latitude (Deg-Min-Sec)	Longitude (Deg-Min-Sec)	10th Percentile Lowest ANC Value (µeq/l)[2]	Number of Samples	Monitoring Period
Bridger	Black Joe	42º44'22"	109º10'16"	67.1	67	1984-2005
Bridger	Deep	42º43'10"	109º10'15"	59.7	64	1984-2005
Bridger	Hobbs	43º02'08"	109º40'20"	69.9	71	1984-2005
Bridger	Lazy Boy	43º19'57"	109º43'47"	10.8	3	1997-2004
Bridger	Upper Frozen	42º41'13"	109º09'39"	6.0	8	1997-2005
Fitzpatrick	Ross	43º22'41"	109º39'30"	53.7	49	1988-2005
Popo Agie	Lower Saddlebag	42º37'24"	108º59'38"	55.2	48	1989-2005

1 From USFS (2006).
2 10th Percentile Lowest ANC Values reported.

4.5 POST-PROCESSING

For each far-field sensitive area, CALPUFF-modeled concentration impacts will be post-processed with POSTUTIL and CALPOST to derive: 1) concentrations for comparison to ambient air quality standards (WAAQS and NAAQS), and PSD Class I and II Increments; 2) deposition rates for comparison to sulfur (S) and nitrogen (N) deposition levels of concern and to calculate changes to ANC at sensitive lakes; and 3) light extinction changes for comparison to visibility impact thresholds. For the mid-field analyses, CALPOST concentrations will be post-

processed to estimate light extinction changes at regional communities for comparison to the visibility impact thresholds. For in-field locations, CALPUFF concentrations will be post-processed to compute applicable concentration impacts for comparison to WAAQS and NAAQS.

In post-processing the PM_{10} impacts at all far-field receptor locations, project alternative traffic emissions of PM_{10} (production and development) will not be included in the total estimated impacts, only the $PM_{2.5}$ impacts will be considered. This is based on supporting documentation from the WRAP analyses of mechanically generated fugitive dust emissions that suggest that particles larger than $PM_{2.5}$ tend to deposit out rapidly near the emissions source and do not transport over long distances (Countess et al., 2001). The WRAP findings suggest that nearly 90 percent of PM_{10} particles from unpaved road emissions are depleted within approximately 50 meters. In addition, even if the PM_{10} particles were in a well mixed 10 meter layer, with an average wind speed of 5 meters per second, only 10 percent of the PM_{10} particles could travel up to 36 kilometers. Since this phenomenon is not modeled adequately in CALPUFF; therefore, to avoid overestimates of PM_{10} impacts at far-field locations, these sources will not be considered in the total modeled impacts. However, the total PM_{10} impacts from traffic emissions will be included in all in-field concentration estimates.

4.5.1 Concentration

CALPOST will be used to process the CALPUFF concentration output file to compute appropriate concentration values for SO_2 (3-hour, 24-hour, and annual average), $PM_{2.5}$ (24-hour and annual average), PM_{10} (24-hour and annual average) and NO_2 (annual average).

4.5.2 Visibility

As discussed in Section 4.4.2, visibility impacts (measured as change in light extinction) will be calculated using five separate methods, which differ primarily by the background data used to derive the percent change in visibility. Changes in light extinction will be estimated for both Project emissions and regional source emissions at receptor locations outlined in Section 4.3.2 of this Protocol.

CALPOST will be run using the FLAG data to calculate the change in light extinction from natural background conditions. This procedure computes light extinction changes from seasonal estimates of natural background aerosol concentrations and either monthly relative humidity factors (BLM test) or hourly relative humidity data from the CALMET wind fields (USFS test), due to CALPUFF-predicted particle species concentrations. Seasonal background extinction values used for the FLAG method are shown in Table 4.1. Those values will be input to CALPOST as variables $BKSO_4$ (dry hygroscopic) and BKSOIL (non-hygroscopic). Using these parameters, CALPOST will compute the change in daily (24-hour) visibility at each receptor, with the results reported as change in deciview (dv). The CALPOST switch ‘MVISBK' is set to 6 for the BLM test and is set to 2 for the USFS method. The relative humidity data cutoff in CALPOST will be set to 98 for the USFS test. The FLAG method conservatively assumes that the seasonal natural visibility conditions occur on every day during the entire season.

CALPOST will also be run using the IMPROVE data (WDEQ test) to calculate the change in daily (24-hour) light extinction using the quarterly mean of the 20% cleanest days particle mass data as background conditions. Quarterly speciated aerosol data for the 20% cleanest days, measured at the Bridger and North Absaroka wilderness areas and Yellowstone National Park IMPROVE sites will be used. This method uses the quarterly background aerosol concentrations and monthly averaged relative humidity factors to estimate the change in light extinction. The CALPOST switch 'MVISBK' is also set to 6 for this method. Similar to the FLAG method, the IMPROVE method also conservatively assumes that the cleanest visibility conditions occur on every day during each day of the year.

For the BART screening methods CALPOST will also be run using the annual background visibility data from Appendix B of (EPA, 200b) provided in Table 4.3. The first test will use the "best days" background visibility condition and the second test will use the annual average background. The background extinction data given in dv units will be converted to values in Mm^{-1} using the haze index equation ($HI=10\ln(b_{ext}/10)$ given in EPA, 2003b. These methods use the annual background extinction values and monthly averaged relative humidity factors to estimate the change in light extinction. The CALPOST switch 'MVISBK' is set to 6 for these methods. The extinction values will be input to CALPOST as BKSOIL (non-hygroscopic). Using these parameters, CALPOST will be used to compute the change in daily (24-hour) visibility for each method.

For the Wyoming regional community locations (Boulder, Cora, and Pinedale) adjusted nephelometer data collected at Boulder will be used to calculate the change in daily (24-hour) light extinction. The CALPOST switch 'MVISBK' will be set to 6 for this method. This method uses quarterly averaged background visibility data and monthly averaged relative humidity factors to estimate the change in light extinction. The quarterly averaged extinction data for the cleanest 20th percent days (Table 4.4) will be used for this visibility test. Relative humidity data factors for the Bridger Wilderness Area (EPA, 2003b) will be used for the regional community locations.

4.5.3 Deposition

The POSTUTIL utility provided with the CALPUFF modeling system will be used following IWAQM guidance to estimate total S and N fluxes from CALPUFF-predicted wet and dry fluxes of SO_2, SO_4, NO_x, NO_3, and HNO_3. CALPOST will be used to summarize the annual S and N deposition values from the POSTUTIL program.

5.0 AIR QUALITY IMPACTS

5.1 NEAR-FIELD

Maximum predicted concentrations in the vicinity of project emissions sources will be compared with the Wyoming Ambient Air Quality Standards (WAAQS), National Ambient Air Quality Standards (NAAQS), and applicable Prevention of Significant Deterioration (PSD) Class II increments shown in Table 5.1. Maximum modeled concentrations will be added to the existing ambient air quality background concentrations shown in Table 3.2, and the total concentrations will be compared to corresponding NAAQS and WAAQS as shown in Table 5.1. Direct project impacts will be compared to Class II PSD Increments. This PSD demonstration is for information only and is not a regulatory PSD Increment consumption analysis, which would be completed as necessary during the WDEQ-AQD permitting process. Near-field HAP impacts from short-term (acute) exposure and for calculation of long-term risk are assessed as described in Section 3.4.

5.2 FAR-FIELD

5.2.1 Ambient Concentration Impacts

Modeled concentrations predicted in PSD Class I and sensitive Class II areas from direct project and regional sources will be compared to ambient air quality standards and PSD increments, shown in Table 5.2. Modeled impacts including applicable background concentrations will be compared with ambient air quality standards. Direct project and cumulative impacts will be compared to applicable PSD increments. The PSD demonstrations are for information only and are not regulatory PSD Increment consumption analyses, which would be completed as necessary by the WDEQ-AQD.

Table 5.1 Ambient Air Quality Standards and PSD Class II Increments for Comparison to Near-Field Analysis Results (μg/m^3).

Pollutant/Averaging Time	NAAQS	WAAQS	PSD Class II Increment[1]
CO			
1-hour[2]	40,000	40,000	--[3]
8-hour[2]	10,000	10,000	--
NO_2			
Annual[4]	100	100	25
O_3			
1-hour [2]	235	235	--
8-hour[5]	157	157	--
PM_{10}			
24-hour[2]	150	150	30
Annual[4]	50	50	17
$PM_{2.5}$			
24-hour[2]	65	65	--
Annual[4]	15	15	--
SO_2			
3-hour[2]	1,300	1,300	512
24-hour[2]	365	260	91
Annual[4]	80	60	20

1 The PSD demonstrations serve information purposes only and do not constitute a regulatory PSD increment consumption analysis.
2 No more than one exceedance per year.
3 -- = No PSD Class II increment has been established for this pollutant.
4 Annual arithmetic mean.
5 Average of annual fourth-highest daily maximum 8-hour average.

Table 5.2 NAAQS, WAAQS, and PSD Class I and Class II Increments for Comparison to Far-field Analysis Results (µg/m^3).

Pollutant/Averaging Time		NAAQS	WAAQS	PSD Class I Increment [1]	PSD Class II Increment [1]
NO_2					
	Annual[2]	100	100	2.5	25
SO_2					
	3-hour[3]	1,300	1,300	25	512
	24-hour[3]	365	260	5	91
	Annual[2]	80	60	2	20
PM_{10}					
	24-hour[3]	150	150	8	30
	Annual[2]	50	50	4	17
$PM_{2.5}$					
	24-hour	65	65	--	--
	Annual	15	15	--	--

1 The PSD demonstrations serve information purposes only and do not constitute a regulatory PSD increment consumption analysis.
2 Annual arithmetic mean.
3 No more than one exceedance per year is allowed.

5.2.2 Visibility

Change in atmospheric light extinction relative to background conditions is used to measure regional haze. Analysis thresholds for atmospheric light extinction are set forth in FLAG (2000), with the results reported in percent change in light extinction and change in deciview (dv). The thresholds are defined as 5% and 10% of the reference background visibility or 0.5 and 1.0 dv for project sources alone and cumulative source impacts, respectively. FLAG (2000) also identifies a goal that any specific project combined with cumulative new source growth will have no days of visibility impairment at or above 1.0 dv in any Class I area. These thresholds and the FLAG guidelines were developed for NSR applications where an AQRV analysis is required, as part of a PSD permit application. The BLM considers a 1.0 dv change as a significant adverse impact; however, there are no applicable local, state, tribal, or federal regulatory visibility standards. The USFS considers a 0.5-dv change as a threshold in order to protect visibility in sensitive areas. It is the responsibility of the jurisdictional Federal Land Manager or Tribal government responsible for that land to determine when adverse impacts are significant or not, and these may differ from BLM levels for significant adverse impacts.

Visibility impact assessments following FLAG guidance are typically based on the maximum predicted daily (24-hour) visibility impacts on an annual basis. The maximum number of days

above threshold values and the maximum predicted impacts are reported. Visibility impact assessments following EPA's regional haze rule guidance (EPA, 2005d) use the annual 98th percentile maximum predicted daily values (8th highest daily value) for assessing visibility impacts.

For each PSD Class I and sensitive Class II area, comparisons of direct project and cumulative change in light extinction impacts to 1.0 and 0.5-dv change thresholds will be provided in the technical support document. Maximum annual predicted visibility impacts will be reported for the BLM, WDEQ, USFS, and regional community location visibility tests along with the corresponding 98th percentile values. For the two BART screening tests only the annual 98th percentile values will be reported.

5.2.3 Deposition

Maximum predicted S and N deposition impacts will be estimated for each analyzed direct project and cumulative source scenario. Predicted direct project impacts will be compared to the National Park Service (NPS) deposition analysis thresholds (DATs) for total N and S deposition in the western U.S., which are defined as 0.005 kilograms per hectare per year (kg/ha-year) for both N and S (NPS, 2001). Total deposition impacts, including background deposition values, from direct project and regional sources will be compared to USFS levels of concern, defined as 5 kg/ha-yr for S and 3 kg/ha-yr for N (Fox et al., 1989). It is understood that the USFS no longer considers these levels of concern to be protective; however, in the absence of alternative FLM-approved values, comparisons with these values will be made.

5.2.4 ANC

The CALPUFF-predicted annual deposition fluxes of S and N at sensitive lake receptors listed in Section 4.4.4 will be used to estimate the change in ANC. The change in ANC will be calculated following the January 2000, USFS Rocky Mountain Region's *Screening Methodology for Calculating ANC Change to High Elevation Lakes, User's Guide* (USFS, 2000). The predicted changes in ANC will be compared with the USFS's Level of Acceptable Change (LAC) thresholds of 10% for lakes with ANC values greater than 25 µeq/l and 1 µeq/l for lakes with background ANC values of 25 µeq/l and less. Lake impacts will be assessed with consideration of limited data points available for several analyzed lakes. ANC calculations will be performed for both Project emissions and for cumulative source emissions.

5.3 MID-FIELD

5.3.1 Ambient Concentration Impacts

Modeled concentrations predicted within PAPA in-field locations from direct project and regional sources will be compared to ambient air quality standards and applicable PSD Class II increments, shown in Table 5.2. Modeled impacts including applicable background concentrations will be compared with ambient air quality standards. Direct project and cumulative impacts will be compared to applicable PSD Class II increments. The PSD

demonstrations are for information only and are not regulatory PSD Increment consumption analyses, which would be completed as necessary by the WDEQ-AQD.

5.3.2 Visibility

For each Wyoming regional community location included in the modeling analyses (Boulder, Cora, and Pinedale), comparisons of direct project and cumulative change in light extinction impacts to 1.0-dv change thresholds will be provided. At these mid-field Wyoming community locations impacts to visibility will be assessed, at the request of the Stakeholders group, although these communities are classified as PSD Class II areas where no visibility protection exits under local, state, or federal law.

6.0 REFERENCES

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Attachment A

Sample CALMET and CALPUFF Input Control Files

CALMET Input Control File

```
Pinedale Anticline Project Sample CALMET Input File, April
Meteorological Data - 2001 MM5 Data, 34 sfc, 61 precip, & 2 ua stations
116 x 138 Modeling Domain w/ 4 km spacing - Lambert Conformal Coordinates
---------------- Run title (3 lines) ----------------------------------------

                    CALMET MODEL CONTROL FILE
                    -------------------------

-------------------------------------------------------------------------------

INPUT GROUP: 0 -- Input and Output File Names


Subgroup (a)
------------
Default Name  Type          File Name
------------  ----          ---------
GEO.DAT       input    ! GEODAT= GEO4KMC.DAT       !
SURF.DAT      input    ! SRFDAT= SURF01_final.DAT  !
CLOUD.DAT     input    * CLDDAT=                   *
PRECIP.DAT    input    ! PRCDAT= PRECIP01.DAT      !
MM4.DAT       input    ! MM4DAT= pinedale_2001-04.mm5 !
WT.DAT        input    * WTDAT=                  *
CALMET.LST    output   ! METLST= apr01.LST     !
CALMET.DAT    output   ! METDAT= apr01.DAT     !
PACOUT.DAT    output   * PACDAT=               *

All file names will be converted to lower case if LCFILES = T
Otherwise, if LCFILES = F, file names will be converted to UPPER CASE
         T = lower case      ! LCFILES = T !
         F = UPPER CASE

NUMBER OF UPPER AIR & OVERWATER STATIONS:

    Number of upper air stations (NUSTA)  No default     ! NUSTA =  2   !
    Number of overwater met stations
                                 (NOWSTA) No default     ! NOWSTA =  0  !

                       !END!
-------------------------------------------------------------------------------
Subgroup (b)
---------------------------------
Upper air files (one per station)
---------------------------------
Default Name  Type       File Name
------------  ----       ---------
UP1.DAT       input     1  ! UPDAT=upriw01_rev.dat! !END!
UP2.DAT       input     2  ! UPDAT=upslc01_rev.dat! !END!
-------------------------------------------------------------------------------
Subgroup (c)
----------------------------------------
Overwater station files (one per station)
----------------------------------------
Default Name  Type       File Name
------------  ----       ---------
-------------------------------------------------------------------------------
Subgroup (d)
----------------
Other file names
----------------

Default Name  Type       File Name
------------  ----       ---------
DIAG.DAT      input      * DIADAT=                  *
PROG.DAT      input      * PRGDAT=                  *
TEST.PRT      output     * TSTPRT=                  *
TEST.OUT      output     * TSTOUT=                  *
TEST.KIN      output     * TSTKIN=                  *
TEST.FRD      output     * TSTFRD=                  *
TEST.SLP      output     * TSTSLP=                  *
```

```
-------------------------------------------------------------------------------
NOTES: (1) File/path names can be up to 70 characters in length
       (2) Subgroups (a) and (d) must have ONE 'END' (surround by
           delimiters) at the end of the group
       (3) Subgroups (b) and (c) must have an 'END' (surround by
           delimiters) at the end of EACH LINE

                        !END!


------------------------------------------------------------------------------

INPUT GROUP: 1 -- General run control parameters
--------------

     Starting date:   Year (IBYR) -- No default       ! IBYR=  2001  !
                     Month (IBMO) -- No default       ! IBMO=  4  !
                       Day (IBDY) -- No default       ! IBDY=  1  !
                      Hour (IBHR) -- No default       ! IBHR=  0  !

     Base time zone        (IBTZ) -- No default       ! IBTZ=  7  !
        PST = 08, MST = 07
        CST = 06, EST = 05

     Length of run (hours) (IRLG) -- No default       ! IRLG=  720  !

     Run type            (IRTYPE) -- Default: 1       ! IRTYPE=  1  !

        0 = Computes wind fields only
        1 = Computes wind fields and micrometeorological variables
            (u*, w*, L, zi, etc.)
        (IRTYPE must be 1 to run CALPUFF or CALGRID)

     Compute special data fields required
     by CALGRID (i.e., 3-D fields of W wind
     components and temperature)
     in additional to regular            Default: T    ! LCALGRD = T !
     fields ? (LCALGRD)
     (LCALGRD must be T to run CALGRID)

      Flag to stop run after
      SETUP phase (ITEST)             Default: 2       ! ITEST=  2   !
      (Used to allow checking
      of the model inputs, files, etc.)
      ITEST = 1 - STOPS program after SETUP phase
      ITEST = 2 - Continues with execution of
                  COMPUTATIONAL phase after SETUP

!END!

------------------------------------------------------------------------------

INPUT GROUP: 2 -- Map Projection and Grid control parameters
--------------

     Projection for all (X,Y):
     -------------------------

     Map projection
     (PMAP)                     Default: UTM    ! PMAP = LCC  !

         UTM :  Universal Transverse Mercator
         TTM :  Tangential Transverse Mercator
         LCC :  Lambert Conformal Conic
          PS :  Polar Stereographic
          EM :  Equatorial Mercator
        LAZA :  Lambert Azimuthal Equal Area

     False Easting and Northing (km) at the projection origin
     (Used only if PMAP= TTM, LCC, or LAZA)
     (FEAST)                    Default=0.0     ! FEAST  = 0.000  !
```

```
(FNORTH)                    Default=0.0     ! FNORTH = 0.000  !

UTM zone (1 to 60)
(Used only if PMAP=UTM)
(IUTMZN)                    No Default      ! IUTMZN =  12   !

Hemisphere for UTM projection?
(Used only if PMAP=UTM)
(UTMHEM)                    Default: N      ! UTMHEM = N  !
    N   :  Northern hemisphere projection
    S   :  Southern hemisphere projection

Latitude and Longitude (decimal degrees) of projection origin
(Used only if PMAP= TTM, LCC, PS, EM, or LAZA)
(RLAT0)                     No Default      ! RLAT0 = 43.05N  !
(RLON0)                     No Default      ! RLON0 = 109.80W  !

    TTM :  RLON0 identifies central (true N/S) meridian of projection
           RLAT0 selected for convenience
    LCC :  RLON0 identifies central (true N/S) meridian of projection
           RLAT0 selected for convenience
    PS  :  RLON0 identifies central (grid N/S) meridian of projection
           RLAT0 selected for convenience
    EM  :  RLON0 identifies central meridian of projection
           RLAT0 is REPLACED by 0.0N (Equator)
    LAZA:  RLON0 identifies longitude of tangent-point of mapping plane
           RLAT0 identifies latitude of tangent-point of mapping plane

Matching parallel(s) of latitude (decimal degrees) for projection
(Used only if PMAP= LCC or PS)
(XLAT1)                     No Default      ! XLAT1 = 30.000N  !
(XLAT2)                     No Default      ! XLAT2 = 60.000N  !

    LCC :  Projection cone slices through Earth's surface at XLAT1 and XLAT2
    PS  :  Projection plane slices through Earth at XLAT1
           (XLAT2 is not used)

----------
Note:  Latitudes and longitudes should be positive, and include a
       letter N,S,E, or W indicating north or south latitude, and
       east or west longitude.  For example,
       35.9  N Latitude  =  35.9N
       118.7 E Longitude = 118.7E


Datum-region
------------

The Datum-Region for the coordinates is identified by a character
string.  Many mapping products currently available use the model of the
Earth known as the World Geodetic System 1984 (WGS-G ).  Other local
models may be in use, and their selection in CALMET will make its output
consistent with local mapping products.  The list of Datum-Regions with
official transformation parameters provided by the National Imagery and
Mapping Agency (NIMA).

NIMA Datum - Regions(Examples)
-------------------------------------------------------------------------------
WGS-G     WGS-84 GRS 80, Global coverage
NAS-C     NORTH AMERICAN 1927 Clarke 1866, MEAN FOR (CONUS)
NWS-27    NWS 6370KM Radius, Global Sphere (NAD27)
NWS-84    NWS 6370KM Radius, Global Sphere (WGS84)
ESR-S     ESRI REFERENCE Normal Sphere (6371KM Radius), Global Reference Sphere

Datum-region for output coordinates
(DATUM)                     Default: WGS-G     ! DATUM = WGS-G   !


Horizontal grid definition:
---------------------------
```

```
     Rectangular grid defined for projection PMAP,
     with X the Easting and Y the Northing coordinate

            No. X grid cells (NX)      No default     ! NX =   116  !
            No. Y grid cells (NY)      No default     ! NY =   138  !

     Grid spacing (DGRIDKM)            No default     ! DGRIDKM = 4. !
                                       Units: km

     Reference grid coordinate of
     SOUTHWEST corner of grid cell (1,1)

        X coordinate (XORIGKM)         No default     ! XORIGKM = -232.000 !
        Y coordinate (YORIGKM)         No default     ! YORIGKM = -272.000 !
                                       Units: km


     Vertical grid definition:
     -------------------------

        No. of vertical layers (NZ)    No default     ! NZ =  10  !

        Cell face heights in arbitrary
        vertical grid (ZFACE(NZ+1))    No defaults
                                       Units: m
        ! ZFACE = 0.,20.,40.,100.,160.,320.,560.,1000.,1500.,2250.,3200. !

!END!


-------------------------------------------------------------------------------

INPUT GROUP: 3 -- Output Options
--------------


    DISK OUTPUT OPTION

       Save met. fields in an unformatted
       output file ?              (LSAVE)  Default: T     ! LSAVE = T !
       (F = Do not save, T = Save)

       Type of unformatted output file:
       (IFORMO)                            Default: 1    ! IFORMO =  1  !

            1 = CALPUFF/CALGRID type file (CALMET.DAT)
            2 = MESOPUFF-II type file     (PACOUT.DAT)


    LINE PRINTER OUTPUT OPTIONS:

       Print met. fields ?  (LPRINT)       Default: F     ! LPRINT = F !
       (F = Do not print, T = Print)
       (NOTE: parameters below control which
              met. variables are printed)

       Print interval
       (IPRINF) in hours                   Default: 1     ! IPRINF =  1  !
       (Meteorological fields are printed
        every  1  hours)


       Specify which layers of U, V wind component
       to print (IUVOUT(NZ)) -- NOTE: NZ values must be entered
       (0=Do not print, 1=Print)
       (used only if LPRINT=T)        Defaults: NZ*0
       ! IUVOUT =  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0  !
       -----------------------


       Specify which levels of the W wind component to print
```

```
(NOTE: W defined at TOP cell face --  10  values)
(IWOUT(NZ)) -- NOTE: NZ values must be entered
(0=Do not print, 1=Print)
(used only if LPRINT=T & LCALGRD=T)
-----------------------------------
                                     Defaults: NZ*0
 ! IWOUT =  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0  !


Specify which levels of the 3-D temperature field to print
(ITOUT(NZ)) -- NOTE: NZ values must be entered
(0=Do not print, 1=Print)
(used only if LPRINT=T & LCALGRD=T)
-----------------------------------
                                     Defaults: NZ*0
 ! ITOUT =  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0  !

Specify which meteorological fields
to print
(used only if LPRINT=T)             Defaults: 0 (all variables)
-----------------------


  Variable            Print ?
                 (0 = do not print,
                  1 = print)
  --------        ------------------

!  STABILITY  =          0           ! - PGT stability class
!  USTAR      =          0           ! - Friction velocity
!  MONIN      =          0           ! - Monin-Obukhov length
!  MIXHT      =          0           ! - Mixing height
!  WSTAR      =          0           ! - Convective velocity scale
!  PRECIP     =          0           ! - Precipitation rate
!  SENSHEAT   =          0           ! - Sensible heat flux
!  CONVZI     =          0           ! - Convective mixing ht.


Testing and debug print options for micrometeorological module

   Print input meteorological data and
   internal variables (LDB)         Default: F       ! LDB = F !
   (F = Do not print, T = print)
   (NOTE: this option produces large amounts of output)

   First time step for which debug data
   are printed (NN1)                Default: 1       ! NN1 =  1  !

   Last time step for which debug data
   are printed (NN2)                Default: 1       ! NN2 =  2  !


Testing and debug print options for wind field module
(all of the following print options control output to
 wind field module's output files: TEST.PRT, TEST.OUT,
 TEST.KIN, TEST.FRD, and TEST.SLP)

   Control variable for writing the test/debug
   wind fields to disk files (IOUTD)
   (0=Do not write, 1=write)        Default: 0       ! IOUTD =  0  !

   Number of levels, starting at the surface,
   to print (NZPRN2)                Default: 1       ! NZPRN2 =  1  !

   Print the INTERPOLATED wind components ?
   (IPR0) (0=no, 1=yes)             Default: 0       !  IPR0 =  0  !

   Print the TERRAIN ADJUSTED surface wind
   components ?
   (IPR1) (0=no, 1=yes)             Default: 0       !  IPR1 =  0  !
```

```
          Print the SMOOTHED wind components and
          the INITIAL DIVERGENCE fields ?
          (IPR2) (0=no, 1=yes)            Default: 0       !  IPR2 =  0  !

          Print the FINAL wind speed and direction
          fields ?
          (IPR3) (0=no, 1=yes)            Default: 0       !  IPR3 =  0  !

          Print the FINAL DIVERGENCE fields ?
          (IPR4) (0=no, 1=yes)            Default: 0       !  IPR4 =  0  !

          Print the winds after KINEMATIC effects
          are added ?
          (IPR5) (0=no, 1=yes)            Default: 0       !  IPR5 =  0  !

          Print the winds after the FROUDE NUMBER
          adjustment is made ?
          (IPR6) (0=no, 1=yes)            Default: 0       !  IPR6 =  0  !

          Print the winds after SLOPE FLOWS
          are added ?
          (IPR7) (0=no, 1=yes)            Default: 0       !  IPR7 =  0  !

          Print the FINAL wind field components ?
          (IPR8) (0=no, 1=yes)            Default: 0       !  IPR8 =  0  !

!END!


-------------------------------------------------------------------------------

INPUT GROUP: 4 -- Meteorological data options
--------------

    NO OBSERVATION MODE             (NOOBS)  Default: 0     ! NOOBS =  0   !
          0 = Use surface, overwater, and upper air stations
          1 = Use surface and overwater stations (no upper air observations)
              Use MM5 for upper air data
          2 = No surface, overwater, or upper air observations
              Use MM5 for surface, overwater, and upper air data

    NUMBER OF SURFACE & PRECIP. METEOROLOGICAL STATIONS

       Number of surface stations   (NSSTA)  No default     ! NSSTA =  34  !

       Number of precipitation stations
       (NPSTA=-1: flag for use of MM5 precip data)
                                    (NPSTA)  No default     ! NPSTA =  61  !

    CLOUD DATA OPTIONS
       Gridded cloud fields:
                                  (ICLOUD)  Default: 0     ! ICLOUD =  0  !
       ICLOUD = 0 - Gridded clouds not used
       ICLOUD = 1 - Gridded CLOUD.DAT generated as OUTPUT
       ICLOUD = 2 - Gridded CLOUD.DAT read as INPUT
       ICLOUD = 3 - Gridded cloud cover from Prognostic Rel. Humidity

    FILE FORMATS

       Surface meteorological data file format
                                  (IFORMS)  Default: 2     ! IFORMS =  2  !
       (1 = unformatted (e.g., SMERGE output))
       (2 = formatted   (free-formatted user input))

       Precipitation data file format
                                  (IFORMP)  Default: 2     ! IFORMP =  2  !
       (1 = unformatted (e.g., PMERGE output))
       (2 = formatted   (free-formatted user input))

       Cloud data file format
                                  (IFORMC)  Default: 2     ! IFORMC =  2  !
```

```
       (1 = unformatted - CALMET unformatted output)
       (2 = formatted   - free-formatted CALMET output or user input)

!END!


------------------------------------------------------------------------------

INPUT GROUP: 5 -- Wind Field Options and Parameters
--------------


    WIND FIELD MODEL OPTIONS
       Model selection variable (IWFCOD)     Default: 1      ! IWFCOD =  1  !
          0 = Objective analysis only
          1 = Diagnostic wind module

       Compute Froude number adjustment
       effects ? (IFRADJ)                    Default: 1      ! IFRADJ =  1  !
       (0 = NO, 1 = YES)

       Compute kinematic effects ? (IKINE)   Default: 0      ! IKINE  =  0  !
       (0 = NO, 1 = YES)

       Use O'Brien procedure for adjustment
       of the vertical velocity ? (IOBR)     Default: 0      ! IOBR =  0  !
       (0 = NO, 1 = YES)

       Compute slope flow effects ? (ISLOPE) Default: 1      ! ISLOPE  =  1  !
       (0 = NO, 1 = YES)

       Extrapolate surface wind observations
       to upper layers ? (IEXTRP)            Default: -4     ! IEXTRP = -4  !
       (1 = no extrapolation is done,
        2 = power law extrapolation used,
        3 = user input multiplicative factors
            for layers 2 - NZ used (see FEXTRP array)
        4 = similarity theory used
        -1, -2, -3, -4 = same as above except layer 1 data
            at upper air stations are ignored

       Extrapolate surface winds even
       if calm? (ICALM)                      Default: 0      ! ICALM  =  0  !
       (0 = NO, 1 = YES)

       Layer-dependent biases modifying the weights of
       surface and upper air stations (BIAS(NZ))
         -1<=BIAS<=1
       Negative BIAS reduces the weight of upper air stations
         (e.g. BIAS=-0.1 reduces the weight of upper air stations
       by 10%; BIAS= -1, reduces their weight by 100 %)
       Positive BIAS reduces the weight of surface stations
         (e.g. BIAS= 0.2 reduces the weight of surface stations
       by 20%; BIAS=1 reduces their weight by 100%)
       Zero BIAS leaves weights unchanged (1/R**2 interpolation)
       Default: NZ*0
                              ! BIAS =  -1 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0 ,  0  !

       Minimum distance from nearest upper air station
       to surface station for which extrapolation
       of surface winds at surface station will be allowed
       (RMIN2: Set to -1 for IEXTRP = 4 or other situations
        where all surface stations should be extrapolated)
                                              Default: 4.    ! RMIN2 = -1.0 !

       Use gridded prognostic wind field model
       output fields as input to the diagnostic
       wind field model (IPROG)              Default: 0      ! IPROG =  14  !
       (0 = No, [IWFCOD = 0 or 1]
        1 = Yes, use CSUMM prog. winds as Step 1 field, [IWFCOD = 0]
        2 = Yes, use CSUMM prog. winds as initial guess field [IWFCOD = 1]
```

```
        3 = Yes, use winds from MM4.DAT file as Step 1 field [IWFCOD = 0]
        4 = Yes, use winds from MM4.DAT file as initial guess field [IWFCOD = 1]
        5 = Yes, use winds from MM4.DAT file as observations [IWFCOD = 1]
        13 = Yes, use winds from MM5.DAT file as Step 1 field [IWFCOD = 0]
        14 = Yes, use winds from MM5.DAT file as initial guess field [IWFCOD = 1]
        15 = Yes, use winds from MM5.DAT file as observations [IWFCOD = 1]

      Timestep (hours) of the prognostic
      model input data   (ISTEPPG)          Default: 1      ! ISTEPPG =  1   !

   RADIUS OF INFLUENCE PARAMETERS

      Use varying radius of influence       Default: F      ! LVARY =  F!
      (if no stations are found within RMAX1,RMAX2,
       or RMAX3, then the closest station will be used)

      Maximum radius of influence over land
      in the surface layer (RMAX1)          No default      ! RMAX1 = 20. !
                                            Units: km
      Maximum radius of influence over land
      aloft (RMAX2)                         No default      ! RMAX2 = 40. !
                                            Units: km
      Maximum radius of influence over water
      (RMAX3)                               No default      ! RMAX3 = 40. !
                                            Units: km


   OTHER WIND FIELD INPUT PARAMETERS

      Minimum radius of influence used in
      the wind field interpolation (RMIN)   Default: 0.1    ! RMIN = 0.1 !
                                            Units: km
      Radius of influence of terrain
      features (TERRAD)                     No default      ! TERRAD = 15. !

                                            Units: km
      Relative weighting of the first
      guess field and observations in the
      SURFACE layer (R1)                    No default      ! R1 = 5. !
      (R1 is the distance from an           Units: km
      observational station at which the
      observation and first guess field are
      equally weighted)

      Relative weighting of the first
      guess field and observations in the
      layers ALOFT (R2)                     No default      ! R2 = 15. !
      (R2 is applied in the upper layers    Units: km
      in the same manner as R1 is used in
      the surface layer).

      Relative weighting parameter of the
      prognostic wind field data (RPROG)    No default      ! RPROG = 0. !
      (Used only if IPROG = 1)              Units: km
      ------------------------

      Maximum acceptable divergence in the
      divergence minimization procedure
      (DIVLIM)                              Default: 5.E-6  ! DIVLIM= 5.0E-06 !

      Maximum number of iterations in the
      divergence min. procedure (NITER)     Default: 50     ! NITER =  50  !

      Number of passes in the smoothing
      procedure (NSMTH(NZ))
      NOTE: NZ values must be entered
           Default: 2,(mxnz-1)*4 ! NSMTH =
 2 ,  4 ,  4 ,  4 ,  4 ,  4 ,  4 ,  4 ,  4 ,  4  !

      Maximum number of stations used in
      each layer for the interpolation of
```

```
   data to a grid point (NINTR2(NZ))
   NOTE: NZ values must be entered       Default: 99.    ! NINTR2 =
   99 ,  99 ,  99 ,  99 ,  99 ,  99 ,  99 ,  99 ,  99 ,  99  !

   Critical Froude number (CRITFN)       Default: 1.0    ! CRITFN = 1. !

   Empirical factor controlling the
   influence of kinematic effects
   (ALPHA)                               Default: 0.1    ! ALPHA = 0.1 !

   Multiplicative scaling factor for
   extrapolation of surface observations
   to upper layers (FEXTR2(NZ))          Default: NZ*0.0
   ! FEXTR2 = 0., 0., 0., 0., 0., 0., 0., 0., 0., 0. !
   (Used only if IEXTRP = 3 or -3)


BARRIER INFORMATION

   Number of barriers to interpolation
   of the wind fields (NBAR)             Default: 0      ! NBAR =  0  !

   THE FOLLOWING 4 VARIABLES ARE INCLUDED
   ONLY IF NBAR > 0
   NOTE: NBAR values must be entered     No defaults
         for each variable               Units: km

      X coordinate of BEGINNING
      of each barrier (XBBAR(NBAR))      ! XBBAR = 0. !
      Y coordinate of BEGINNING
      of each barrier (YBBAR(NBAR))      ! YBBAR = 0. !

      X coordinate of ENDING
      of each barrier (XEBAR(NBAR))      ! XEBAR = 0. !
      Y coordinate of ENDING
      of each barrier (YEBAR(NBAR))      ! YEBAR = 0. !


DIAGNOSTIC MODULE DATA INPUT OPTIONS

   Surface temperature (IDIOPT1)         Default: 0      ! IDIOPT1 =  0  !
      0 = Compute internally from
          hourly surface observations
      1 = Read preprocessed values from
          a data file (DIAG.DAT)

      Surface met. station to use for
      the surface temperature (ISURFT)   No default     ! ISURFT =  18  !
      (Must be a value from 1 to NSSTA)
      (Used only if IDIOPT1 = 0)
      --------------------------

   Domain-averaged temperature lapse
   rate (IDIOPT2)                        Default: 0     ! IDIOPT2 =  0  !
      0 = Compute internally from
          twice-daily upper air observations
      1 = Read hourly preprocessed values
          from a data file (DIAG.DAT)

      Upper air station to use for
      the domain-scale lapse rate (IUPT) No default     ! IUPT   =  1 !
      (Must be a value from 1 to NUSTA)
      (Used only if IDIOPT2 = 0)
      --------------------------

      Depth through which the domain-scale
      lapse rate is computed (ZUPT)      Default: 200.  ! ZUPT = 200. !
      (Used only if IDIOPT2 = 0)         Units: meters
      --------------------------

   Domain-averaged wind components
```

```
(IDIOPT3)                              Default: 0     ! IDIOPT3 =  0  !
   0 = Compute internally from
       twice-daily upper air observations
   1 = Read hourly preprocessed values
       a data file (DIAG.DAT)

   Upper air station to use for
   the domain-scale winds (IUPWND)    Default: -1    ! IUPWND = -1  !
   (Must be a value from -1 to NUSTA)
   (Used only if IDIOPT3 = 0)
   --------------------------

   Bottom and top of layer through
   which the domain-scale winds
   are computed
   (ZUPWND(1), ZUPWND(2))        Defaults: 1., 1000. ! ZUPWND= 1., 1000. !
   (Used only if IDIOPT3 = 0)    Units: meters
   --------------------------

Observed surface wind components
for wind field module (IDIOPT4)  Default: 0     ! IDIOPT4 =  0  !
   0 = Read WS, WD from a surface
       data file (SURF.DAT)
   1 = Read hourly preprocessed U, V from
       a data file (DIAG.DAT)

Observed upper air wind components
for wind field module (IDIOPT5)  Default: 0     ! IDIOPT5 =  0  !
   0 = Read WS, WD from an upper
       air data file (UP1.DAT, UP2.DAT, etc.)
   1 = Read hourly preprocessed U, V from
       a data file (DIAG.DAT)

LAKE BREEZE INFORMATION

   Use Lake Breeze Module  (LLBREZE)
                                     Default: F      ! LLBREZE = F !

    Number of lake breeze regions (NBOX)            ! NBOX =  0  !

 X Grid line 1 defining the region of interest
                                                     ! XG1 = 0. !
 X Grid line 2 defining the region of interest
                                                     ! XG2 = 0. !
 Y Grid line 1 defining the region of interest
                                                     ! YG1 = 0. !
 Y Grid line 2 defining the region of interest
                                                     ! YG2 = 0. !

  X Point defining the coastline (Straight line)
            (XBCST)  (KM)   Default: none    ! XBCST = 0. !

  Y Point defining the coastline (Straight line)
            (YBCST)  (KM)   Default: none    ! YBCST = 0. !

  X Point defining the coastline (Straight line)
            (XECST)  (KM)   Default: none    ! XECST = 0. !

  Y Point defining the coastline (Straight line)
            (YECST)  (KM)   Default: none    ! YECST = 0. !


Number of stations in the region     Default: none ! NLB =  0 !
(Surface stations + upper air stations)

Station ID's  in the region   (METBXID(NLB))
(Surface stations first, then upper air stations)
  ! METBXID =  0 !

!END!
```

```
-------------------------------------------------------------------------------

INPUT GROUP: 6 -- Mixing Height, Temperature and Precipitation Parameters
--------------

    EMPIRICAL MIXING HEIGHT CONSTANTS

       Neutral, mechanical equation
       (CONSTB)                              Default: 1.41   ! CONSTB = 1.41 !
       Convective mixing ht. equation
       (CONSTE)                              Default: 0.15   ! CONSTE = 0.15 !
       Stable mixing ht. equation
       (CONSTN)                              Default: 2400.  ! CONSTN = 2400.!
       Overwater mixing ht. equation
       (CONSTW)                              Default: 0.16   ! CONSTW = 0.16 !
       Absolute value of Coriolis
       parameter (FCORIOL)                   Default: 1.E-4  ! FCORIOL = 1.0E-04!
                                             Units: (1/s)

    SPATIAL AVERAGING OF MIXING HEIGHTS

       Conduct spatial averaging
       (IAVEZI)  (0=no, 1=yes)               Default: 1      ! IAVEZI =  1  !

       Max. search radius in averaging
       process (MNMDAV)                      Default: 1      ! MNMDAV =  1  !
                                             Units: Grid
                                                    cells
       Half-angle of upwind looking cone
       for averaging (HAFANG)                Default: 30.    ! HAFANG = 30. !
                                             Units: deg.
       Layer of winds used in upwind
       averaging (ILEVZI)                    Default: 1      ! ILEVZI =  1  !
       (must be between 1 and NZ)

    OTHER MIXING HEIGHT VARIABLES

       Minimum potential temperature lapse
       rate in the stable layer above the
       current convective mixing ht.         Default: 0.001  ! DPTMIN = 0.001 !
       (DPTMIN)                              Units: deg. K/m
       Depth of layer above current conv.
       mixing height through which lapse     Default: 200.   ! DZZI = 200. !
       rate is computed (DZZI)               Units: meters

       Minimum overland mixing height        Default:  50.   ! ZIMIN = 50. !
       (ZIMIN)                               Units: meters
       Maximum overland mixing height        Default: 3000.  ! ZIMAX = 3000. !
       (ZIMAX)                               Units: meters
       Minimum overwater mixing height       Default:   50.  ! ZIMINW = 50. !
       (ZIMINW) -- (Not used if observed     Units: meters
       overwater mixing hts. are used)
       Maximum overwater mixing height       Default: 3000.  ! ZIMAXW = 3000. !
       (ZIMAXW) -- (Not used if observed     Units: meters
       overwater mixing hts. are used)


    TEMPERATURE PARAMETERS

       3D temperature from observations or
       from prognostic data? (ITPROG)        Default:0         !ITPROG =  0   !

          0 = Use Surface and upper air stations
              (only if NOOBS = 0)
          1 = Use Surface stations (no upper air observations)
              Use MM5 for upper air data
              (only if NOOBS = 0,1)
          2 = No surface or upper air observations
              Use MM5 for surface and upper air data
              (only if NOOBS = 0,1,2)
```

```
       Interpolation type
       (1 = 1/R ; 2 = 1/R**2)                Default:1         ! IRAD =  1  !

       Radius of influence for temperature
       interpolation (TRADKM)                Default: 500.     ! TRADKM = 500. !
                                             Units: km

       Maximum Number of stations to include
       in temperature interpolation (NUMTS)  Default: 5        ! NUMTS = 5  !

       Conduct spatial averaging of temp-
       eratures (IAVET)  (0=no, 1=yes)         Default: 1     ! IAVET =  1  !
       (will use mixing ht MNMDAV,HAFANG
        so make sure they are correct)

       Default temperature gradient        Default: -.0098 ! TGDEFB = -0.0098 !
       below the mixing height over
       water (K/m) (TGDEFB)

       Default temperature gradient        Default: -.0045 ! TGDEFA = -0.0045 !
       above the mixing height over
       water (K/m) (TGDEFA)

       Beginning (JWAT1) and ending (JWAT2)
       land use categories for temperature                   ! JWAT1 =  999  !
       interpolation over water -- Make                      ! JWAT2 =  999  !
       bigger than largest land use to disable

   PRECIP INTERPOLATION PARAMETERS

       Method of interpolation (NFLAGP)      Default = 2    ! NFLAGP =  2  !
        (1=1/R,2=1/R**2,3=EXP/R**2)
       Radius of Influence (km) (SIGMAP)     Default = 100.0  ! SIGMAP = 100. !
        (0.0 => use half dist. btwn
         nearest stns w & w/out
         precip when NFLAGP = 3)
       Minimum Precip. Rate Cutoff (mm/hr)   Default = 0.01  ! CUTP = 0.01 !
        (values < CUTP = 0.0 mm/hr)
!END!


-------------------------------------------------------------------------------

INPUT GROUP: 7 -- Surface meteorological station parameters
--------------

     SURFACE STATION VARIABLES
     (One record per station --  34  records in all)


             1     2
         Name   ID            X coord.   Y coord.   Time   Anem.
                               (km)       (km)      zone   Ht.(m)
       ---------------------------------------------------------
! SS1  ='KPIH' 25780      -218.40091   -10.51052  7     10.0 !
! SS2  ='KIDA' 25785      -177.12294    52.6585   7      7.9 !
! SS3  ='KMLD' 25786      -198.54764   -93.61361  7      7.9 !
! SS4  ='KU78' 25868      -141.38824   -41.39212  7      9.1 !
! SS5  ='KRXE' 26818      -155.41907    86.02029  7     10.0 !
! SS6  ='KRKS' 25744        59.16297  -155.54793  7     10.0 !
! SS7  ='KRWL' 25745       209.12218  -130.91878  7     10.1 !
! SS8  ='KLND' 25760        84.37669   -24.46433  7     10.0 !
! SS9  ='KRIW' 25765       104.96267     2.69977  7     10.1 !
! SS10 ='KEVW' 25775      -100.06805  -190.8622   7     10.1 !
! SS11 ='KJAC' 25776       -72.8003     59.48678  7     10.1 !
! SS12 ='KBYG' 26654       237.27166   147.69128  7     10.0 !
! SS13 ='KSHR' 26660       216.58147   188.17299  7     10.0 !
! SS14 =' P60' 26664       -47.35795   161.23067  7     10.1 !
! SS15 ='KWRL' 26665       143.43285   100.12221  7      6.1 !
! SS16 ='KGEY' 26667       131.85671   158.91996  7     10.0 !
```

```
! SS17 ='KCOD' 26700        60.13412   157.80002  7     10.0 !
! SS18 ='KBPI' 26710       -23.81807   -50.12008  7     10.1 !
! SS19 ='KWEY' 26763       -99.60432   172.59078  7      9.8 !
! SS20 ='KWYS' 26764      -100.84845   176.15375  7     10.0 !
! SS21 ='KBIL' 26770        93.84694   295.95191  7     10.0 !
! SS22 ='KDLN' 26796      -208.45779   239.76404  7     10.1 !
! SS23 ='KBZN' 26797      -102.66088   294.27092  7     10.1 !
! SS24 ='KLVM' 26798       -47.61005   284.67335  7     10.1 !
! SS25 ='KCAG' 25700       187.62061  -271.50088  7     10.1 !
! SS26 ='KHDN' 25715       209.55603  -270.83858  7     10.1 !
! SS27 ='KLGU' 24796      -164.94212  -134.03061  7     10.1 !
! SS28 ='KVEL' 25705        20.5709   -281.35837  7     10.1 !
! SS29 ='KSLC' 25720      -177.26493  -241.31181  7     10.0 !
! SS30 ='KOGD' 25750      -180.11159  -196.34621  7     10.1 !
! SS31 ='KHIF' 25755      -176.2922   -205.38351  7      4.0 !
! SS32 ='YEL ' 40800       -46.12183   162.29469  7     10.0 !
! SS33 ='PND ' 16500         0.9474    -12.99608  7     10.0 !
! SS34 ='BP  ' 88888        17.81917   -62.49556  7     10.0 !
-------------------
      1
        Four character string for station name
        (MUST START IN COLUMN 9)

      2
        Five digit integer for station ID

!END!


-------------------------------------------------------------------------------

INPUT GROUP: 8 -- Upper air meteorological station parameters
--------------

     UPPER AIR STATION VARIABLES
     (One record per station --  2  records in all)

             1     2
         Name    ID      X coord.   Y coord.  Time zone
                           (km)       (km)
        ----------------------------------------------
! US1  ='KRIW'   24061   104.96267    2.69977   7  !
! US2  ='KSLC'   24127  -177.26493 -241.31181   7  !
-------------------
      1
        Four character string for station name
        (MUST START IN COLUMN 9)

      2
        Five digit integer for station ID

!END!


-------------------------------------------------------------------------------

INPUT GROUP: 9 -- Precipitation station parameters
--------------

     PRECIPITATION STATION VARIABLES
     (One record per station -- 61  records in all)
     (NOT INCLUDED IF NPSTA = 0)

            1          2
         Name   Station    X coord.  Y coord.
                  Code       (km)      (km)
        -----------------------------------
! PS1  ='wy01'   480697    -25.18903     -55.48678   !
! PS2  ='wy02'   481000    127.85275      38.89125   !
! PS3  ='wy03'   482715     11.71824      51.87955   !
! PS4  ='wy04'   483100    -93.33238    -190.96246   !
```

```
! PS5  ='wy05'   484910    -75.60488      46.95638   !
! PS6  ='wy06'   485345    -46.03946     163.04547   !
! PS7  ='wy07'   485390     84.37669     -24.46433   !
! PS8  ='wy08'   486440    -60.83393      86.2015    !
! PS9  ='wy09'   486555    -43.25857    -191.4888    !
! PS10 ='wy10'   486597     71.60517    -185.85961   !
! PS11 ='wy11'   486875    128.4441      -52.41299   !
! PS12 ='wy12'   487375    221.908         2.07873   !
! PS13 ='wy13'   487388     78.96463     186.56739   !
! PS14 ='wy14'   487533    209.12218    -130.91878   !
! PS15 ='wy15'   487760    112.90137      -0.81532   !
! PS16 ='wy16'   487845     59.16297    -155.54793   !
! PS17 ='wy17'   488155    216.58147     188.17299   !
! PS18 ='wy18'   488626    222.41663     168.61917   !
! PS19 ='wy19'   488852    187.05716     112.02419   !
! PS20 ='wy20'   488858    189.11058      85.23487   !
! PS21 ='wy21'   488875    124.73298      65.67754   !
! PS22 ='wy22'   488888     85.65817      72.21319   !
! PS23 ='wy23'   489770    141.99217     105.45823   !
! PS24 ='mt01'   238880     31.4484      268.46619   !
! PS25 ='mt02'   241102     66.84776     245.46093   !
! PS26 ='mt03'   241995    -12.7135      211.18771   !
! PS27 ='mt04'   242414   -214.10091     223.85037   !
! PS28 ='mt05'   244038   -117.00852     196.19446   !
! PS29 ='mt06'   244820   -154.6657      168.36357   !
! PS30 ='mt07'   245030   -213.25997     173.66436   !
! PS31 ='mt08'   245106    184.21809     246.17434   !
! PS32 ='mt09'   248866    -99.57469     174.41529   !
! PS33 ='mt10'   249240    141.37159     245.0234    !
! PS34 ='id01'   102707   -185.15259     131.62072   !
! PS35 ='id02'   103732   -154.80382     -48.27933   !
! PS36 ='id03'   104230   -132.85674     -12.88857   !
! PS37 ='id04'   104456   -155.3827       34.14257   !
! PS38 ='id05'   104598   -120.54867     147.9516    !
! PS39 ='id06'   107211   -218.40091     -10.51052   !
! PS40 ='id07'   109065   -115.21477      86.97115   !
! PS41 ='id08'   109158   -181.07979     -42.21091   !
! PS42 ='ut01'   420342   -154.37442    -256.21165   !
! PS43 ='ut02'   420820   -170.20753    -234.28564   !
! PS44 ='ut03'   421590   -110.16865    -226.63895   !
! PS45 ='ut04'   421759   -162.65911    -259.56512   !
! PS46 ='ut05'   422385   -133.18577    -222.55076   !
! PS47 ='ut06'   422726   -173.81347    -216.21337   !
! PS48 ='ut07'   423348   -221.51477    -259.67418   !
! PS49 ='ut08'   424538   -173.81347    -216.21337   !
! PS50 ='ut09'   425186   -161.0086     -137.67918   !
! PS51 ='ut10'   425194   -167.92116    -146.42983   !
! PS52 ='ut11'   425815    -57.47079    -266.71134   !
! PS53 ='ut12'   425892   -156.9036     -245.38432   !
! PS54 ='ut13'   426374   -117.32655    -248.04269   !
! PS55 ='ut14'   426404   -174.52533    -191.1179    !
! PS56 ='ut15'   426414   -181.31211    -192.76148   !
! PS57 ='ut16'   426648   -140.72813    -254.68803   !
! PS58 ='ut17'   426757   -180.66118    -169.42997   !
! PS59 ='ut18'   426938   -188.80849    -124.34066   !
! PS60 ='ut19'   427598   -177.26493    -241.31181   !
! PS61 ='ut20'   427846   -146.29735    -261.78067   !

-------------------
      1
        Four character string for station name
        (MUST START IN COLUMN 9)

      2
        Six digit station code composed of state
        code (first 2 digits) and station ID (last
        4 digits)

!END!
```

CALPUFF Input Control File

```
Pinedale Anticline – Sample CALPUFF Input File


---------------- Run title (3 lines) ----------------------------------------

                    CALPUFF MODEL CONTROL FILE
                    --------------------------

------------------------------------------------------------------------------

INPUT GROUP: 0 -- Input and Output File Names

--------------
Default Name  Type          File Name
------------  ----          ---------
CALMET.DAT    input    * METDAT =             *
    or
ISCMET.DAT    input    * ISCDAT =             *
    or
PLMMET.DAT    input    * PLMDAT =             *
    or
PROFILE.DAT   input    * PRFDAT =             *
SURFACE.DAT   input    * SFCDAT =             *
RESTARTB.DAT  input    * RSTARTB=             *
------------------------------------------------------------------------------
CALPUFF.LST   output   ! PUFLST =CALPUFF.LST   !
CONC.DAT      output   ! CONDAT =CONC.DAT      !
DFLX.DAT      output   ! DFDAT  =DFLX.DAT      !
WFLX.DAT      output   ! WFDAT  =WFLX.DAT      !

VISB.DAT      output   * VISDAT =  *
RESTARTE.DAT  output   * RSTARTE=             *
------------------------------------------------------------------------------
Emission Files
--------------
PTEMARB.DAT   input    * PTDAT  =             *
VOLEMARB.DAT  input    * VOLDAT =             *
BAEMARB.DAT   input    * ARDAT  =             *
LNEMARB.DAT   input    * LNDAT  =             *
------------------------------------------------------------------------------
Other Files
-----------
OZONE.DAT     input    ! OZDAT  =2001ozone.dat    !
VD.DAT        input    * VDDAT  =             *
CHEM.DAT      input    * CHEMDAT=             *
H2O2.DAT      input    * H2O2DAT=             *
HILL.DAT      input    * HILDAT=             *
HILLRCT.DAT   input    * RCTDAT=             *
COASTLN.DAT   input    * CSTDAT=             *
FLUXBDY.DAT   input    * BDYDAT=             *
BCON.DAT      input    * BCNDAT=             *
DEBUG.DAT     output   * DEBUG =             *
MASSFLX.DAT   output   * FLXDAT=             *
MASSBAL.DAT   output   * BALDAT=             *
FOG.DAT       output   * FOGDAT=             *
------------------------------------------------------------------------------
All file names will be converted to lower case if LCFILES = T
Otherwise, if LCFILES = F, file names will be converted to UPPER CASE
         T = lower case      ! LCFILES = T !
         F = UPPER CASE
NOTE: (1) file/path names can be up to 70 characters in length


Provision for multiple input files
----------------------------------

     Number of CALMET.DAT files for run (NMETDAT)
                                    Default: 1       ! NMETDAT =   12 !

     Number of PTEMARB.DAT files for run (NPTDAT)
                                    Default: 0       ! NPTDAT =  0  !

     Number of BAEMARB.DAT files for run (NARDAT)
                                    Default: 0       ! NARDAT =  0  !

     Number of VOLEMARB.DAT files for run (NVOLDAT)
                                    Default: 0       ! NVOLDAT =  0  !

!END!
```

```
-------------
Subgroup (0a)
-------------

  The following CALMET.DAT filenames are processed in sequence if NMETDAT>1

Default Name  Type          File Name
------------  ----          ---------
 none         input    ! METDAT=jan01.dat     !  !END!
 none         input    ! METDAT=feb01.dat     !  !END!
 none         input    ! METDAT=mar01.dat     !  !END!
 none         input    ! METDAT=apr01.dat     !  !END!
 none         input    ! METDAT=may01.dat     !  !END!
 none         input    ! METDAT=jun01.dat     !  !END!
 none         input    ! METDAT=jul01.dat     !  !END!
 none         input    ! METDAT=aug01.dat     !  !END!
 none         input    ! METDAT=sep01.dat     !  !END!
 none         input    ! METDAT=oct01.dat     !  !END!
 none         input    ! METDAT=nov01.dat     !  !END!
 none         input    ! METDAT=dec01.dat     !  !END!

--------------------------------------------------------------------------------

INPUT GROUP: 1 -- General run control parameters
--------------

    Option to run all periods found
    in the met. file     (METRUN)   Default: 0       ! METRUN =   0  !

         METRUN = 0 - Run period explicitly defined below
         METRUN = 1 - Run all periods in met. file

     Starting date:   Year (IBYR) -- No default       ! IBYR =  2001  !
     (used only if   Month (IBMO) -- No default       ! IBMO =  1  !
      METRUN = 0)      Day (IBDY) -- No default       ! IBDY =  1  !
                      Hour (IBHR) -- No default       ! IBHR =  1  !

     Base time zone        (XBTZ) -- No default       ! XBTZ = 7.0  !
        PST = 8., MST = 7.
        CST = 6., EST = 5.

     Length of run (hours) (IRLG) -- No default       ! IRLG =  8760 !

     Number of chemical species (NSPEC)
                                     Default: 5       ! NSPEC =  7   !

     Number of chemical species
     to be emitted  (NSE)            Default: 3       ! NSE =  4     !

     Flag to stop run after
     SETUP phase (ITEST)             Default: 2       ! ITEST =  2   !
     (Used to allow checking
     of the model inputs, files, etc.)
           ITEST = 1 - STOPS program after SETUP phase
           ITEST = 2 - Continues with execution of program
                       after SETUP

     Restart Configuration:

        Control flag (MRESTART)      Default: 0       ! MRESTART =  0   !

           0 = Do not read or write a restart file
           1 = Read a restart file at the beginning of
               the run
           2 = Write a restart file during run
           3 = Read a restart file at beginning of run
               and write a restart file during run

        Number of periods in Restart
        output cycle (NRESPD)        Default: 0       ! NRESPD =  0   !

           0 = File written only at last period
          >0 = File updated every NRESPD periods

     Meteorological Data Format (METFM)
                                     Default: 1       ! METFM =  1   !

           METFM = 1 - CALMET binary file (CALMET.MET)
           METFM = 2 - ISC ASCII file (ISCMET.MET)
           METFM = 3 - AUSPLUME ASCII file (PLMMET.MET)
```

```
          METFM = 4 - CTDM plus tower file (PROFILE.DAT) and
                      surface parameters file (SURFACE.DAT)

     PG sigma-y is adjusted by the factor (AVET/PGTIME)**0.2
     Averaging Time (minutes) (AVET)
                                    Default: 60.0    ! AVET = 60. !
     PG Averaging Time (minutes) (PGTIME)
                                    Default: 60.0    ! PGTIME = 60. !


!END!


-------------------------------------------------------------------------------

INPUT GROUP: 2 -- Technical options
--------------


     Vertical distribution used in the
     near field (MGAUSS)                  Default: 1     ! MGAUSS =  1   !
        0 = uniform
        1 = Gaussian

     Terrain adjustment method
     (MCTADJ)                             Default: 3     ! MCTADJ =  3   !
        0 = no adjustment
        1 = ISC-type of terrain adjustment
        2 = simple, CALPUFF-type of terrain
            adjustment
        3 = partial plume path adjustment

     Subgrid-scale complex terrain
     flag (MCTSG)                         Default: 0     ! MCTSG =  0   !
        0 = not modeled
        1 = modeled

     Near-field puffs modeled as
     elongated 0 (MSLUG)                  Default: 0     ! MSLUG =  0   !
        0 = no
        1 = yes (slug model used)

     Transitional plume rise modeled ?
     (MTRANS)                             Default: 1     ! MTRANS =  1   !
        0 = no  (i.e., final rise only)
        1 = yes (i.e., transitional rise computed)

     Stack tip downwash? (MTIP)           Default: 1     ! MTIP =  1  !
        0 = no  (i.e., no stack tip downwash)
        1 = yes (i.e., use stack tip downwash)

     Vertical wind shear modeled above
     stack top? (MSHEAR)                  Default: 0     ! MSHEAR =  0  !
        0 = no  (i.e., vertical wind shear not modeled)
        1 = yes (i.e., vertical wind shear modeled)

     Puff splitting allowed? (MSPLIT)     Default: 0     ! MSPLIT =  0  !
        0 = no (i.e., puffs not split)
        1 = yes (i.e., puffs are split)

     Chemical mechanism flag (MCHEM)      Default: 1     ! MCHEM =  1   !
        0 = chemical transformation not
            modeled
        1 = transformation rates computed
            internally (MESOPUFF II scheme)
        2 = user-specified transformation
            rates used
        3 = transformation rates computed
            internally (RIVAD/ARM3 scheme)
        4 = secondary organic aerosol formation
            computed (MESOPUFF II scheme for OH)

     Aqueous phase transformation flag (MAQCHEM)
     (Used only if MCHEM = 1, or 3)       Default: 0     ! MAQCHEM =  0   !
        0 = aqueous phase transformation
            not modeled
        1 = transformation rates adjusted
            for aqueous phase reactions

     Wet removal modeled ? (MWET)         Default: 1     ! MWET =  1   !
        0 = no
```

```
   1 = yes

Dry deposition modeled ? (MDRY)       Default: 1     ! MDRY =  1   !
   0 = no
   1 = yes
   (dry deposition method specified
    for each species in Input Group 3)

Method used to compute dispersion
coefficients (MDISP)                  Default: 3     ! MDISP =  3   !

   1 = dispersion coefficients computed from measured values
       of turbulence, sigma v, sigma w
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
       urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.
   5 = CTDM sigmas used for stable and neutral conditions.
       For unstable conditions, sigmas are computed as in
       MDISP = 3, described above.  MDISP = 5 assumes that
       measured values are read

Sigma-v/sigma-theta, sigma-w measurements used? (MTURBVW)
(Used only if MDISP = 1 or 5)         Default: 3     ! MTURBVW =  3  !
   1 = use sigma-v or sigma-theta measurements
       from PROFILE.DAT to compute sigma-y
       (valid for METFM = 1, 2, 3, 4)
   2 = use sigma-w measurements
       from PROFILE.DAT to compute sigma-z
       (valid for METFM = 1, 2, 3, 4)
   3 = use both sigma-(v/theta) and sigma-w
       from PROFILE.DAT to compute sigma-y and sigma-z
       (valid for METFM = 1, 2, 3, 4)
   4 = use sigma-theta measurements
       from PLMMET.DAT to compute sigma-y
       (valid only if METFM = 3)

Back-up method used to compute dispersion
when measured turbulence data are
missing (MDISP2)                      Default: 3     ! MDISP2 =  3  !
(used only if MDISP = 1 or 5)
   2 = dispersion coefficients from internally calculated
       sigma v, sigma w using micrometeorological variables
       (u*, w*, L, etc.)
   3 = PG dispersion coefficients for RURAL areas (computed using
       the ISCST multi-segment approximation) and MP coefficients in
       urban areas
   4 = same as 3 except PG coefficients computed using
       the MESOPUFF II eqns.

PG sigma-y,z adj. for roughness?      Default: 0     ! MROUGH =  0  !
(MROUGH)
   0 = no
   1 = yes

Partial plume penetration of          Default: 1     ! MPARTL =  1  !
elevated inversion?
(MPARTL)
   0 = no
   1 = yes

Strength of temperature inversion     Default: 0     ! MTINV =  0  !
provided in PROFILE.DAT extended records?
(MTINV)
   0 = no (computed from measured/default gradients)
   1 = yes

PDF used for dispersion under convective conditions?
                                      Default: 0     ! MPDF =  0  !
(MPDF)
   0 = no
   1 = yes

Sub-Grid TIBL module used for shore line?
                                      Default: 0     ! MSGTIBL = 0  !
(MSGTIBL)
   0 = no
```

```
        1 = yes

     Boundary conditions (concentration) modeled?
                                          Default: 0     ! MBCON = 0  !
     (MBCON)
        0 = no
        1 = yes


     Analyses of fogging and icing impacts due to emissions from
     arrays of mechanically-forced cooling towers can be performed
     using CALPUFF in conjunction with a cooling tower emissions
     processor (CTEMISS) and its associated postprocessors.  Hourly
     emissions of water vapor and temperature from each cooling tower
     cell are computed for the current cell configuration and ambient
     conditions by CTEMISS. CALPUFF models the dispersion of these
     emissions and provides cloud information in a specialized format
     for further analysis. Output to FOG.DAT is provided in either
     'plume mode' or 'receptor mode' format.

     Configure for FOG Model output?
                                          Default: 0     ! MFOG =  0   !
     (MFOG)
        0 = no
        1 = yes  - report results in PLUME Mode format
        2 = yes  - report results in RECEPTOR Mode format


     Test options specified to see if
     they conform to regulatory
     values? (MREG)                       Default: 1     ! MREG =  0   !

        0 = NO checks are made
        1 = Technical options must conform to USEPA
            Long Range Transport (LRT) guidance
                        METFM    1 or 2
                        AVET     60. (min)
                        PGTIME   60. (min)
                        MGAUSS   1
                        MCTADJ   3
                        MTRANS   1
                        MTIP     1
                        MCHEM    1 or 3 (if modeling SOx, NOx)
                        MWET     1
                        MDRY     1
                        MDISP    2 or 3
                        MPDF     0 if MDISP=3
                                 1 if MDISP=2
                        MROUGH   0
                        MPARTL   1
                        SYTDEP   550. (m)
                        MHFTSZ   0


!END!


-------------------------------------------------------------------------------

INPUT GROUP: 3a, 3b -- Species list
-------------------

------------
Subgroup (3a)
------------

  The following species are modeled:

! CSPEC =          SO2 !         !END!
! CSPEC =          SO4 !         !END!
! CSPEC =          NOX !         !END!
! CSPEC =         HNO3 !         !END!
! CSPEC =          NO3 !         !END!
! CSPEC =          PMF !         !END!
! CSPEC =          PMC !         !END!


                                                     Dry                OUTPUT GROUP
    SPECIES          MODELED          EMITTED       DEPOSITED              NUMBER
     NAME         (0=NO, 1=YES)    (0=NO, 1=YES)    (0=NO,               (0=NONE,
   (Limit: 12                                        1=COMPUTED-GAS       1=1st CGRUP,
```

```
    Characters                                        2=COMPUTED-PARTICLE   2=2nd CGRUP,
    in length)                                        3=USER-SPECIFIED)     3= etc.)

!          SO2  =         1,               1,           1,                  0   !
!          SO4  =         1,               0,           2,                  0   !
!          NOX  =         1,               1,           1,                  0   !
!         HNO3  =         1,               0,           1,                  0   !
!          NO3  =         1,               0,           2,                  0   !
!          PMF  =         1,               1,           2,                  0   !
!          PMC  =         1,               1,           2,                  0   !

!END!

-------------
Subgroup (3b)
-------------
  The following names are used for Species-Groups in which results
  for certain species are combined (added) prior to output.  The
  CGRUP name will be used as the species name in output files.
  Use this feature to model specific particle-size distributions
  by treating each size-range as a separate species.
  Order must be consistent with 3(a) above.



-------------------------------------------------------------------------------


INPUT GROUP: 4 -- Map Projection and Grid control parameters
--------------

     Projection for all (X,Y):
     -------------------------

     Map projection
     (PMAP)                     Default: UTM    ! PMAP = LCC  !

         UTM :  Universal Transverse Mercator
         TTM :  Tangential Transverse Mercator
         LCC :  Lambert Conformal Conic
          PS :  Polar Stereographic
          EM :  Equatorial Mercator
        LAZA :  Lambert Azimuthal Equal Area

     False Easting and Northing (km) at the projection origin
     (Used only if PMAP= TTM, LCC, or LAZA)
     (FEAST)                    Default=0.0     ! FEAST  = 0.000  !
     (FNORTH)                   Default=0.0     ! FNORTH = 0.000  !

     UTM zone (1 to 60)
     (Used only if PMAP=UTM)
     (IUTMZN)                   No Default      ! IUTMZN =  12   !

     Hemisphere for UTM projection?
     (Used only if PMAP=UTM)
     (UTMHEM)                   Default: N      ! UTMHEM = N  !
         N   :  Northern hemisphere projection
         S   :  Southern hemisphere projection

     Latitude and Longitude (decimal degrees) of projection origin
     (Used only if PMAP= TTM, LCC, PS, EM, or LAZA)
     (RLAT0)                    No Default      ! RLAT0 =  43.05N  !
     (RLON0)                    No Default      ! RLON0 =  109.80W  !

         TTM :  RLON0 identifies central (true N/S) meridian of projection
                RLAT0 selected for convenience
         LCC :  RLON0 identifies central (true N/S) meridian of projection
                RLAT0 selected for convenience
         PS  :  RLON0 identifies central (grid N/S) meridian of projection
                RLAT0 selected for convenience
         EM  :  RLON0 identifies central meridian of projection
                RLAT0 is REPLACED by 0.0N (Equator)
         LAZA:  RLON0 identifies longitude of tangent-point of mapping plane
                RLAT0 identifies latitude of tangent-point of mapping plane

     Matching parallel(s) of latitude (decimal degrees) for projection
     (Used only if PMAP= LCC or PS)
     (XLAT1)                    No Default      ! XLAT1 =  30N  !
     (XLAT2)                    No Default      ! XLAT2 =  60N  !

         LCC :  Projection cone slices through Earth's surface at XLAT1 and XLAT2
```

```
         PS  :  Projection plane slices through Earth at XLAT1
                (XLAT2 is not used)

     ----------
     Note:  Latitudes and longitudes should be positive, and include a
            letter N,S,E, or W indicating north or south latitude, and
            east or west longitude.  For example,
            35.9  N Latitude  =  35.9N
            118.7 E Longitude = 118.7E


     Datum-region
     ------------

     The Datum-Region for the coordinates is identified by a character
     string.  Many mapping products currently available use the model of the
     Earth known as the World Geodetic System 1984 (WGS-G ).  Other local
     models may be in use, and their selection in CALMET will make its output
     consistent with local mapping products.  The list of Datum-Regions with
     official transformation parameters provided by the National Imagery and
     Mapping Agency (NIMA).

     NIMA Datum - Regions(Examples)
     ------------------------------------------------------------------------------
     WGS-G     WGS-84 GRS 80, Global coverage
     NAS-C     NORTH AMERICAN 1927 Clarke 1866, MEAN FOR (CONUS)
     NWS-27    NWS 6370KM Radius, Global Sphere (NAD27)
     NWS-84    NWS 6370KM Radius, Global Sphere (WGS84)
     ESR-S     ESRI REFERENCE Normal Sphere (6371KM Radius), Global Reference Sphere

     Datum-region for output coordinates
     (DATUM)                    Default: WGS-G     ! DATUM = WGS-G  !


METEOROLOGICAL Grid:

     Rectangular grid defined for projection PMAP,
     with X the Easting and Y the Northing coordinate

            No. X grid cells (NX)      No default     ! NX =  116   !
            No. Y grid cells (NY)      No default     ! NY =  138  !
        No. vertical layers (NZ)       No default     ! NZ =  10   !

          Grid spacing (DGRIDKM)       No default     ! DGRIDKM = 4. !
                                       Units: km

               Cell face heights
                   (ZFACE(nz+1))       No defaults
                                       Units: m
        ! ZFACE = 0.,20.,40.,100.,160.,320.,560.,1000.,1500.,2250.,3200. !


            Reference Coordinates
          of SOUTHWEST corner of
                grid cell(1, 1):

        X coordinate (XORIGKM)         No default     ! XORIGKM = -232.000 !
        Y coordinate (YORIGKM)         No default     ! YORIGKM = -272.000 !
                                      Units: km


COMPUTATIONAL Grid:

     The computational grid is identical to or a subset of the MET. grid.
     The lower left (LL) corner of the computational grid is at grid point
     (IBCOMP, JBCOMP) of the MET. grid.  The upper right (UR) corner of the
     computational grid is at grid point (IECOMP, JECOMP) of the MET. grid.
     The grid spacing of the computational grid is the same as the MET. grid.

        X index of LL corner (IBCOMP)      No default     ! IBCOMP =  1   !
                  (1 <= IBCOMP <= NX)

        Y index of LL corner (JBCOMP)      No default     ! JBCOMP =  1   !
                  (1 <= JBCOMP <= NY)


        X index of UR corner (IECOMP)      No default     ! IECOMP =  116   !
                  (1 <= IECOMP <= NX)

        Y index of UR corner (JECOMP)      No default     ! JECOMP =  138   !
                  (1 <= JECOMP <= NY)
```

```
SAMPLING Grid (GRIDDED RECEPTORS):

     The lower left (LL) corner of the sampling grid is at grid point
     (IBSAMP, JBSAMP) of the MET. grid.  The upper right (UR) corner of the
     sampling grid is at grid point (IESAMP, JESAMP) of the MET. grid.
     The sampling grid must be identical to or a subset of the computational
     grid.  It may be a nested grid inside the computational grid.
     The grid spacing of the sampling grid is DGRIDKM/MESHDN.

        Logical flag indicating if gridded
        receptors are used (LSAMP)         Default: T     ! LSAMP = F !
        (T=yes, F=no)

        X index of LL corner (IBSAMP)      No default     ! IBSAMP =   1  !
         (IBCOMP <= IBSAMP <= IECOMP)

        Y index of LL corner (JBSAMP)      No default     ! JBSAMP =   1  !
         (JBCOMP <= JBSAMP <= JECOMP)


        X index of UR corner (IESAMP)      No default     ! IESAMP =   1  !
         (IBCOMP <= IESAMP <= IECOMP)

        Y index of UR corner (JESAMP)      No default     ! JESAMP =   1  !
         (JBCOMP <= JESAMP <= JECOMP)


       Nesting factor of the sampling
        grid (MESHDN)                      Default: 1     ! MESHDN =  2  !
        (MESHDN is an integer >= 1)

!END!


-------------------------------------------------------------------------------


INPUT GROUP: 5 -- Output Options
--------------
                                          *                          *
     FILE                        DEFAULT VALUE             VALUE THIS RUN
     ----                        -------------             --------------

   Concentrations (ICON)               1                   !  ICON =  1   !
   Dry Fluxes (IDRY)                   1                   !  IDRY =  1   !
   Wet Fluxes (IWET)                   1                   !  IWET =  1   !
   Relative Humidity (IVIS)            1                   !  IVIS =  1   !
    (relative humidity file is
     required for visibility
     analysis)
   Use data compression option in output file?
   (LCOMPRS)                            Default: T         ! LCOMPRS = T !

   *
    0 = Do not create file, 1 = create file


    DIAGNOSTIC MASS FLUX OUTPUT OPTIONS:

       Mass flux across specified boundaries
       for selected species reported hourly?
       (IMFLX)                          Default: 0         ! IMFLX =  0  !
         0 = no
         1 = yes (FLUXBDY.DAT and MASSFLX.DAT filenames
                  are specified in Input Group 0)

       Mass balance for each species
       reported hourly?
       (IMBAL)                          Default: 0         ! IMBAL =  0  !
         0 = no
         1 = yes (MASSBAL.DAT filename is
              specified in Input Group 0)


    LINE PRINTER OUTPUT OPTIONS:

       Print concentrations (ICPRT)     Default: 0         ! ICPRT =  0   !
       Print dry fluxes (IDPRT)         Default: 0         ! IDPRT =  0   !
```

```
       Print wet fluxes (IWPRT)        Default: 0         ! IWPRT =  0   !
       (0 = Do not print, 1 = Print)

       Concentration print interval
       (ICFRQ) in hours                Default: 1         ! ICFRQ =  1   !
       Dry flux print interval
       (IDFRQ) in hours                Default: 1         ! IDFRQ =  1   !
       Wet flux print interval
       (IWFRQ) in hours                Default: 1         ! IWFRQ =  1   !

       Units for Line Printer Output
       (IPRTU)                         Default: 1         ! IPRTU =  3   !
                      for            for
                 Concentration    Deposition
           1 =       g/m**3         g/m**2/s
           2 =      mg/m**3        mg/m**2/s
           3 =      ug/m**3        ug/m**2/s
           4 =      ng/m**3        ng/m**2/s
           5 =     Odour Units

       Messages tracking progress of run
       written to the screen ?
       (IMESG)                         Default: 2         ! IMESG =  2   !
         0 = no
         1 = yes (advection step, puff ID)
         2 = yes (YYYYJJJHH, # old puffs, # emitted puffs)


     SPECIES (or GROUP for combined species) LIST FOR OUTPUT OPTIONS

                  ---- CONCENTRATIONS ----   ------ DRY FLUXES ------   ------ WET FLUXES ------   -- MASS FLUX
--
   SPECIES
   /GROUP          PRINTED?  SAVED ON DISK?   PRINTED?  SAVED ON DISK?   PRINTED?  SAVED ON DISK?   SAVED ON
DISK?
   -------        ------------------------   ------------------------   ------------------------   -------------
--
!          SO2 =     0,           1,           0,           1,           0,           1,           0   !
!          SO4 =     0,           1,           0,           1,           0,           1,           0   !
!          NOX =     0,           1,           0,           1,           0,           1,           0   !
!         HNO3 =     0,           1,           0,           1,           0,           1,           0   !
!          NO3 =     0,           1,           0,           1,           0,           1,           0   !
!          PMF =     0,           1,           0,           1,           0,           1,           0
!
!          PMC =     0,           1,           0,           1,           0,           1,           0   !

     OPTIONS FOR PRINTING "DEBUG" QUANTITIES (much output)

       Logical for debug output
       (LDEBUG)                                Default: F     ! LDEBUG = F !

       First puff to track
       (IPFDEB)                                Default: 1     ! IPFDEB =  1  !

       Number of puffs to track
       (NPFDEB)                                Default: 1     ! NPFDEB =  1  !

       Met. period to start output
       (NN1)                                   Default: 1     ! NN1 =  1   !

       Met. period to end output
       (NN2)                                   Default: 10    ! NN2 =  10  !

!END!


-------------------------------------------------------------------------------


INPUT GROUP: 6a, 6b, & 6c -- Subgrid scale complex terrain inputs
-------------------------

---------------
Subgroup (6a)
---------------
       Number of terrain features (NHILL)      Default: 0     ! NHILL =  0   !

       Number of special complex terrain
       receptors  (NCTREC)                     Default: 0     ! NCTREC =  0   !

       Terrain and CTSG Receptor data for
```

```
       CTSG hills input in CTDM format ?
       (MHILL)                                  No Default     ! MHILL =  0   !
       1 = Hill and Receptor data created
           by CTDM processors & read from
           HILL.DAT and HILLRCT.DAT files
       2 = Hill data created by OPTHILL &
           input below in Subgroup (6b);
           Receptor data in Subgroup (6c)

       Factor to convert horizontal dimensions  Default: 1.0   ! XHILL2M = 1. !
       to meters (MHILL=1)

       Factor to convert vertical dimensions    Default: 1.0   ! ZHILL2M = 1. !
       to meters (MHILL=1)

       X-origin of CTDM system relative to      No Default     ! XCTDMKM = 0.0E00 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)

       Y-origin of CTDM system relative to      No Default     ! YCTDMKM = 0.0E00 !
       CALPUFF coordinate system, in Kilometers (MHILL=1)

! END !

---------------
Subgroup (6b)
---------------

                      1 **
     HILL information


HILL            XC         YC        THETAH  ZGRID  RELIEF    EXPO 1    EXPO 2   SCALE 1    SCALE 2    AMAX1
AMAX2
 NO.           (km)       (km)       (deg.)   (m)     (m)       (m)       (m)       (m)        (m)       (m)
(m)
----          ----       ----      ------  -----  ------    ------    ------   -------    -------    -----     -
----

---------------
Subgroup (6c)
---------------

    COMPLEX TERRAIN RECEPTOR INFORMATION

                      XRCT         YRCT        ZRCT          XHH
                      (km)         (km)         (m)
                     ------        -----      ------         ----


-------------------
1
     Description of Complex Terrain Variables:
          XC, YC  = Coordinates of center of hill
          THETAH  = Orientation of major axis of hill (clockwise from
                    North)
          ZGRID   = Height of the  0  of the grid above mean sea
                    level
          RELIEF  = Height of the crest of the hill above the grid elevation
          EXPO 1  = Hill-shape exponent for the major axis
          EXPO 2  = Hill-shape exponent for the major axis
          SCALE 1 = Horizontal length scale along the major axis
          SCALE 2 = Horizontal length scale along the minor axis
          AMAX    = Maximum allowed axis length for the major axis
          BMAX    = Maximum allowed axis length for the major axis

          XRCT, YRCT = Coordinates of the complex terrain receptors
          ZRCT    = Height of the ground (MSL) at the complex terrain
                    Receptor
          XHH     = Hill number associated with each complex terrain receptor
                    (NOTE: MUST BE ENTERED AS A REAL NUMBER)

   **
     NOTE: DATA for each hill and CTSG receptor are treated as a separate
           input subgroup and therefore must end with an input group terminator.

-------------------------------------------------------------------------------


INPUT GROUP: 7 -- Chemical parameters for dry deposition of gases
--------------
```

```
      SPECIES       DIFFUSIVITY        ALPHA  STAR        REACTIVITY     MESOPHYLL  RESISTANCE       HENRY'S  LAW
COEFFICIENT
       NAME        (cm**2/s)                                            (s/cm)                (dimensionless)
      -------     -----------      ----------      ----------    --------------------     ----------

!          SO2 =     0.1509,         1000.,            8.,                0.,                  0.04 !
!          NOX =     0.1656,            1.,            8.,                5.,                   3.5 !
!         HNO3 =     0.1628,            1.,           18.,                0.,            0.00000008 !

!END!


--------------------------------------------------------------------------------


INPUT GROUP: 8 -- Size parameters for dry deposition of particles
--------------

     For SINGLE SPECIES, the mean and standard deviation are used to
     compute a deposition velocity for NINT (see group 9) size-ranges,
     and these are then averaged to obtain a mean deposition velocity.

     For GROUPED SPECIES, the size distribution should be explicitly
     specified (by the 'species' in the group), and the standard deviation
     for each should be entered as 0.  The model will then use the
     deposition velocity for the stated mean diameter.

      SPECIES      GEOMETRIC MASS MEAN        GEOMETRIC STANDARD
       NAME             DIAMETER                  DEVIATION
                        (microns)                 (microns)
      -------      -------------------        ------------------
!          SO4 =          0.48,                      2.   !
!          NO3 =          0.48,                      2.   !
!          PMF =          0.48,                      2.   !
!          PMC =          3.00,                      2.   !

!END!


--------------------------------------------------------------------------------


INPUT GROUP: 9 -- Miscellaneous dry deposition parameters
--------------

     Reference cuticle resistance (s/cm)
     (RCUTR)                          Default: 30    !  RCUTR = 30.0 !
     Reference ground resistance  (s/cm)
     (RGR)                            Default: 10    !    RGR = 10.0 !
     Reference pollutant reactivity
     (REACTR)                         Default: 8     ! REACTR = 8.0 !

     Number of particle-size intervals used to
     evaluate effective particle deposition velocity
     (NINT)                           Default: 9     !   NINT =  9  !

     Vegetation state in unirrigated areas
     (IVEG)                           Default: 1     !   IVEG =  1   !
        IVEG=1 for active and unstressed vegetation
        IVEG=2 for active and stressed vegetation
        IVEG=3 for inactive vegetation

!END!


--------------------------------------------------------------------------------


INPUT GROUP: 10 -- Wet Deposition Parameters
---------------


                      Scavenging Coefficient -- Units: (sec)**(-1)

       Pollutant      Liquid Precip.       Frozen Precip.
       ---------      --------------       --------------
!          SO2 =         3.0E-05,              0.0E00 !
!          SO4 =         1.0E-04,             3.0E-05 !
!         HNO3 =         6.0E-05,              0.0E00 !
!          NO3 =         1.0E-04,             3.0E-05 !
!         PM10 =         1.0E-04,             3.0E-05 !
```

```
!END!

-------------------------------------------------------------------------------

INPUT GROUP: 11 -- Chemistry Parameters
---------------

     Ozone data input option (MOZ)     Default: 1            ! MOZ =  1   !
     (Used only if MCHEM = 1, 3, or 4)
        0 = use a monthly background ozone value
        1 = read hourly ozone concentrations from
            the OZONE.DAT data file

     Monthly ozone concentrations
     (Used only if MCHEM = 1, 3, or 4 and
      MOZ = 0 or MOZ = 1 and all hourly O3 data missing)
     (BCKO3) in ppb                    Default: 12*80.
     !  BCKO3 = 44.70, 44.70, 44.70, 44.70, 44.70, 44.70, 44.70, 44.70, 44.70, 44.70, 44.70, 44.70 !

     Monthly ammonia concentrations
     (Used only if MCHEM = 1, or 3)
     (BCKNH3) in ppb                   Default: 12*10.
     !  BCKNH3 = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00 !

     Nighttime SO2 loss rate (RNITE1)
     in percent/hour                   Default: 0.2          ! RNITE1 = .2 !

     Nighttime NOx loss rate (RNITE2)
     in percent/hour                   Default: 2.0          ! RNITE2 = 2.0 !

     Nighttime HNO3 formation rate (RNITE3)
     in percent/hour                   Default: 2.0          ! RNITE3 = 2.0 !

     H2O2 data input option (MH2O2)    Default: 1            ! MH2O2 =  1   !
     (Used only if MAQCHEM = 1)
        0 = use a monthly background H2O2 value
        1 = read hourly H2O2 concentrations from
            the H2O2.DAT data file

     Monthly H2O2 concentrations
     (Used only if MQACHEM = 1 and
      MH2O2 = 0 or MH2O2 = 1 and all hourly H2O2 data missing)
     (BCKH2O2) in ppb                  Default: 12*1.
     !  BCKH2O2 = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00 !


 --- Data for SECONDARY ORGANIC AEROSOL (SOA) Option
     (used only if MCHEM = 4)

     The SOA module uses monthly values of:
          Fine particulate concentration in ug/m^3 (BCKPMF)
          Organic fraction of fine particulate     (OFRAC)
          VOC / NOX ratio (after reaction)         (VCNX)
     to characterize the air mass when computing
     the formation of SOA from VOC emissions.
     Typical values for several distinct air mass types are:

        Month    1    2    3    4    5    6    7    8    9   10   11   12
                Jan  Feb  Mar  Apr  May  Jun  Jul  Aug  Sep  Oct  Nov  Dec

     Clean Continental
        BCKPMF   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.   1.
        OFRAC  .15  .15  .20  .20  .20  .20  .20  .20  .20  .20  .20  .15
        VCNX    50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.

     Clean Marine (surface)
        BCKPMF  .5   .5   .5   .5   .5   .5   .5   .5   .5   .5   .5   .5
        OFRAC  .25  .25  .30  .30  .30  .30  .30  .30  .30  .30  .30  .25
        VCNX    50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.  50.

     Urban - low biogenic (controls present)
        BCKPMF  30.  30.  30.  30.  30.  30.  30.  30.  30.  30.  30.  30.
        OFRAC  .20  .20  .25  .25  .25  .25  .25  .25  .20  .20  .20  .20
        VCNX     4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.   4.

     Urban - high biogenic (controls present)
        BCKPMF  60.  60.  60.  60.  60.  60.  60.  60.  60.  60.  60.  60.
        OFRAC  .25  .25  .30  .30  .30  .55  .55  .55  .35  .35  .35  .25
```

```
        VCNX    15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.

     Regional Plume
        BCKPMF  20.  20.  20.  20.  20.  20.  20.  20.  20.  20.  20.  20.
        OFRAC  .20  .20  .25  .35  .25  .40  .40  .40  .30  .30  .30  .20
        VCNX    15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.  15.

     Urban - no controls present
        BCKPMF 100. 100. 100. 100. 100. 100. 100. 100. 100. 100. 100. 100.
        OFRAC  .30  .30  .35  .35  .35  .55  .55  .55  .35  .35  .35  .30
        VCNX     2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.   2.

     Default: Clean Continental
     !  BCKPMF = 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00, 1.00 !
     !  OFRAC  = 0.15, 0.15, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.20, 0.15 !
     !  VCNX   = 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00, 50.00 !


!END!


------------------------------------------------------------------------------


INPUT GROUP: 12 -- Misc. Dispersion and Computational Parameters
---------------

     Horizontal size of puff (m) beyond which
     time-dependent dispersion equations (Heffter)
     are used to determine sigma-y and
     sigma-z (SYTDEP)                          Default: 550.   ! SYTDEP = 5.5E02 !

     Switch for using Heffter equation for sigma z
     as above (0 = Not use Heffter; 1 = use Heffter
     (MHFTSZ)                                  Default: 0      ! MHFTSZ =  0   !

     Stability class used to determine plume
     growth rates for puffs above the boundary
     layer (JSUP)                              Default: 5      ! JSUP =  5   !

     Vertical dispersion constant for stable
     conditions (k1 in Eqn. 2.7-3)  (CONK1)    Default: 0.01   ! CONK1 = .01 !

     Vertical dispersion constant for neutral/
     unstable conditions (k2 in Eqn. 2.7-4)
     (CONK2)                                   Default: 0.1    ! CONK2 = .1 !

     Factor for determining Transition-point from
     Schulman-Scire to Huber-Snyder Building Downwash
     scheme (SS used for Hs < Hb + TBD * HL)
     (TBD)                                     Default: 0.5    ! TBD = .5 !
        TBD < 0   ==> always use Huber-Snyder
        TBD = 1.5 ==> always use Schulman-Scire
        TBD = 0.5 ==> ISC Transition-point

     Range of land use categories for which
     urban dispersion is assumed
     (IURB1, IURB2)                            Default: 10     ! IURB1 =  10  !
                                                        19     ! IURB2 =  19  !

     Site characterization parameters for single-point Met data files ---------
     (needed for METFM = 2,3,4)

        Land use category for modeling domain
        (ILANDUIN)                             Default: 20     ! ILANDUIN =  20  !

        Roughness length (m) for modeling domain
        (Z0IN)                                 Default: 0.25   ! Z0IN = .25 !

        Leaf area index for modeling domain
        (XLAIIN)                               Default: 3.0    ! XLAIIN = 3.0 !

        Elevation above sea level (m)
        (ELEVIN)                               Default: 0.0    ! ELEVIN = .0 !

        Latitude (degrees) for met location
        (XLATIN)                               Default: -999.  ! XLATIN = -999.0 !

        Longitude (degrees) for met location
        (XLONIN)                               Default: -999.  ! XLONIN = -999.0 !
```

```
Specialized information for interpreting single-point Met data files -----

   Anemometer height (m) (Used only if METFM = 2,3)
   (ANEMHT)                                Default: 10.    ! ANEMHT = 10.0 !

   Form of lateral turbulance data in PROFILE.DAT file
   (Used only if METFM = 4 or MTURBVW = 1 or 3)
   (ISIGMAV)                               Default: 1      ! ISIGMAV =  0  !
       0 = read sigma-theta
       1 = read sigma-v

   Choice of mixing heights (Used only if METFM = 4)
   (IMIXCTDM)                              Default: 0      ! IMIXCTDM =  0  !
       0 = read PREDICTED mixing heights
       1 = read OBSERVED mixing heights

Maximum length of a slug (met. grid units)
(XMXLEN)                                   Default: 1.0    ! XMXLEN = 1.0 !

Maximum travel distance of a puff/slug (in
grid units) during one sampling step
(XSAMLEN)                                  Default: 1.0    ! XSAMLEN = 1.0 !

Maximum Number of slugs/puffs release from
one source during one time step
(MXNEW)                                    Default: 99     ! MXNEW =  99   !

Maximum Number of sampling steps for
one puff/slug during one time step
(MXSAM)                                    Default: 99     ! MXSAM =  99   !

Number of iterations used when computing
the transport wind for a sampling step
that includes gradual rise (for CALMET
and PROFILE winds)
(NCOUNT)                                   Default: 2      ! NCOUNT =  2   !

Minimum sigma y for a new puff/slug (m)
(SYMIN)                                    Default: 1.0    ! SYMIN = 1.0  !

Minimum sigma z for a new puff/slug (m)
(SZMIN)                                    Default: 1.0    ! SZMIN = 1.0  !

Default minimum turbulence velocities
sigma-v and sigma-w for each
stability class (m/s)
(SVMIN(6) and SWMIN(6))     Default SVMIN : .50,  .50,  .50,  .50,  .50,  .50
                            Default SWMIN : .20,  .12,  .08,  .06,  .03,  .016

                         Stability Class :  A     B     C     D     E     F
                                            ---   ---   ---   ---   ---   ---
                                  ! SVMIN = 0.500, 0.500, 0.500, 0.500, 0.500, 0.500!
                                  ! SWMIN = 0.200, 0.120, 0.080, 0.060, 0.030, 0.016!

Divergence criterion for dw/dz across puff
used to initiate adjustment for horizontal
convergence (1/s)
Partial adjustment starts at CDIV(1), and
full adjustment is reached at CDIV(2)
(CDIV(2))                                  Default: 0.0,0.0  ! CDIV = .0, .0 !

Minimum wind speed (m/s) allowed for
non-calm conditions. Also used as minimum
speed returned when using power-law
extrapolation toward surface
(WSCALM)                                   Default: 0.5    ! WSCALM = .5 !

Maximum mixing height (m)
(XMAXZI)                                   Default: 3000.  ! XMAXZI = 3000.0 !

Minimum mixing height (m)
(XMINZI)                                   Default: 50.    ! XMINZI = 50.0 !

Default wind speed classes --
5 upper bounds (m/s) are entered;
the 6th class has no upper limit
(WSCAT(5))                     Default   :
                               ISC RURAL : 1.54, 3.09, 5.14, 8.23, 10.8 (10.8+)

                          Wind Speed Class :  1     2     3     4     5
                                              ---   ---   ---   ---   ---
```

```
                                  ! WSCAT = 1.54, 3.09, 5.14, 8.23, 10.80 !

Default wind speed profile power-law
exponents for stabilities 1-6
(PLX0(6))                       Default   : ISC RURAL values
                                ISC RURAL : .07, .07, .10, .15, .35, .55
                                ISC URBAN : .15, .15, .20, .25, .30, .30

                          Stability Class :  A     B     C     D     E     F
                                            ---   ---   ---   ---   ---   ---
                                     ! PLX0 = 0.07, 0.07, 0.10, 0.15, 0.35, 0.55 !

Default potential temperature gradient
for stable classes E, F (degK/m)
(PTG0(2))                       Default: 0.020, 0.035
                                     ! PTG0 = 0.020,   0.035 !

Default plume path coefficients for
each stability class (used when option
for partial plume height terrain adjustment
is selected -- MCTADJ=3)
(PPC(6))                  Stability Class :  A     B     C     D     E     F
                             Default  PPC : .50,  .50,  .50,  .50,  .35,  .35
                                            ---   ---   ---   ---   ---   ---
                                     !  PPC = 0.50, 0.50, 0.50, 0.50, 0.35, 0.35 !

Slug-to-puff transition criterion factor
equal to sigma-y/length of slug
(SL2PF)                                Default: 10.        ! SL2PF = 10.0 !

Puff-splitting control variables ------------------------

  VERTICAL SPLIT
  --------------

  Number of puffs that result every time a puff
  is split - nsplit=2 means that 1 puff splits
  into 2
  (NSPLIT)                             Default:   3        ! NSPLIT =  3  !

  Time(s) of a day when split puffs are eligible to
  be split once again; this is typically set once
  per day, around sunset before nocturnal shear develops.
  24 values: 0 is midnight (00:00) and 23 is 11 PM (23:00)
  0=do not re-split    1=eligible for re-split
  (IRESPLIT(24))                       Default:  Hour 17 = 1
  !  IRESPLIT = 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0 !

  Split is allowed only if last hour's mixing
  height (m) exceeds a minimum value
  (ZISPLIT)                            Default: 100.       ! ZISPLIT = 100.0 !

  Split is allowed only if ratio of last hour's
  mixing ht to the maximum mixing ht experienced
  by the puff is less than a maximum value (this
  postpones a split until a nocturnal layer develops)
  (ROLDMAX)                            Default: 0.25       ! ROLDMAX = 0.25 !


  HORIZONTAL SPLIT
  ----------------

  Number of puffs that result every time a puff
  is split - nsplith=5 means that 1 puff splits
  into 5
  (NSPLITH)                            Default:   5        ! NSPLITH =  5  !

  Minimum sigma-y (Grid Cells Units) of puff
  before it may be split
  (SYSPLITH)                           Default:  1.0       ! SYSPLITH = 1.0 !

  Minimum puff elongation rate (SYSPLITH/hr) due to
  wind shear, before it may be split
  (SHSPLITH)                           Default:  2.        ! SHSPLITH = 2.0 !

  Minimum concentration (g/m^3) of each
  species in puff before it may be split
  Enter array of NSPEC values; if a single value is
  entered, it will be used for ALL species
  (CNSPLITH)                           Default:  1.0E-07   ! CNSPLITH = 1.0E-07 !
```

```
     Integration control variables ------------------------

       Fractional convergence criterion for numerical SLUG
       sampling integration
       (EPSSLUG)                          Default:   1.0e-04  ! EPSSLUG = 1.0E-04 !

       Fractional convergence criterion for numerical AREA
       source integration
       (EPSAREA)                          Default:   1.0e-06  ! EPSAREA = 1.0E-06 !

       Trajectory step-length (m) used for numerical rise
       integration
       (DSRISE)                           Default:   1.0      ! DSRISE = 1.0 !

!END!


-------------------------------------------------------------------------------


INPUT GROUPS: 13a, 13b, 13c, 13d -- Point source parameters
--------------------------------

---------------
Subgroup (13a)
---------------

     Number of point sources with
     parameters provided below      (NPT1)  No default  !  NPT1 =  0 !

     Units used for point source
     emissions below                (IPTU)  Default: 1  !  IPTU =   1  !
           1 =        g/s
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (13d)        (NSPT1) Default: 0  !  NSPT1 =  0  !

     Number of point sources with
     variable emission parameters
     provided in external file      (NPT2)  No default  !  NPT2 =  0  !

     (If NPT2 > 0, these point
     source emissions are read from
     the file: PTEMARB.DAT)

!END!

---------------
Subgroup (13b)
---------------
                                        a
          POINT SOURCE: CONSTANT DATA
          ----------------------------
                                                                          b          c
  Source      X UTM     Y UTM     Stack   Base     Stack    Exit  Exit    Bldg.  Emission
   No.     Coordinate Coordinate Height Elevation Diameter  Vel.  Temp.   Dwash   Rates
              (km)      (km)       (m)      (m)       (m)  (m/s) (deg. K)
  ------   ---------- ---------- ------  ------   -------- ----- -------- ----- --------



--------

    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.

     SRCNAM  is a 12-character name for a source
             (No default)
     X       is an array holding the source data listed by the column headings
             (No default)
     SIGYZI  is an array holding the initial sigma-y and sigma-z (m)
             (Default: 0.,0.)
```

```
     FMFAC   is a vertical momentum flux factor (0. or 1.0) used to represent
             the effect of rain-caps or other physical configurations that
             reduce momentum rise associated with the actual exit velocity.
             (Default: 1.0  -- full momentum used)

    b
     0. = No building downwash modeled, 1. = downwash modeled
     NOTE: must be entered as a REAL number (i.e., with decimal point)

    c
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by IPTU
     (e.g. 1 for g/s).

---------------
Subgroup (13c)
---------------

           BUILDING DIMENSION DATA FOR SOURCES SUBJECT TO DOWNWASH
           -------------------------------------------------------
Source                                                                  a
 No.       Effective building width and height (in meters) every 10 degrees
------     ---------------------------------------------------------------

--------

    a
     Each pair of width and height values is treated as a separate input
     subgroup and therefore must end with an input group terminator.

---------------
Subgroup (13d)
---------------
                                                a
          POINT SOURCE: VARIABLE EMISSIONS DATA
          -------------------------------------

     Use this subgroup to describe temporal variations in the emission
     rates given in 13b.  Factors entered multiply the rates in 13b.
     Skip sources here that have constant emissions.  For more elaborate
     variation in source parameters, use PTEMARB.DAT and NPT2 > 0.

     IVARY determines the type of variation, and is source-specific:
     (IVARY)                                Default: 0
           0 =       Constant
           1 =       Diurnal cycle (24 scaling factors: hours 1-24)
           2 =       Monthly cycle (12 scaling factors: months 1-12)
           3 =       Hour & Season (4 groups of 24 hourly scaling factors,
                                    where first group is DEC-JAN-FEB)
           4 =       Speed & Stab. (6 groups of 6 scaling factors, where
                                    first group is Stability Class A,
                                    and the speed classes have upper
                                    bounds (m/s) defined in Group 12
           5 =       Temperature   (12 scaling factors, where temperature
                                    classes have upper bounds (C) of:
                                    0, 5, 10, 15, 20, 25, 30, 35, 40,
                                    45, 50, 50+)



--------
    a
     Data for each species are treated as a separate input subgroup
     and therefore must end with an input group terminator.


-------------------------------------------------------------------------------


INPUT GROUPS: 14a, 14b, 14c, 14d -- Area source parameters
--------------------------------

---------------
Subgroup (14a)
---------------

     Number of polygon area sources with
     parameters specified below (NAR1)       No default  !  NAR1 =  0   !

     Units used for area source
```

```
     emissions below            (IARU)       Default: 1  !  IARU =   1  !
           1 =        g/m**2/s
           2 =       kg/m**2/hr
           3 =       lb/m**2/hr
           4 =     tons/m**2/yr
           5 =     Odour Unit * m/s  (vol. flux/m**2 of odour compound)
           6 =     Odour Unit * m/min
           7 =     metric tons/m**2/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (14d)        (NSAR1) Default: 0  !  NSAR1 =  0  !

     Number of buoyant polygon area sources
     with variable location and emission
     parameters (NAR2)                      No default  !  NAR2 =  0   !
     (If NAR2 > 0, ALL parameter data for
     these sources are read from the file: BAEMARB.DAT)

!END!

---------------
Subgroup (14b)
---------------
                                    a
          AREA SOURCE: CONSTANT DATA
          ----------------------------
                                                          b
Source           Effect.    Base      Initial    Emission
 No.             Height   Elevation   Sigma z     Rates
                   (m)       (m)        (m)
-------          ------    ------     --------   ---------
Subgroup (14b)


--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.
    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled,  but not emitted.  Units are specified by IARU
     (e.g. 1 for g/m**2/s).

---------------
Subgroup (14c)
---------------

           COORDINATES (UTM-km) FOR EACH VERTEX(4) OF EACH POLYGON
           -------------------------------------------------------
Source                                                              a
 No.       Ordered list of X followed by list of Y,  grouped by source
------     ---------------------------------------------------------


--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.


---------------
Subgroup (14d)
---------------
                                          a
          AREA SOURCE: VARIABLE EMISSIONS DATA
          ------------------------------------

     Use this subgroup to describe temporal variations in the emission
     rates given in 14b.  Factors entered multiply the rates in 14b.
     Skip sources here that have constant emissions.  For more elaborate
     variation in source parameters, use BAEMARB.DAT and NAR2 > 0.

     IVARY determines the type of variation, and is source-specific:
     (IVARY)                                Default: 0
           0 =       Constant
           1 =       Diurnal cycle (24 scaling factors: hours 1-24)
           2 =       Monthly cycle (12 scaling factors: months 1-12)
           3 =       Hour & Season (4 groups of 24 hourly scaling factors,
```

```
                                 where first group is DEC-JAN-FEB)
           4 =       Speed & Stab. (6 groups of 6 scaling factors, where
                                 first group is Stability Class A,
                                 and the speed classes have upper
                                 bounds (m/s) defined in Group 12
           5 =       Temperature   (12 scaling factors, where temperature
                                 classes have upper bounds (C) of:
                                 0, 5, 10, 15, 20, 25, 30, 35, 40,
                                 45, 50, 50+)



--------
    a
     Data for each species are treated as a separate input subgroup
     and therefore must end with an input group terminator.


-------------------------------------------------------------------------------

INPUT GROUPS: 15a, 15b, 15c -- Line source parameters
---------------------------

---------------
Subgroup (15a)
---------------

     Number of buoyant line sources
     with variable location and emission
     parameters (NLN2)                             No default  !  NLN2 =  0   !

     (If NLN2 > 0, ALL parameter data for
      these sources are read from the file: LNEMARB.DAT)

     Number of buoyant line sources (NLINES)       No default   ! NLINES =  0  !

     Units used for line source
     emissions below               (ILNU)          Default: 1  !  ILNU =   1  !
           1 =        g/s
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr

     Number of source-species
     combinations with variable
     emissions scaling factors
     provided below in (15c)       (NSLN1) Default: 0  !  NSLN1 =  0  !

     Maximum number of segments used to model
     each line (MXNSEG)                            Default: 7   ! MXNSEG =  7  !

     The following variables are required only if NLINES > 0.  They are
     used in the buoyant line source plume rise calculations.

        Number of distances at which               Default: 6   ! NLRISE =  6  !
        transitional rise is computed

        Average building length (XL)               No default   ! XL = .0 !
                                                   (in meters)

        Average building height (HBL)              No default   ! HBL = .0 !
                                                   (in meters)

        Average building width (WBL)               No default   ! WBL = .0 !
                                                   (in meters)

        Average line source width (WML)            No default   ! WML = .0 !
                                                   (in meters)

        Average separation between buildings (DXL) No default   ! DXL = .0 !
                                                   (in meters)

        Average buoyancy parameter (FPRIMEL)       No default   ! FPRIMEL = .0 !
                                                   (in m**4/s**3)

!END!

---------------
```

```
Subgroup (15b)
---------------

          BUOYANT LINE SOURCE: CONSTANT DATA
          ----------------------------------
                                                                                a
Source     Beg. X      Beg. Y      End. X    End. Y     Release    Base        Emission
 No.     Coordinate  Coordinate  Coordinate Coordinate  Height    Elevation      Rates
            (km)        (km)        (km)       (km)       (m)       (m)
------   ----------  ----------  ---------  ----------  -------   ---------    ---------

    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.

    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by ILNTU
     (e.g. 1 for g/s).

---------------
Subgroup (15c)
---------------
                                                        a
          BUOYANT LINE SOURCE: VARIABLE EMISSIONS DATA
          --------------------------------------------

     Use this subgroup to describe temporal variations in the emission
     rates given in 15b.  Factors entered multiply the rates in 15b.
     Skip sources here that have constant emissions.

     IVARY determines the type of variation, and is source-specific:
     (IVARY)                                Default: 0
           0 =       Constant
           1 =       Diurnal cycle (24 scaling factors: hours 1-24)
           2 =       Monthly cycle (12 scaling factors: months 1-12)
           3 =       Hour & Season (4 groups of 24 hourly scaling factors,
                                    where first group is DEC-JAN-FEB)
           4 =       Speed & Stab. (6 groups of 6 scaling factors, where
                                    first group is Stability Class A,
                                    and the speed classes have upper
                                    bounds (m/s) defined in Group 12
           5 =       Temperature   (12 scaling factors, where temperature
                                    classes have upper bounds (C) of:
                                    0, 5, 10, 15, 20, 25, 30, 35, 40,
                                    45, 50, 50+)



--------
    a
     Data for each species are treated as a separate input subgroup
     and therefore must end with an input group terminator.


-------------------------------------------------------------------------------


INPUT GROUPS: 16a, 16b, 16c -- Volume source parameters
---------------------------

---------------
Subgroup (16a)
---------------

     Number of volume sources with
     parameters provided in 16b,c (NVL1)     No default  !  NVL1 =  0   !

     Units used for volume source
     emissions below in 16b       (IVLU)     Default: 1  !  IVLU =   4  !
           1 =        g/s
           2 =       kg/hr
           3 =       lb/hr
           4 =     tons/yr
           5 =     Odour Unit * m**3/s  (vol. flux of odour compound)
           6 =     Odour Unit * m**3/min
           7 =     metric tons/yr

     Number of source-species
     combinations with variable
```

```
     emissions scaling factors
     provided below in (16c)      (NSVL1)    Default: 0  !  NSVL1 =  0  !

     Number of volume sources with
     variable location and emission
     parameters                   (NVL2)     No default  !  NVL2 =   0   !

     (If NVL2 > 0, ALL parameter data for
      these sources are read from the VOLEMARB.DAT file(s) )

!END!

---------------
Subgroup (16b)
---------------
                                        a
           VOLUME SOURCE: CONSTANT DATA
           ----------------------------
                                                                          b
        X UTM      Y UTM      Effect.    Base     Initial    Initial    Emission
     Coordinate  Coordinate   Height   Elevation  Sigma y    Sigma z     Rates
        (km)       (km)        (m)       (m)        (m)        (m)
     ----------  ----------   ------    ------    --------   --------   --------


--------
    a
     Data for each source are treated as a separate input subgroup
     and therefore must end with an input group terminator.

    b
     An emission rate must be entered for every pollutant modeled.
     Enter emission rate of zero for secondary pollutants that are
     modeled, but not emitted.  Units are specified by IVLU
     (e.g. 1 for g/s).

---------------
Subgroup (16c)
---------------
                                            a
          VOLUME SOURCE: VARIABLE EMISSIONS DATA
          --------------------------------------

     Use this subgroup to describe temporal variations in the emission
     rates given in 16b.  Factors entered multiply the rates in 16b.
     Skip sources here that have constant emissions.  For more elaborate
     variation in source parameters, use VOLEMARB.DAT and NVL2 > 0.

     IVARY determines the type of variation, and is source-specific:
     (IVARY)                                Default: 0
           0 =       Constant
           1 =       Diurnal cycle (24 scaling factors: hours 1-24)
           2 =       Monthly cycle (12 scaling factors: months 1-12)
           3 =       Hour & Season (4 groups of 24 hourly scaling factors,
                                    where first group is DEC-JAN-FEB)
           4 =       Speed & Stab. (6 groups of 6 scaling factors, where
                                    first group is Stability Class A,
                                    and the speed classes have upper
                                    bounds (m/s) defined in Group 12
           5 =       Temperature   (12 scaling factors, where temperature
                                    classes have upper bounds (C) of:
                                    0, 5, 10, 15, 20, 25, 30, 35, 40,
                                    45, 50, 50+)



--------
    a
     Data for each species are treated as a separate input subgroup
     and therefore must end with an input group terminator.


-------------------------------------------------------------------------------

INPUT GROUPS: 17a & 17b -- Non-gridded (discrete) receptor information
-----------------------

---------------
Subgroup (17a)
---------------
```

```
     Number of non-gridded receptors (NREC)  No default  !  NREC =  0   !

!END!

---------------
Subgroup (17b)
---------------
                                                    a
           NON-GRIDDED (DISCRETE) RECEPTOR DATA
           ------------------------------------

                  X UTM       Y UTM        Ground        Height   b
Receptor       Coordinate   Coordinate    Elevation   Above Ground
  No.             (km)        (km)           (m)           (m)
--------       ----------   ----------    ---------   ------------
-------------
    a
     Data for each receptor are treated as a separate input subgroup
     and therefore must end with an input group terminator.

    b
     Receptor height above ground is optional.  If no value is entered,
     the receptor is placed on the ground.
```

Appendix B

Near-Field Modeling Analysis
AERMOD Parameters

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Table B.1- Pinedale Anticline Near-Field Modeling PM10 Source Emissions and Modeling Parameters

Table B.2 – Pinedale Anticline Near-Field Modeling PM2.5 Source Emissions and Modeling Parameters

Table B.3 – Pinedale Anticline Near-Field Modeling Drill Rig and Modeling Parameters

Table B.4 – Pinedale Anticline Near-Field Modeling Compression Modeling Summary

Table B.1

Pinedale Anticline Near-Field Modeling

PM_{10} Source Emissions and Modeling Parameters

PM_{10} Sources	Modeled Emission Rate	Modeled Area Source	Modeled Emission Rate	Modeled Emission Rate	Source Type	Source Layout	Area Source Release Height	Area Source X_{int}	Area Source Y_{int}	Volume Source Release Height	Volume Source s y_{int}	Volume Source s z_{int}
	(lb/hr)	(m^2)	($g/s/m^2$)	(g/s)			(m)	(m)	(m)	(m)	(m)	(m)
Well Pad Construction	0.750			0.095	Volume	16 volume sources representing the well pad area. Information given for one volume source.				5	33.1	4.65
Road Construction	0.338			0.052	Volume	13 volume sources representing the newly constructed road (~3/16 mile). Information given for one volume source.				5	9.3	4.65
Well Pad Construction Traffic	0.053			0.007	Volume	Heavy equipment exhaust added in volume source representing the well pad area.				5	33.1	4.65
Road Construction Traffic	0.065			0.008	Volume	Heavy equipment exhaust added in volume source representing the newly constructed road.				5	9.3	4.65
Well Pad Wind Erosion	7.560	80980	1.18E-05		Area	Area source centered around the well pad.	0	284.57	284.57			
Access Road Wind Erosion	1.580	2600	7.66E-05		Area	Area source covering the newly constructed road.	0	260	10			

Table B.2
Pinedale Anticline Near-Field Modeling
$PM_{2.5}$ Source Emissions and Modeling Parameters

$PM_{2.5}$ Sources	Modeled Emission Rate	Modeled Area Source	Modeled Emission Rate	Modeled Emission Rate	Source Type	Source Layout	Area Source Release Height	Area Source X_{int}	Area Source Y_{int}	Volume Source Release Height	Volume Source s y_{int}	Volume Source s z_{int}
	(lb/hr)	(m^2)	($g/s/m^2$)	(g/s)			(m)	(m)	(m)	(m)	(m)	(m)
Well Pad Construction	0.198			0.095	Volume	16 volume sources representing the well pad area. Information given for one volume source.				5	33.1	4.65
Road Construction	0.089			0.052	Volume	13 volume sources representing the newly constructed road (~3/16 mile). Information given for one volume source.				5	9.3	4.65
Well Pad Construction Traffic	0.053			0.007	Volume	Heavy equipment exhaust added in volume source representing the well pad area.				5	33.1	4.65
Road Construction Traffic	0.065			0.008	Volume	Heavy equipment exhaust added in volume source representing the newly constructed road.				5	9.3	4.65
Well Pad Wind Erosion	3.020	80980	4.70E-06		Area	Area source centered around the well pad.	0	284.57	284.57			
Access Road Wind Erosion	0.630	2600	3.05E-05		Area	Area source covering the newly constructed road.	0	260	10			

Table B.3

Pinedale Anticline Near-Field Modeling

Drill Rig and Modeling Parameters

SO_2 Sources	Modeled Emission Rate	Modeled Emission Rate	Source Type	Source Layout	Stack Height	Stack Temperature	Stack Velocity	Stack Diameter
	(lb/hr)	(g/s)			(m)	(K)	(m/s)	(m)
Drilling Rig (stack 1)	0.157	0.020	Point	Three stacks per drill rig centered on pad. See additional comment.	6.1	675	30	0.2
Drilling Rig (stack 2)	0.157	0.020	Point		6.1	700	25	0.2
Drilling Rig (stack 3)	0.157	0.020	Point		6.1	725	20	0.2

All three stack parameter scenarios are for each drill rig.
There are a total of four drill rigs per section for tier 1and 2 (12 stacks) and two drill rigs for tier 0 analysis (6 stacks).

Table B.4
Pinedale Anticline Near-Field Modeling
Compression Modeling Summary

			Source Location UTM Zone 13		Stack Parameters					Modeled Emissions		
Facility	Stack ID	Source Type	Easting	Northing	Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	Stack Parameter and Emissions Source	NOx (g/s)	CO (g/s)	Formaldehyde (g/s)
Paradise C.S.	PE1	Point	597497.0	4726451.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.713	0.256	0.081
Paradise C.S.	PE2	Point	597505.9	4726451.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.713	0.256	0.081
Paradise C.S.	PE3	Point	597515.0	4726451.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.713	0.256	0.081
Paradise C.S.	PE4	Point	597524.2	4726451.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.713	0.256	0.081
Paradise C.S.	PE5	Point	597533.3	4726451.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.713	0.256	0.081
Paradise C.S.	PE6	Point	597542.5	4726451.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.713	0.256	0.081
Paradise C.S.	PE7	Point	597551.0	4726451.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.713	0.256	0.081
Paradise C.S.	PE8	Point	597560.0	4726451.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.713	0.256	0.081
Paradise C.S.	PE9	Point	597569.0	4726416.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.717	0.257	0.082
Paradise C.S.	PE10	Point	597578.0	4726416.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.717	0.257	0.082
Paradise C.S.	PE11	Point	597587.0	4726416.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.717	0.257	0.082
Paradise C.S.	PE12	Point	597596.0	4726416.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.717	0.257	0.082
Paradise C.S.	PE13	Point	597605.0	4726416.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.717	0.257	0.082
Paradise C.S.	PE14	Point	597614.0	4726416.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.717	0.257	0.082
Paradise C.S.	PE15	Point	597623.0	4726416.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.717	0.257	0.082
Paradise C.S.	PE16	Point	597632.0	4726416.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.717	0.257	0.082
Paradise C.S.	PE17	Point	597641.0	4726416.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.717	0.257	0.082
Paradise C.S.	PE18	Point	597650.0	4726416.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.717	0.257	0.082
Paradise C.S.	PE19	Point	597659.0	4726416.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.717	0.257	0.082
Paradise C.S.	PE20	Point	597668.0	4726416.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.717	0.257	0.082
Paradise C.S.	PE21	Point	597677.0	4726416.7	14.80	726.50	28.65	0.71	Paradise Permit Application	0.717	0.257	0.082
Paradise C.S.	PG1	Point	597575.2	4726393.7	12.80	808.00	21.67	0.50	Paradise Permit Application	0.500	0.129	0.035
Paradise C.S.	PG2	Point	597581.3	4726393.7	12.80	808.00	21.67	0.50	Paradise Permit Application	0.500	0.129	0.035
Paradise C.S.	PVRU	Point	597593.4	4726491.5	9.10	832.00	16.70	0.20	Paradise Permit Application	0.070	0.014	0.005
Paradise C.S.	PH1	Point	597567.6		5.50	561.00	2.09	0.61	Paradise Permit Application	0.050	0.041	0.001
Paradise C.S.	PEF1	Point	597623.4	4726526.5	11.00	1273.00	0.27	2.18	Paradise Permit Application	0.070	0.140	0.000
Paradise C.S.	PT1	Point	597497.0	4726358.7	14.80	802.00	33.49	1.22	Paradise Permit Application	1.068	1.335	0.003
Paradise C.S.	PT2	Point	597505.9	4726358.7	14.80	802.00	33.49	1.22	Paradise Permit Application	1.068	1.335	0.003
Paradise C.S.	PT3	Point	597515.0	4726358.7	14.80	802.00	33.49	1.22	Paradise Permit Application	1.068	1.335	0.003
Paradise C.S.	PT4	Point	597524.2	4726358.7	14.80	802.00	33.49	1.22	Paradise Permit Application	1.068	1.335	0.003
Paradise C.S.	PT5	Point	597533.3	4726358.7	14.80	802.00	33.49	1.22	Paradise Permit Application	1.068	1.335	0.003
Paradise C.S.	PT6	Point	597542.5	4726358.7	14.80	802.00	33.49	1.22	Paradise Permit Application	1.068	1.335	0.003
Paradise C.S.	PT7	Point	597551.0	4726358.7	14.80	802.00	33.49	1.22	Paradise Permit Application	1.068	1.335	0.003
Paradise C.S.	PT8	Point	597560.0	4726358.7	14.80	802.00	33.49	1.22	Paradise Permit Application	1.068	1.335	0.003
Paradise C.S.	PT9	Point	597569.0	4726358.7	14.80	802.00	33.49	1.22	Paradise Permit Application	1.068	1.335	0.003
Paradise C.S.	PT10	Point	597578.0	4726358.7	14.80	802.00	33.49	1.22	Paradise Permit Application	1.068	1.335	0.003
Paradise C.S.	PT11	Point	597587.0	4726358.7	14.80	802.00	33.49	1.22	Paradise Permit Application	1.068	1.335	0.003
Paradise C.S.	PT12	Point	597596.0	4726358.7	14.80	802.00	33.49	1.22	Paradise Permit Application	1.068	1.335	0.003
Paradise C.S.	PT13	Point	597605.0	4726358.7	14.80	802.00	33.49	1.22	Paradise Permit Application	1.068	1.335	0.003
Pinedale C.S.	QPE1	Point	597642.9	4727057.5	15.24	721.3	30	0.51	Pinedale Permit Application	0.363	0.156	0.0250
Pinedale C.S.	QPE2	Point	597647.6	4727050.0	15.24	721.3	30	0.51	Pinedale Permit Application	0.363	0.156	0.0250
Pinedale C.S.	QPE3a	Point	597666.9	4727027.0	15.24	713.71	72.54	0.46	Pinedale Permit Application	0.361	0.155	0.0315
Pinedale C.S.	QPE3b	Point	597612.1	4727125.0	15.24	713.71	72.54	0.46	Pinedale Permit Application	0.361	0.155	0.0315
Pinedale C.S.	QPE4a	Point	597672.0	4727018.0	15.24	713.71	72.54	0.46	Pinedale Permit Application	0.361	0.155	0.0315

Table B.4
Pinedale Anticline Near-Field Modeling
Compression Modeling Summary

			Source Location UTM Zone 13		Stack Parameters					Modeled Emissions		
Facility	Stack ID	Source Type	Easting	Northing	Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	Stack Parameter and Emissions Source	NOx (g/s)	CO (g/s)	Formaldehyde (g/s)
Pinedale C.S.	QPE4b	Point	597673.3	4727016.0	15.24	713.71	72.54	0.46	Pinedale Permit Application	0.361	0.155	0.0315
Pinedale C.S.	QPE5a	Point	597604.9	4727138.0	15.24	713.71	72.54	0.46	Pinedale Permit Application	0.361	0.129	0.0315
Pinedale C.S.	QPE5b	Point	597606.1	4727136.0	15.24	713.71	72.54	0.46	Pinedale Permit Application	0.361	0.129	0.0315
Pinedale C.S.	QPE6a	Point	597610.8	4727127.0	15.24	713.71	72.54	0.46	Pinedale Permit Application	0.361	0.129	0.0315
Pinedale C.S.	QPE6b	Point	597612.1	4727125.0	15.24	713.71	72.54	0.46	Pinedale Permit Application	0.361	0.129	0.0315
Pinedale C.S.	QPT1	Point	597606.1	4727160.0	15.24	802.00	33.49	1.22	Pinedale Permit Application	0.861	0.861	0.0600
Pinedale C.S.	QPT2	Point	597610.8	4727160.0	15.24	802.00	33.49	1.22	Pinedale Permit Application	0.861	0.861	0.0600
Pinedale C.S.	QPT3	Point	597612.1	4727160.0	15.24	802.00	33.49	1.22	Pinedale Permit Application	0.861	0.861	0.0600
Falcon C.S.	FE1	Point	608976.3	4708663.6	14.00	726.50	28.65	0.71	Falcon Permit Application	0.713	0.256	0.081
Falcon C.S.	FE2	Point	608970.4	4708656.6	14.00	726.50	28.65	0.71	Falcon Permit Application	0.713	0.256	0.081
Falcon C.S.	FE3	Point	608964.5	4708649.6	14.00	726.50	28.65	0.71	Falcon Permit Application	0.713	0.256	0.081
Falcon C.S.	FE4	Point	608958.6	4708642.6	14.00	726.50	28.65	0.71	Falcon Permit Application	0.713	0.256	0.081
Falcon C.S.	FE5	Point	608942.8	4708635.7	14.00	726.50	28.65	0.71	Falcon Permit Application	0.713	0.256	0.081
Falcon C.S.	FE6	Point	608936.8	4708711.0	14.00	726.50	28.65	0.71	Falcon Permit Application	0.713	0.256	0.081
Falcon C.S.	FG5	Point	608991.8	4708715.0	7.62	808.00	21.67	0.50	Falcon Permit Application	0.505	0.129	0.035
Falcon C.S.	FG6	Point	608987.0	4708715.0	7.62	808.00	21.67	0.50	Falcon Permit Application	0.505	0.129	0.035
Falcon C.S.	FVRU	Point	608938.7	4708621.9	6.10	832.00	16.70	0.20	Falcon Permit Application	0.068	0.014	0.005
Falcon C.S.	FH1	Point	608903.0	4708636.7	4.60	561.00	2.10	0.61	Falcon Permit Application	0.048	0.040	0.000
Falcon C.S.	FH2	Point	608908.4	4708656.9	5.50	561.00	0.60	0.30	Falcon Permit Application	0.003	0.003	0.000
Falcon C.S.	FCU1	Point	608874.6	4708632.9	10.97	1273.00	0.44	1.22	Falcon Permit Application	0.038	0.210	0.000
Falcon C.S.	FEF1	Point	608858.8	4708624.0	10.97	1273.00	0.27	2.18	Falcon Permit Application	0.065	0.129	0.000
Falcon C.S.	FE7	Point	608976.3	4708589.0	14.00	726.50	28.65	0.71	Falcon Permit Application	0.713	0.256	0.081
Falcon C.S.	FE8	Point	608970.4	4708589.0	14.00	726.50	28.65	0.71	Falcon Permit Application	0.713	0.256	0.081
Falcon C.S.	FT1	Point	608964.5	4708589.0	14.80	802.00	33.49	1.22	Falcon Permit Application	1.110	1.389	0.003
Falcon C.S.	FT2	Point	608958.6	4708589.0	14.80	802.00	33.49	1.22	Falcon Permit Application	1.110	1.389	0.003
Falcon C.S.	FT3	Point	608942.8	4708589.0	14.80	802.00	33.49	1.22	Falcon Permit Application	1.110	1.389	0.003
Bird Canyon C.S.	BE1	Point	580414.5	4681474.3	14.80	738.70	37.18	0.50	Bird Canyon Permit Application	0.480	0.172	0.048
Bird Canyon C.S.	BE2	Point	580419.2	4681481.2	14.80	738.70	37.18	0.50	Bird Canyon Permit Application	0.480	0.172	0.048
Bird Canyon C.S.	BE3	Point	580424.9	4681486.6	14.80	726.50	28.65	0.71	Bird Canyon Permit Application	0.713	0.256	0.081
Bird Canyon C.S.	BE4	Point	580487.1	4681544.9	14.80	726.50	28.65	0.71	Bird Canyon Permit Application	0.713	0.256	0.081
Bird Canyon C.S.	BE5	Point	580493.6	4681550.9	14.80	726.50	28.65	0.71	Bird Canyon Permit Application	0.713	0.256	0.081
Bird Canyon C.S.	BE6	Point	580500.6	4681556.6	14.80	726.50	28.65	0.71	Bird Canyon Permit Application	0.713	0.256	0.081
Bird Canyon C.S.	BE7	Point	580469.3	4681387.4	14.80	726.50	28.65	0.71	Bird Canyon Permit Application	0.713	0.256	0.081
Bird Canyon C.S.	BE8	Point	580475.7	4681393.4	14.80	726.50	28.65	0.71	Bird Canyon Permit Application	0.713	0.256	0.081
Bird Canyon C.S.	BE9	Point	580482.2	4681399.4	14.80	726.50	28.65	0.71	Bird Canyon Permit Application	0.713	0.256	0.081
Bird Canyon C.S.	BE10	Point	580488.7	4681405.4	14.80	726.50	28.65	0.71	Bird Canyon Permit Application	0.713	0.256	0.081
Bird Canyon C.S.	BE11	Point	580494.9	4681411.4	14.80	726.50	28.65	0.71	Bird Canyon Permit Application	0.713	0.256	0.081
Bird Canyon C.S.	BG5	Point	580460.7	4681460.0	14.80	808.00	21.67	0.50	Bird Canyon Permit Application	0.500	0.129	0.035
Bird Canyon C.S.	BG6	Point	580464.8	4681463.8	14.80	808.00	21.67	0.50	Bird Canyon Permit Application	0.500	0.129	0.035
Bird Canyon C.S.	BCU1	Point	580505.4	4681605.7	11.00	637.00	0.44	1.22	Bird Canyon Permit Application	0.080	0.378	0.000
Bird Canyon C.S.	BH1	Point	580462.3	4681523.4	3.70	561.00	2.96	0.10	Bird Canyon Permit Application	0.002	0.002	0.000
Bird Canyon C.S.	BE12	Point	580414.5	4681352.4	14.80	726.50	28.65	0.71	Bird Canyon Permit Application	0.713	0.256	0.081
Bird Canyon C.S.	BE13	Point	580419.2	4681358.4	14.80	726.50	28.65	0.71	Bird Canyon Permit Application	0.713	0.256	0.081

Table B.5
Pinedale Anticline Near-Field Modeling
HAPS Sources Emissions and Modeling Parameters

HAP Pollutants	Modeled Emission Rate	Modeled Emission Rate	Source Type	Source Layout	Release Height	Volume Source s y_{int}	Volume Source s z_{int}
	(lb/hr)	(g/s)			(m)	(m)	(m)
Benzene	0.661	0.083	Volume	Each pollutant was modeled using 4 volume sources (1 in each quarter section - 1 section modeled). Each volume source represents a well pad with 32 wells (128 total). Includes gas dehydration emissions and condensate storage tank emissions.	5.0	11.63	4.65
Toluene	1.281	0.161	Volume		5.0	11.63	4.65
Ethylbenzene	0.079	0.010	Volume		5.0	11.63	4.65
Xylene	0.976	0.123	Volume		5.0	11.63	4.65
n-Hexane	0.423	0.053	Volume		5.0	11.63	4.65
Formaldehyde	See Table B.4 (Compressors)						

Appendix C

CALMET and CALPUFF Input Data

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Table C.1 - Surface Meteorological Stations Used in the Development of the CALMET Wind Fields

Station Name	Station Type	Call Sign	Model ID	Anemometer Height (m)	Lambert Conformal Coordinates		CALMET Year		
					X (km)	Y (km)	2001	2002	2003
Pocatello, ID	NWS	KPIH	25780	10	-218.401	-10.511	X	X	X
Idaho Falls, ID	NWS	KIDA	25785	7.9	-177.123	52.659	X	X	X
Malad City, ID	NWS	KMLD	25786	7.9	-198.548	-93.614	X	X	X
Soda Springs, ID	NWS	KU78	25868	9.1	-141.388	-41.392	X	X	X
Rexburg, ID	NWS	KRXE	26818	10	-155.419	86.020	X		X
Rock Springs, WY	NWS	KRKS	25744	10	59.163	-155.548	X	X	X
Rawlins, WY	NWS	KRWL	25745	10	209.122	-130.919	X	X	X
Lander Hunt Field, WY	NWS	KLND	25760	10	84.377	-24.464	X	X	X
Riverton, WY	NWS	KRIW	25765	10	104.963	2.700	X	X	X
Evanston/Burns Field, WY	NWS	KEVW	25775	10	-100.068	-190.862	X	X	X
Jackson Hole, WY	NWS	KJAC	25776	10	-72.800	59.487	X	X	X
Johnson Co Arpt, WY	NWS	KBYG	26654	10	237.272	147.691	X	X	X
Sheridan CO Arpt, WY	NWS	KSHR	26660	10	216.581	188.173	X	X	X
Yellowstone Lake, WY	NWS	P60	26664	10	-47.358	161.231	X	X	X
Worland, WY	NWS	KWRL	26665	6.1	143.433	100.122	X	X	X
South Big Horn Co, WY	NWS	KGEY	26667	10	131.857	158.920	X	X	X
Cody, WY	NWS	KCOD	26700	10	60.134	157.800	X	X	X
Big Piney, WY	NWS	KBPI	26710	10	-23.818	-50.120	X		X
West Yellowstone, MT	NWS	KWEY	26763	9.8	-99.604	172.591	X		X
Yellowstone, MT	NWS	KWYS	26764	10	-100.848	176.154	X		X
Billings, MT	NWS	KBIL	26770	10	93.847	295.952	X	X	X
Dillon Arpt, MT	NWS	KDLN	26796	10	-208.458	239.764	X	X	X
Bozeman Gallatin, MT	NWS	KBZN	26797	10	-102.661	294.271	X	X	X
Livingston Mission, MT	NWS	KLVM	26798	10	-47.610	284.673	X	X	X
Craig-Moffat, CO	NWS	KCAG	25700	10	187.621	-271.501	X	X	X
Hayden/Yampa, CO	NWS	KHDN	25715	10	209.556	-270.839	X	X	X
Logan-Cache Arpt, UT	NWS	KLGU	24796	10	-164.942	-134.031	X		X
Vernal, UT	NWS	KVEL	25705	10	20.571	-281.358	X	X	X
Salt Lake City, UT	NWS	KSLC	25720	10	-177.265	-241.312	X	X	X
Ogden-Hinckley Arpt, UT	NWS	KOGD	25750	10	-180.112	-196.346	X	X	X
Ogden Hill AFB, UT	NWS	KHIF	25755	4	-176.292	-205.384	X	X	X
Yellowstone, WY	CASTNET	YEL	40800	10	-46.122	162.295	X	X	X
Pinedale, WY	CASTNET	PND	16500	10	0.947	-12.996	X	X	X
Jonah Field (BP), WY	Industrial	BP	88888	10	17.819	-62.496	X	X	X

Table C.2 - Upper Air Meteorological Stations Used in the Development of the CALMET Wind Fields

Station Name	Station Type	Call Sign	Model ID	Lambert Conformal Coordinates		CALMET Year		
				X (km)	Y (km)	2001	2002	2003
Riverton, WY	NWS	KRIW	24061	104.963	2.700	X	X	X
Salt Lake City, UT	NWS	KSLC	24127	-177.265	-241.312	X	X	X

Table C.3 - Ozone Monitoring Stations Used for CALPUFF Modeling

Station Name	State	Monitor ID Number	Source	Lambert Conformal Coordinates		2001	2002	2003
				X(km)	Y(km)			
Craters of the Moon NP	ID	160230101	AIRS	-294.162	51.003	X	X	X
	UT	490030003	AIRS	-168.049	-256.235	X	X	X
	UT	490050004	AIRS	-164.141	-139.639	X	X	X
	UT	490570007	AIRS	-177.414	-198.603	X	X	X
Yellowstone NP	WY	YEL408	CASTNET	-46.091	162.262	X	X	X
Pinedale	WY	PND165	CASTNET	0.947	-13.018	X	X	X
Centennial	WY	CNT169	CASTNET	288.384	-174.765	X	X	X
	WY	560391011	AIRS	-46.041	162.861	X	X	X

Table C.4

Pinedale Anticline CALPUFF Modeling

Modeling Parameters for Project Area Point Sources

Source	Stack Height	Stack Temperature	Stack Velocity	Stack Diameter
	(m)	(K)	(m/s)	(m)
Drilling Rig	5.0	675.0	30.0	0.2
Drilling Rig	5.0	700.0	25.0	0.2
Granger Gas Plant Expansion	13.7	689.0	34.1	0.6
Pinedale Compressor Station	15.2	713.7	72.5	0.5
Pinedale Compressor Station	16.0	758.0	9.8	2.2
Paradise Compressor Station	14.8	726.5	28.7	0.7
Paradise Compressor Station	16.0	758.0	9.8	2.2
Falcon Compressor Station	14.8	726.5	28.7	0.7
Falcon Compressor Station	16.0	758.0	9.8	2.2
Bird Canyon Compressor Station	14.8	726.5	28.7	0.7

Figure C.1 - Surface and Upper Air Meteorological Stations Used for Year 2001 CALMET Windfields

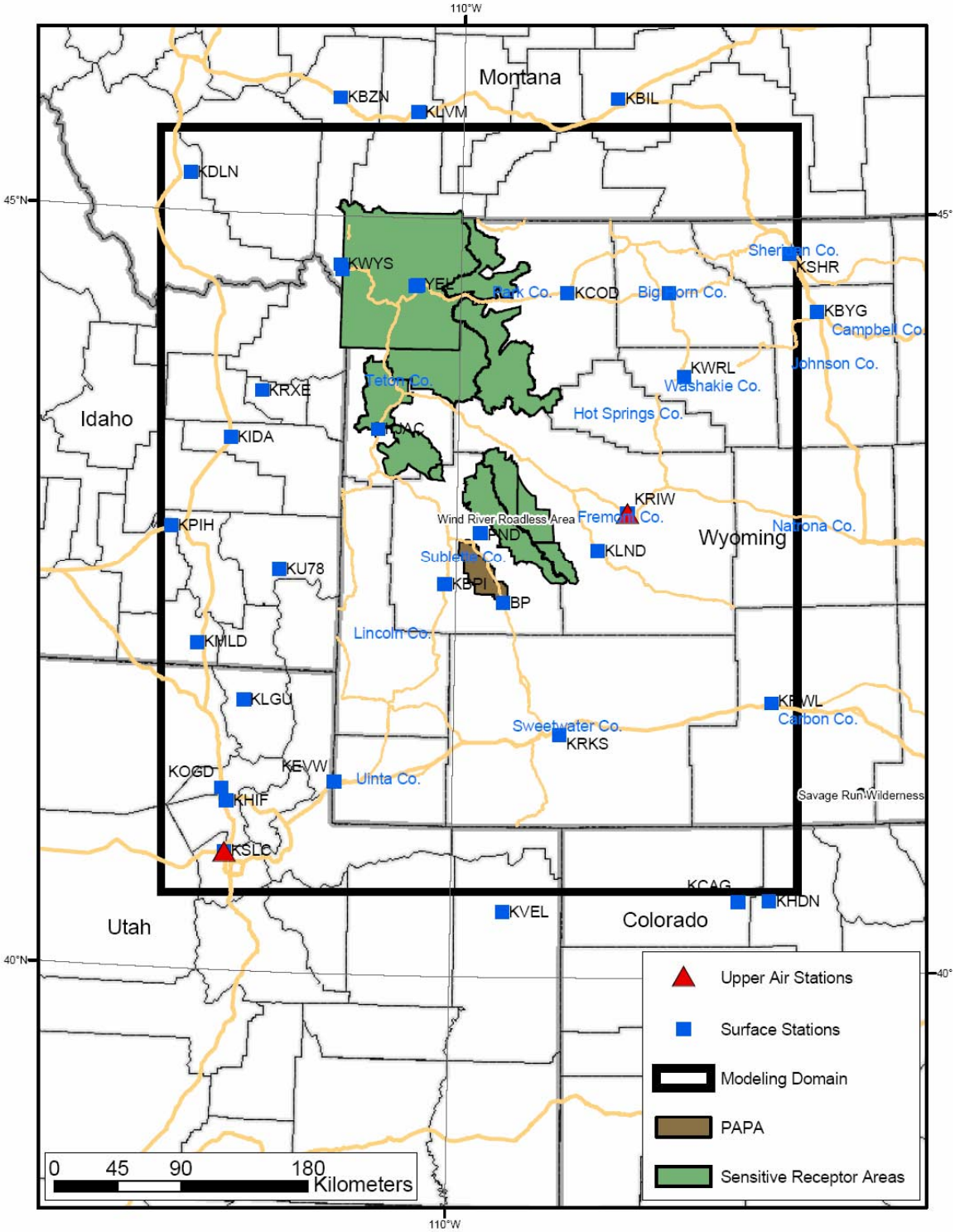


Figure C.2 - Surface and Upper Air Meteorological Stations Used for Year 2002 CALMET Windfields

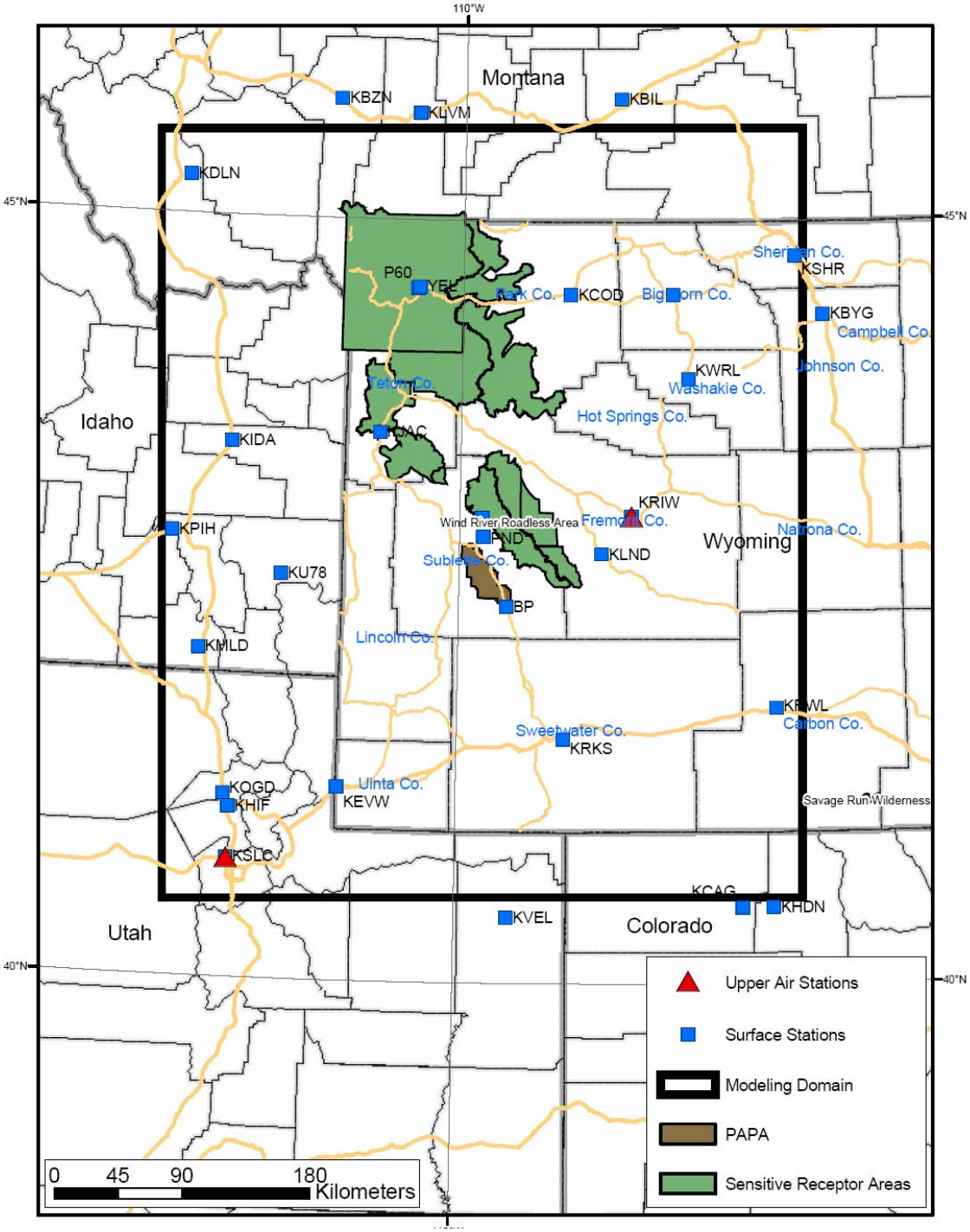


Figure C.3 - Surface and Upper Air Meteorological Stations Used for Year 2003 CALMET Windfields

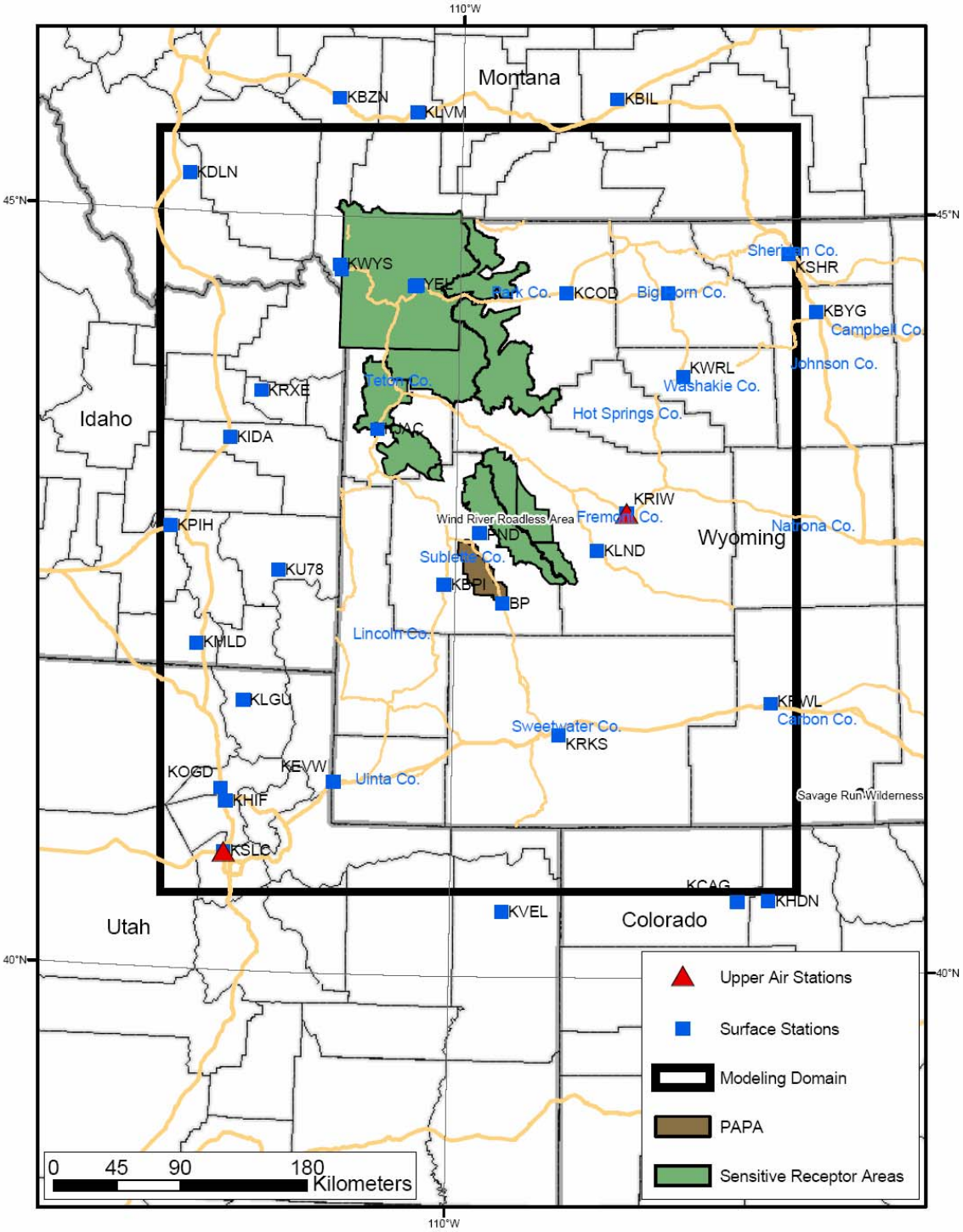


Figure C.4 - Area Sources Modeled for Year 2005

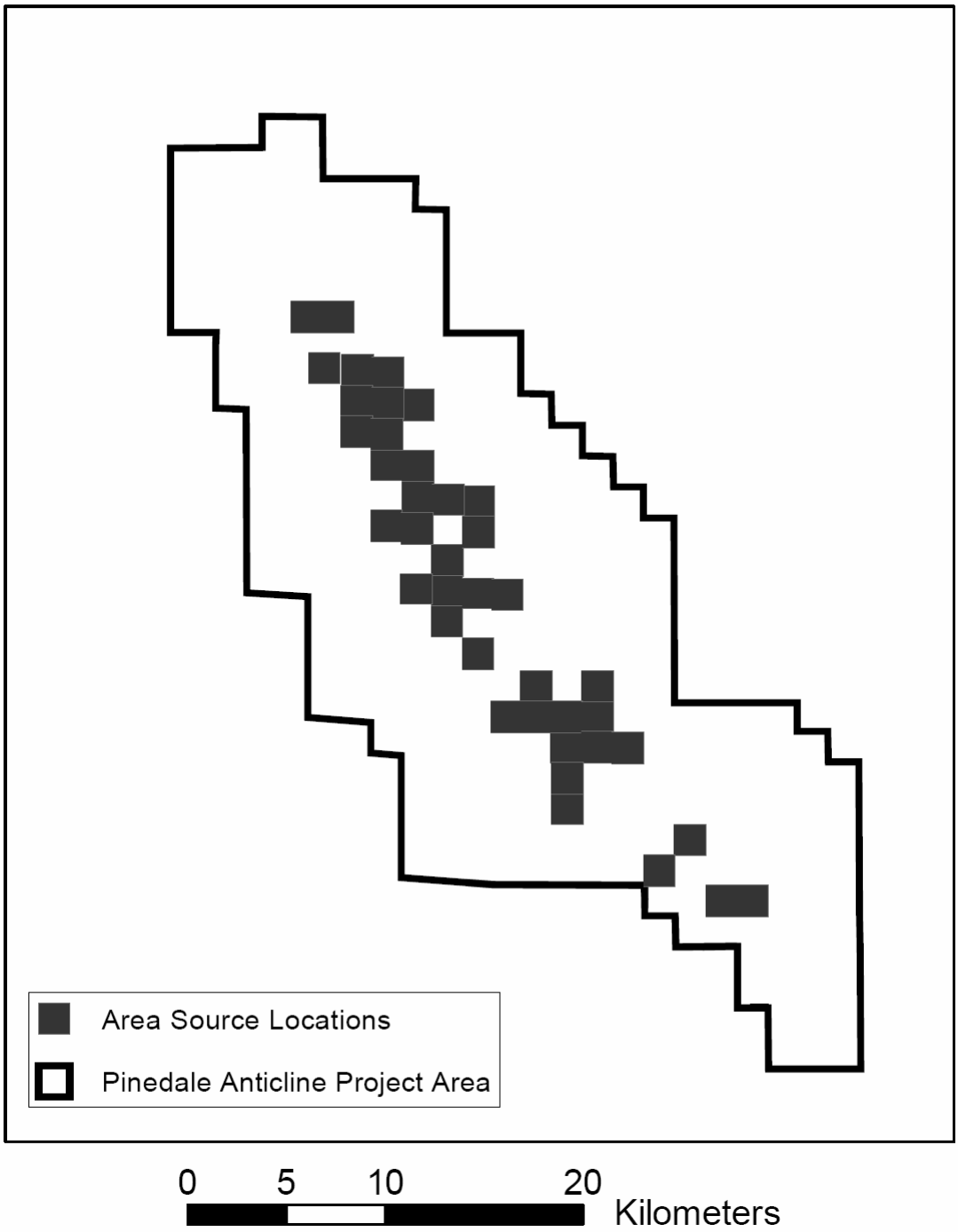


Figure C.5 - Area Sources Modeled for Year 2007

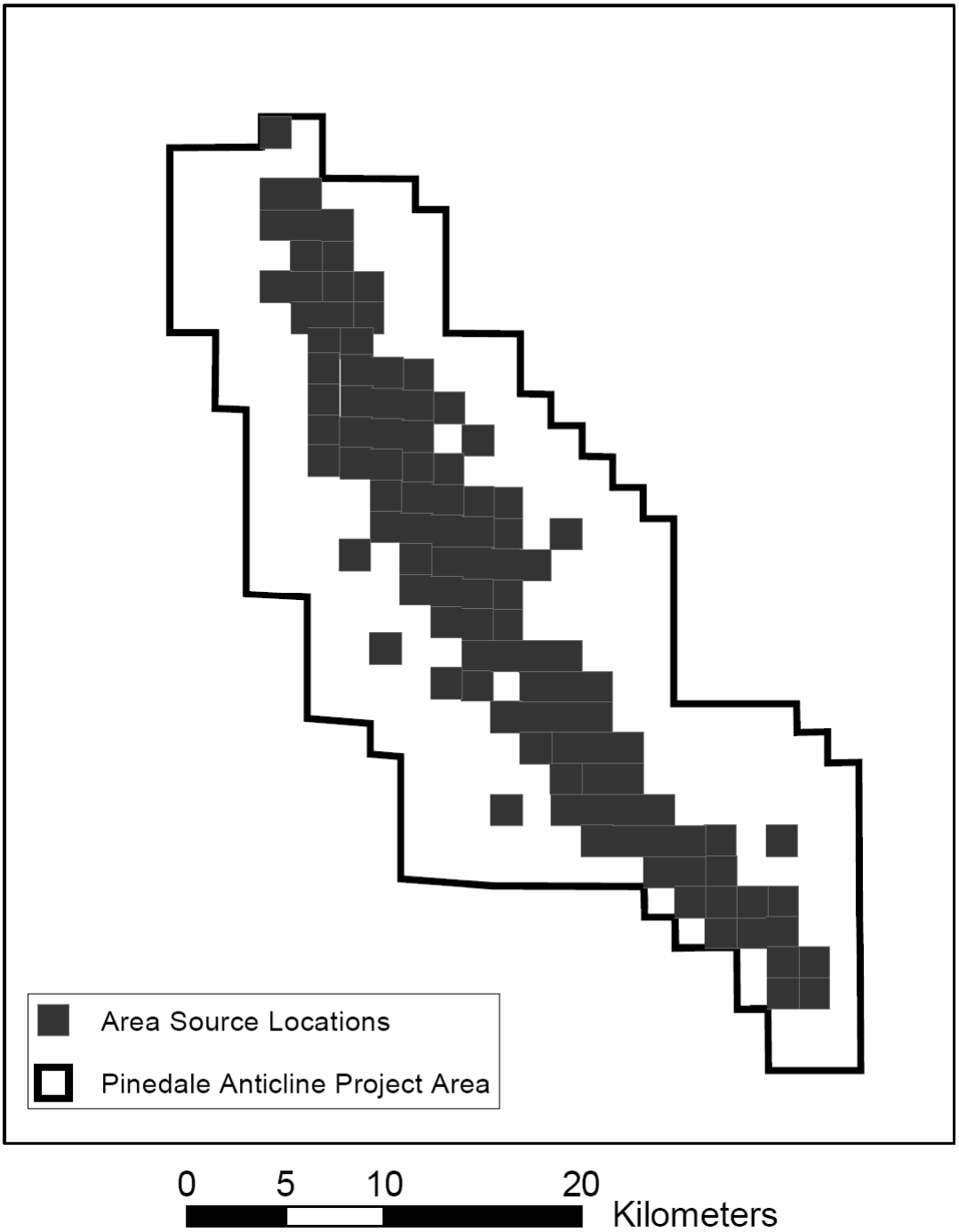


Figure C.6 - Area Sources Modeled for Year 2009

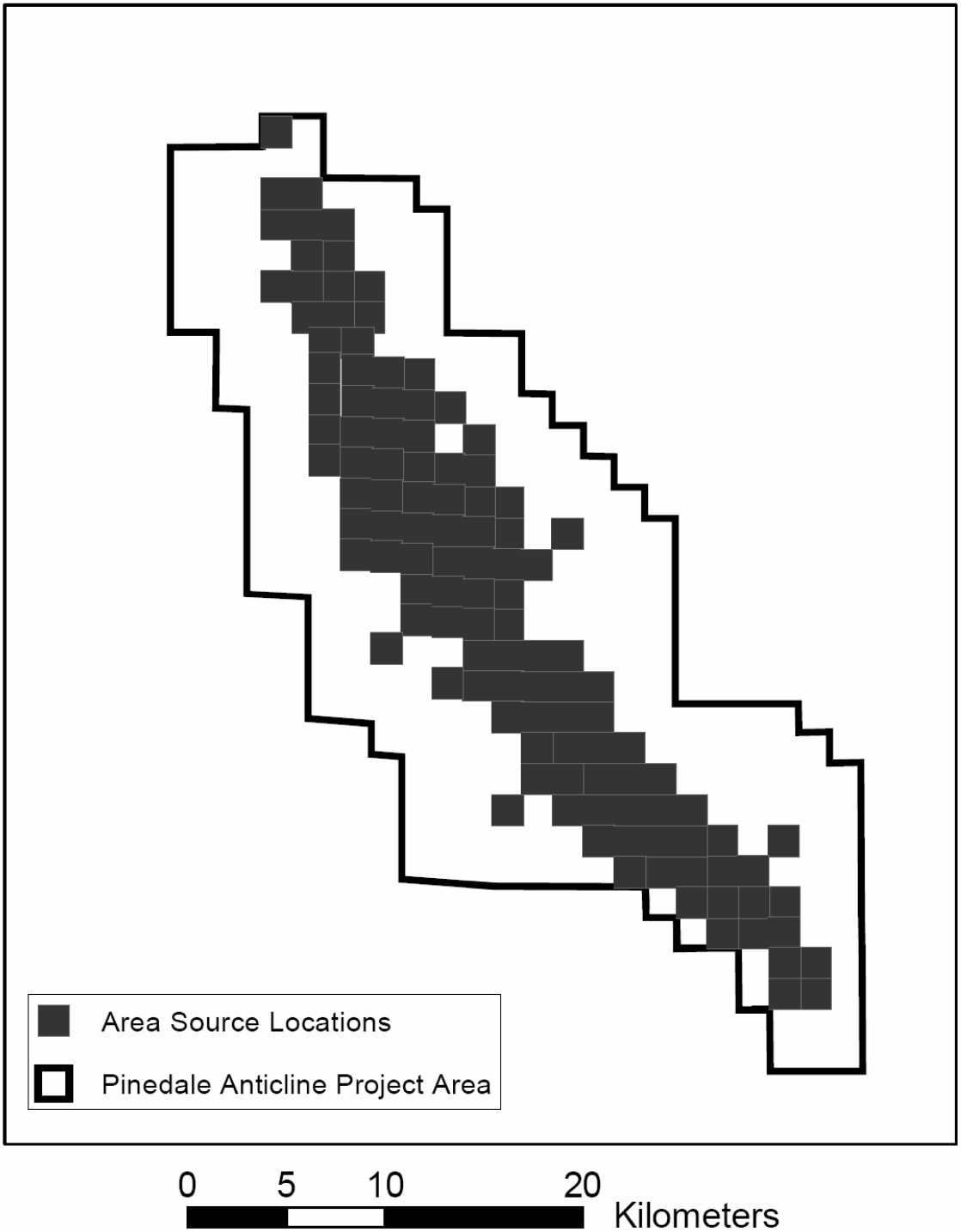


Figure C.7 - Area Sources Modeled for Year 2026

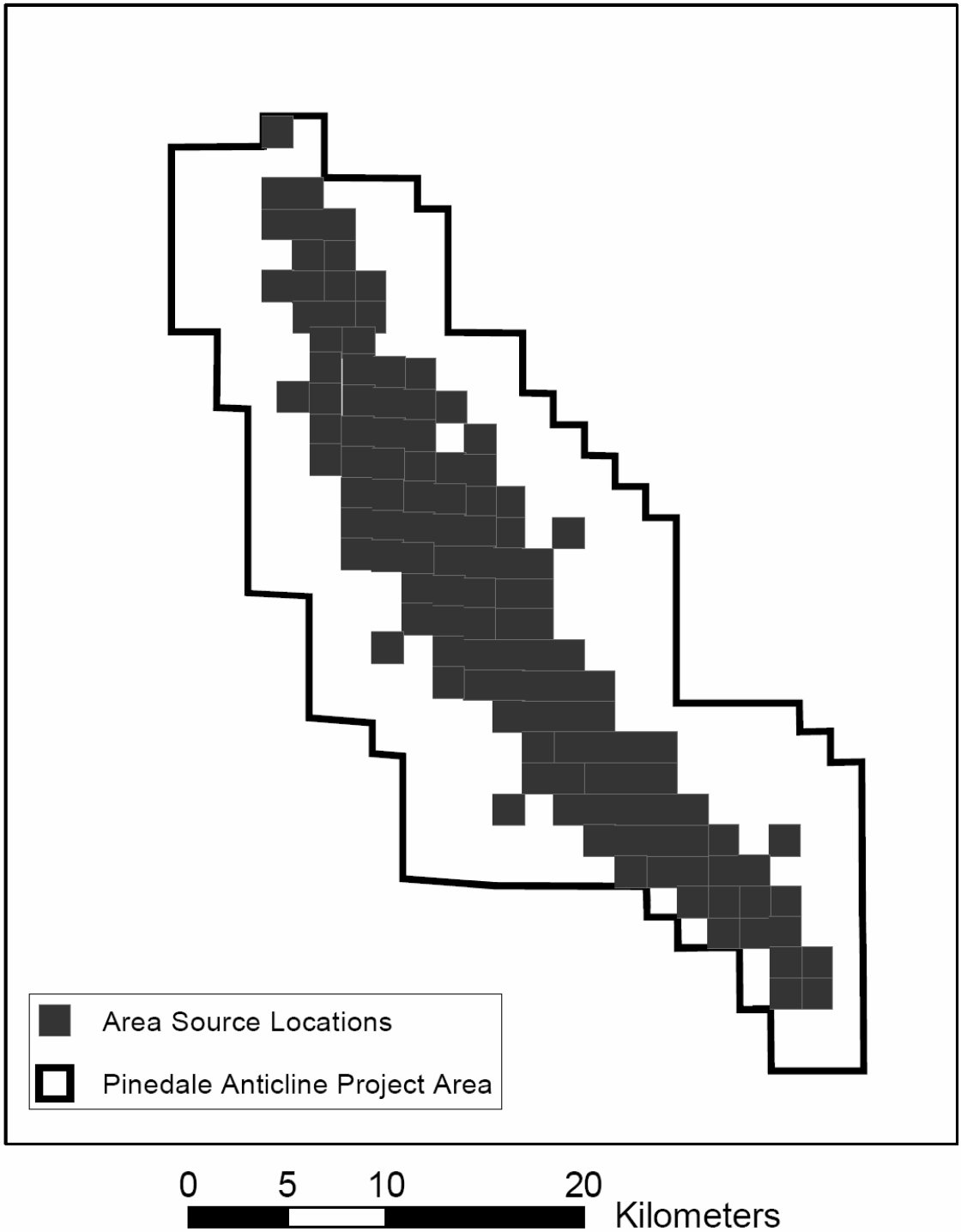


Figure C.8 - Drill Rig and Compressor Stations Modeled for Year 2005

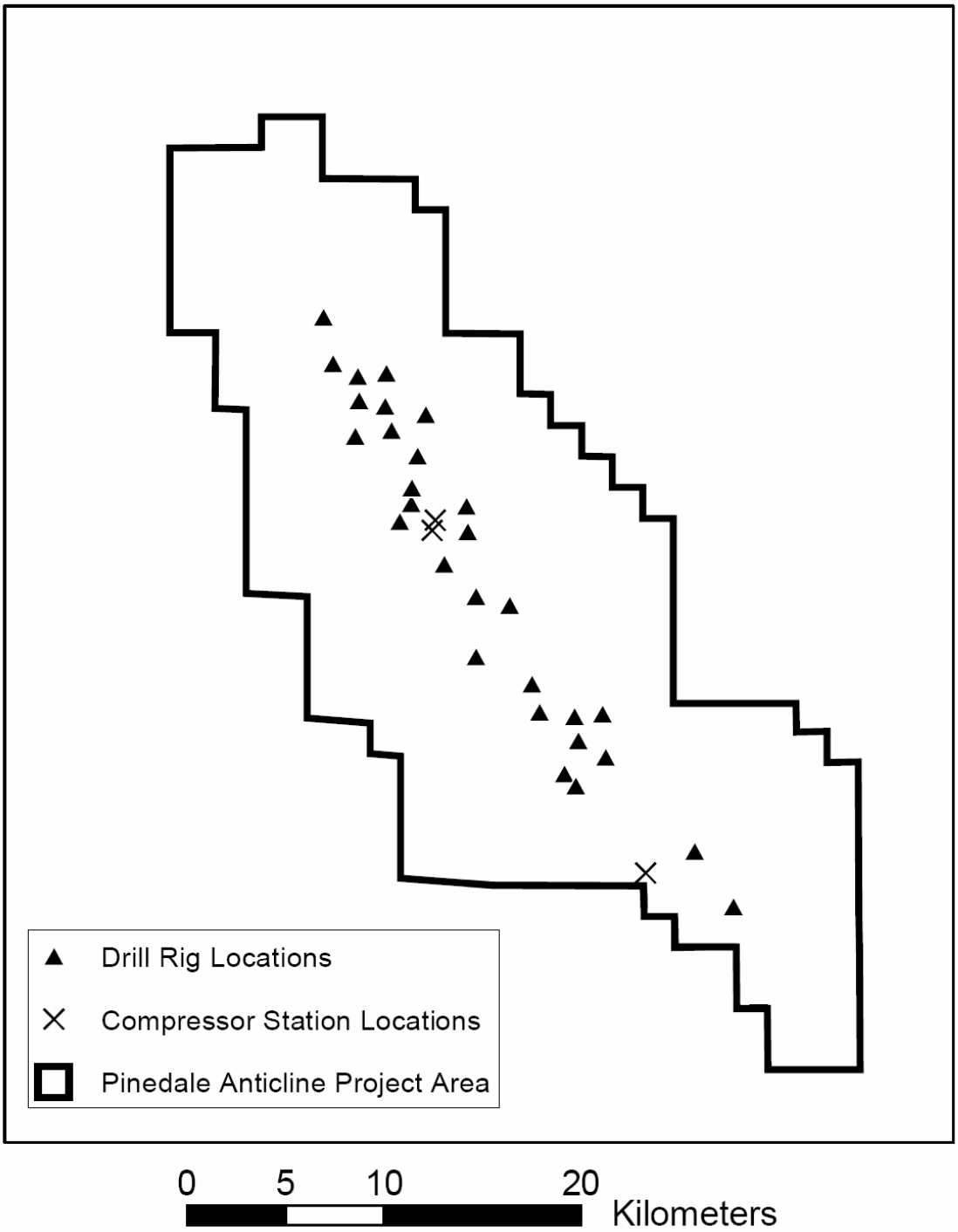


Figure C.9 - Drill Rig and Compressor Stations Modeled for Year 2007

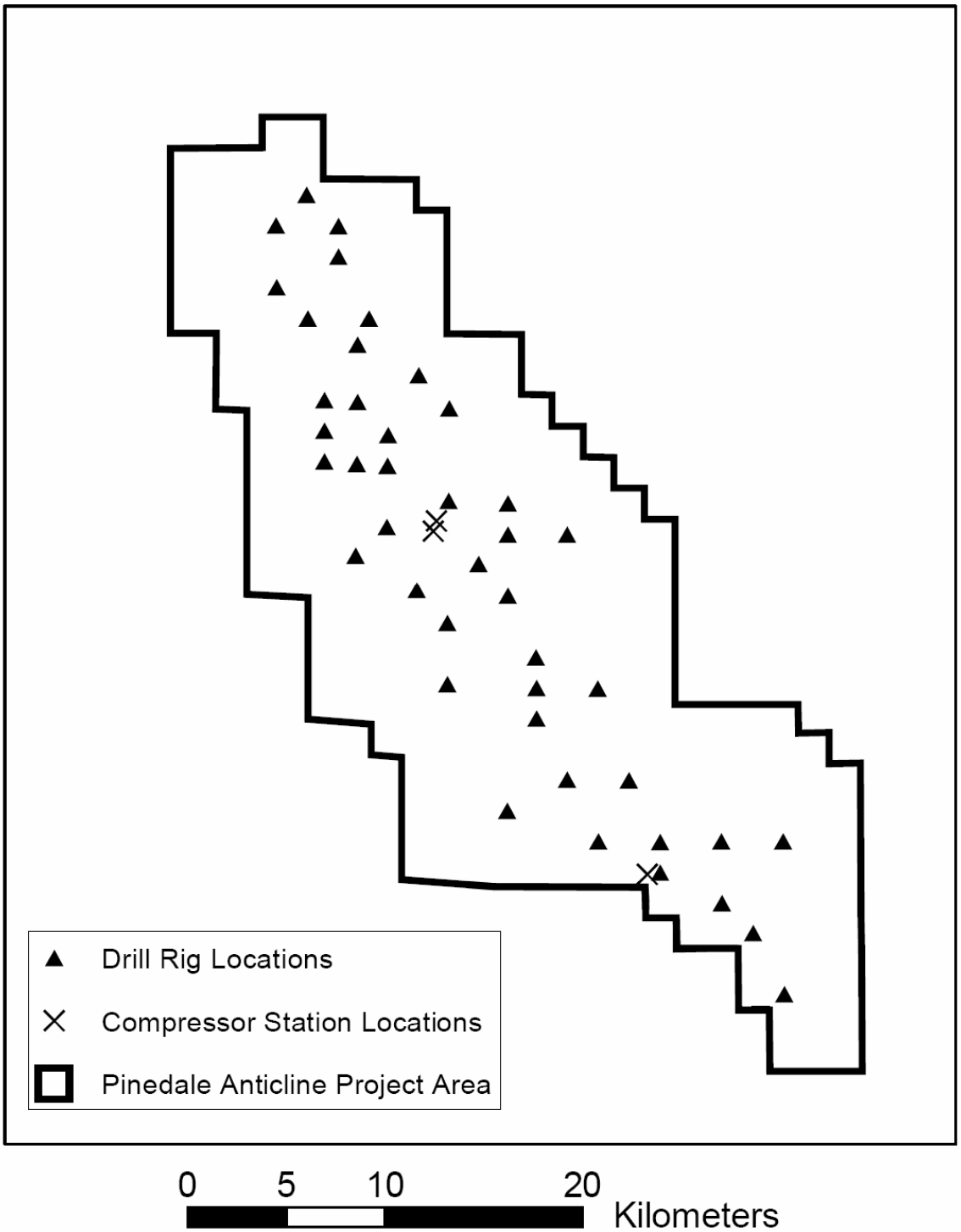


Figure C.10 - Drill Rig and Compressor Stations Modeled for Year 2009

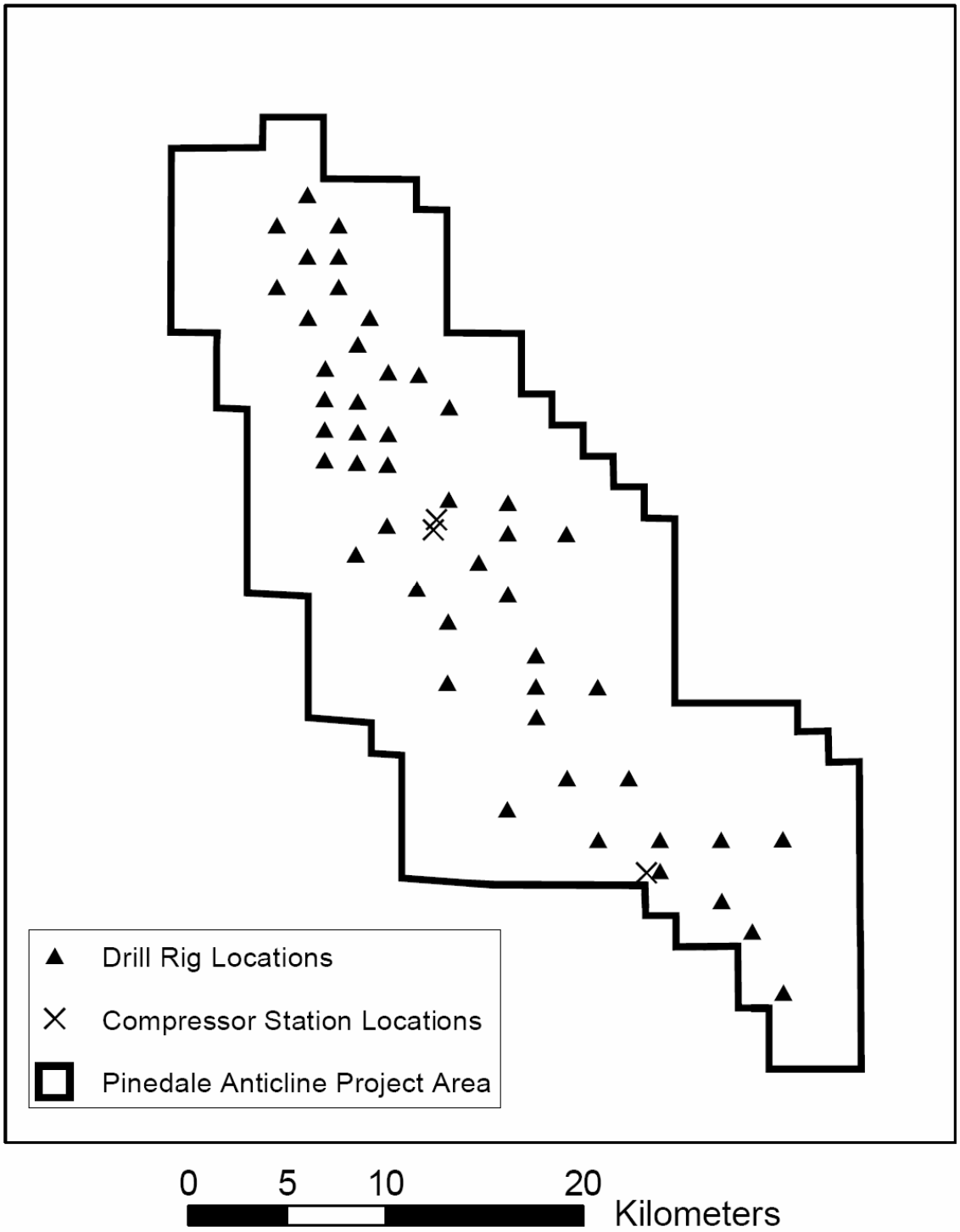
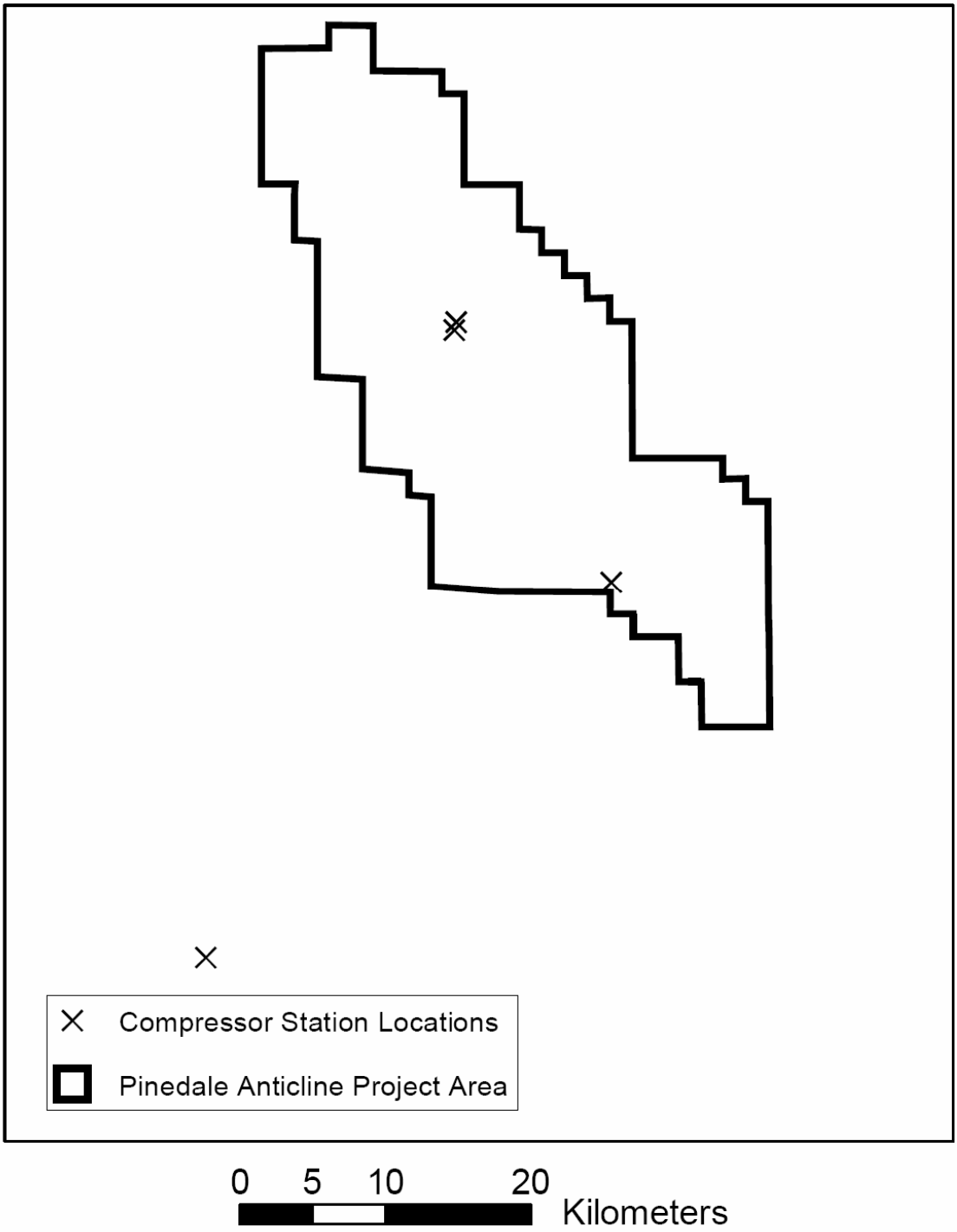


Figure C.11 - Compressor Stations Modeled for Year 2026



Appendix D

Pinedale Anticline Zone Test Analysis

Pinedale Anticline Zone Test Modeling

Due to the close proximity and physical alignment of the PAPA to the Bridger Wilderness sensitivity "zone" modeling was performed using CALPUFF to determine whether there are any areas within the PAPA that could potentially result in much greater impacts at the Bridger Wilderness as a result of the meteorology and source location. Visibility impairment was used as the impact criteria to test the zone influence. CALPOST method 6 for visibility processing combined with FLAG natural background data and regional haze rule monthly relative humidity factors applicable to the Bridger Wilderness were used.

The PAPA was divided into three distinct zones, south, north, and central. 10 drill rigs were randomly placed in each of the three zones. Emissions for a 4000 hp, Tier 1 emissions level, drill rig were used (NO_x – 25.6 lb/hr, SO_2 – 0.5 lb/hr, $PM_{10}/PM_{2.5}$ – 1.5 lb/hr).

Three years of CALMET wind fields were used (2001 – 2003). CALPUFF was used to model the 10 drill rigs for each of the three zones for the three years of meteorology data. CALPOST was used to process visibility impacts at the Bridger Wilderness.

Figures D.1 through D.6 present the results for the zone test analysis. Results are presented as the number of days per year above a 1.0 deciview (dv) change (Figures D1, D2, and D3) and the maximum dv change (Figures D4, D5, D6) at each receptor in the Bridger Wilderness. The values are the maximum results from any of the three modeled years. Figures D.1 and D.4 present the modeling results at the Bridger Wilderness for the 10 drill rigs when modeled from the south zone. Figures D.2 and D.5 present the model results for the drill rigs in the central zone, and Figures D.3 and D.6 illustrate the results for drill rig impacts from the north zone.

These modeling results indicate that the PAPA sources tend to have a larger impact at areas in the Bridger Wilderness that are northeast of the PAPA.

Figure D.1
Pinedale Anticline Zone Analysis for Drill Rigs in South Zone
Maximum Number of Days/Year Above 1.0 Delta Deciview Over Three Years (2001-2003)

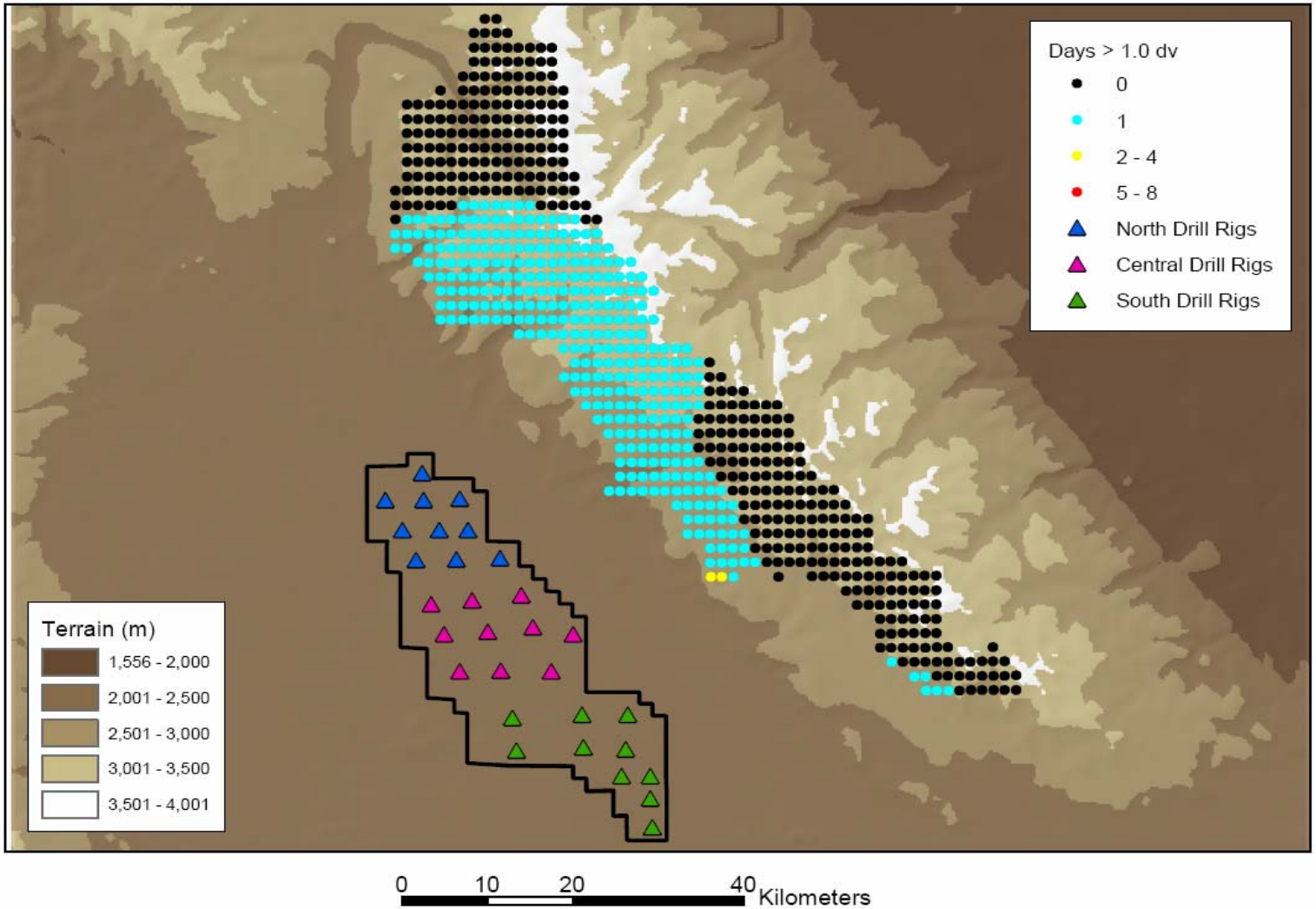


Figure D.2
Pinedale Anticline Zone Analysis for Drill Rigs in Central Zone
Maximum Number of Days/Year Above 1.0 Delta Deciview Over Three Years (2001-2003)

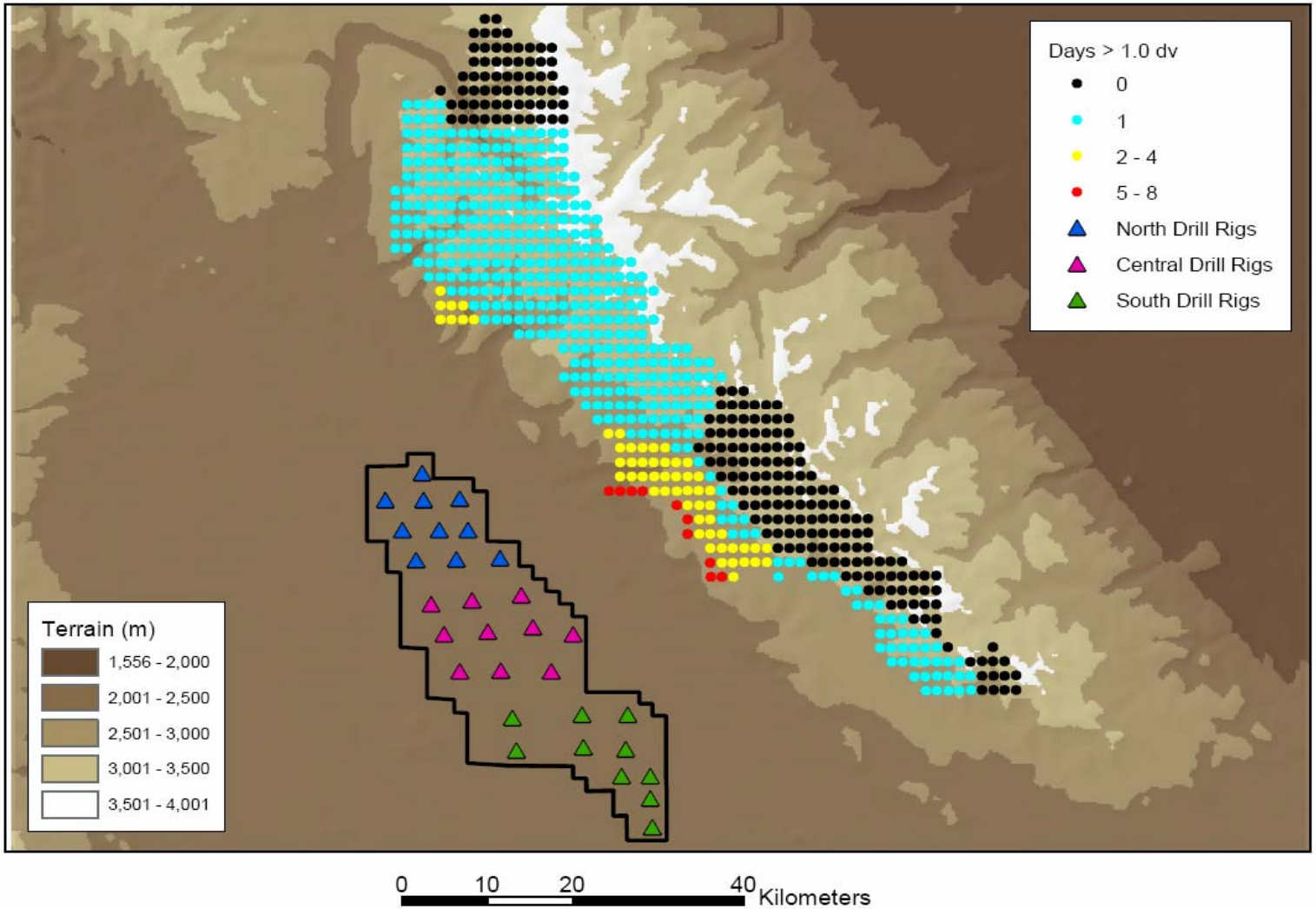


Figure D.3
Pinedale Anticline Zone Analysis for Drill Rigs in North Zone
Maximum Number of Days/Year Above 1.0 Delta Deciview Over Three Years (2001-2003)

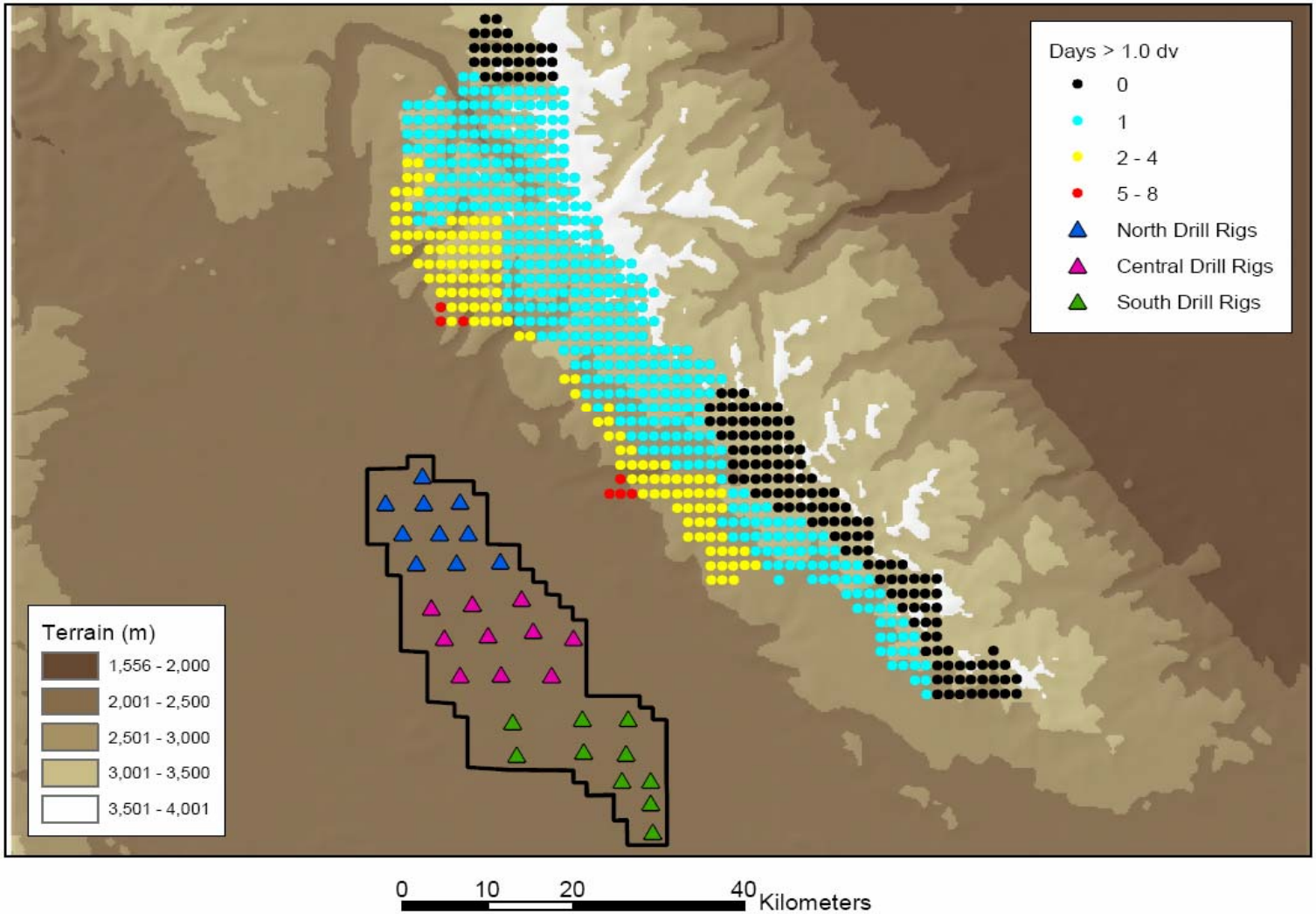


Figure D.4
Pinedale Anticline Zone Analysis for Drill Rigs in South Zone
Maximum Predicted Delta Deciview Over Three Years (2001-2003)

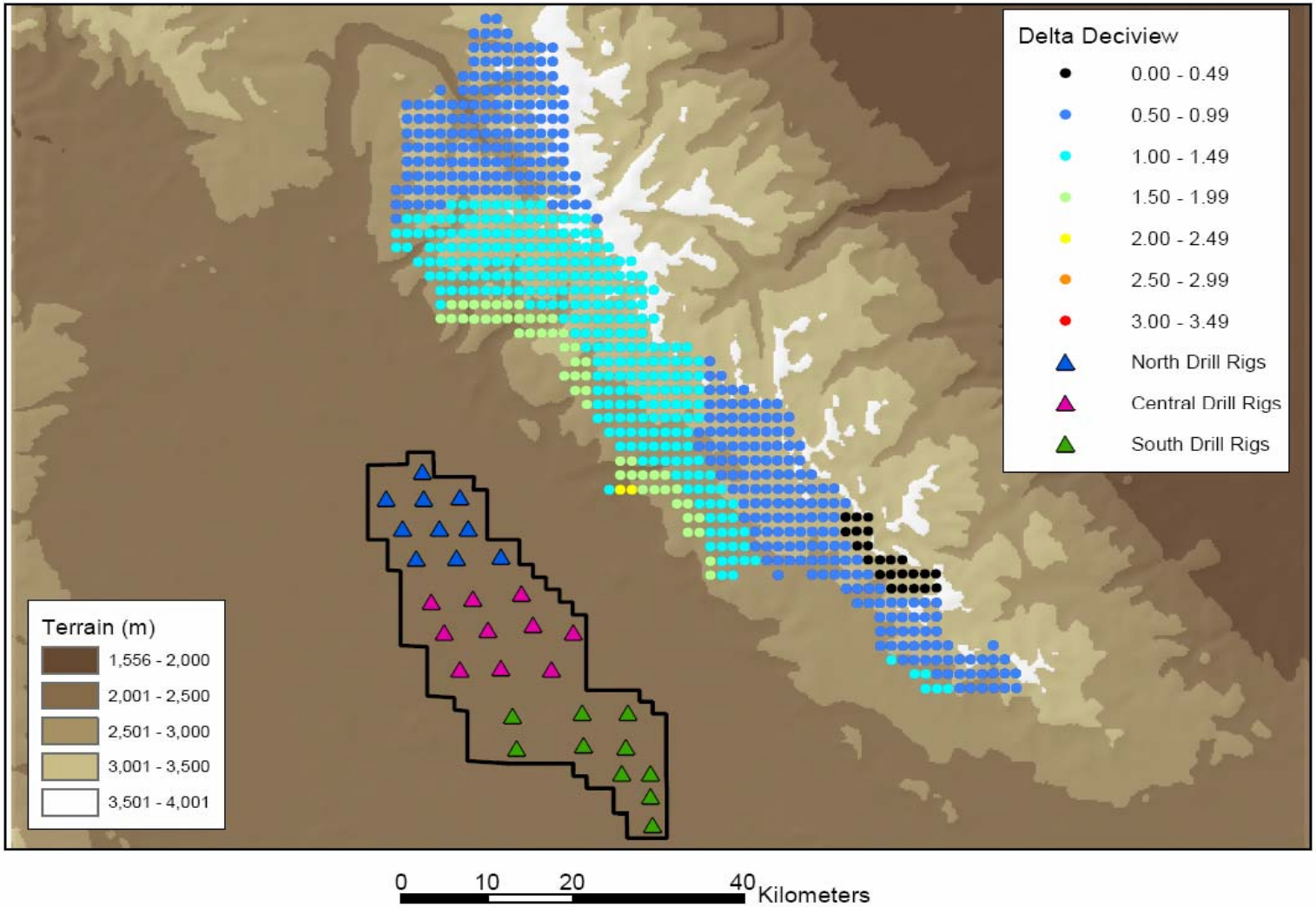


Figure D.5
Pinedale Anticline Zone Analysis for Drill Rigs in Central Zone
Maximum Predicted Delta Deciview Over Three Years (2001-2003)

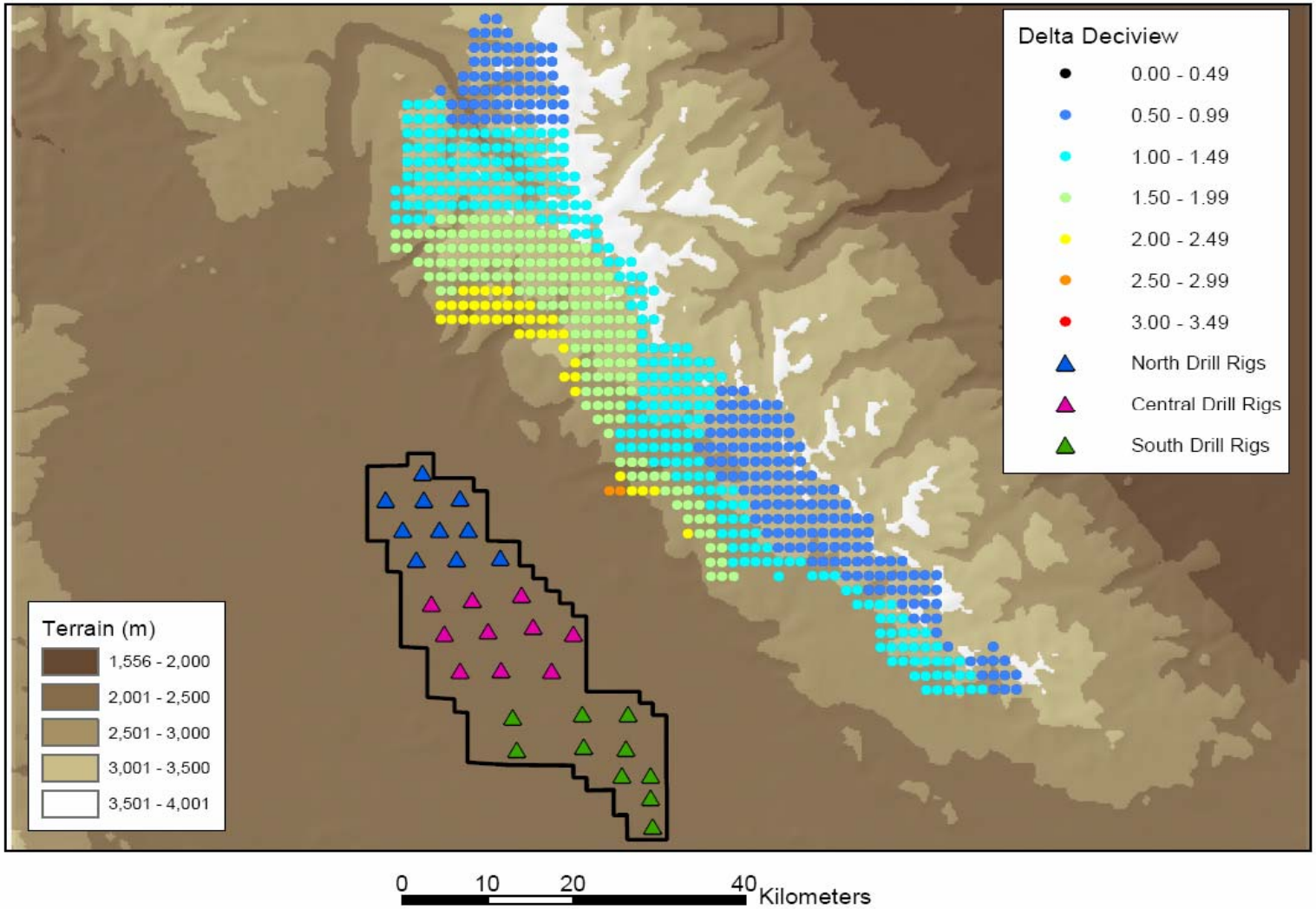
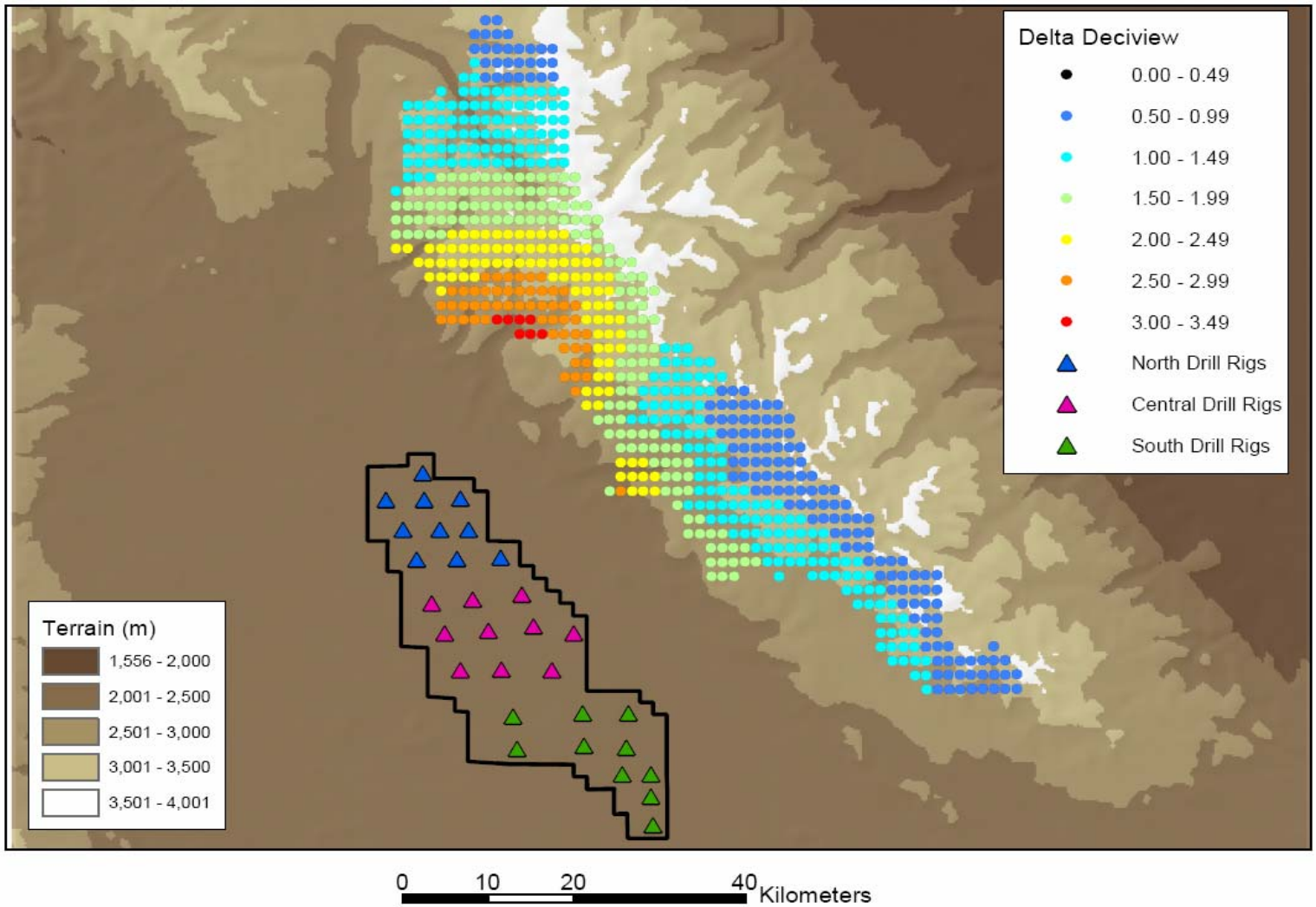


Figure D.6
Pinedale Anticline Zone Analysis for Drill Rigs in North Zone
Maximum Predicted Delta Deciview Over Three Years (2001-2003)



Appendix E

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Table E.1.8 - Maximum Modeled NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 – 2003

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E.10 – Modeled Sulfur Deposition Impacts

Table E.10.1 - Maximum Modeled Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003

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E.11 – Modeled Change in Acid Neutralizing Capacity

Table E.11.1 - Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003

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E.12 – Far-field Visibility Impacts – FLAG Background Data (MVISBK=6)

Table E.12.1 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

Table E.12.2 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

Table E.12.3 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

Table E.12.4 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

Table E.12.5 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

Table E.12.6 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

Table E.12.7 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

Table E.12.8 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

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Table E.12.11 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

E.13 – Far-field Visibility Impacts – IMPROVE Background Data

Table E.13.1 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

Table E.13.2 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

Table E.13.3 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

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Table E.13.5 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

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Table E.13.7 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

Table E.13.8 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

Table E.13.9 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

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Table E.13.11 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

E.14 – Far-field Visibility Impacts – FLAG Background Data (MVISBK=2)

Table E.14.1 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

Table E.14.2 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

Table E.14.3 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

Table E.14.4 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

Table E.14.5 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

Table E.14.6 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

Table E.14.7 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

Table E.14.8 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

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Table E.14.11 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

E.15 – Far-field Visibility Impacts – Regional Haze Rule – Best Days – Background Data

Table E.15.1 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

Table E.15.2 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

Table E.15.3 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

Table E.15.4 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

Table E.15.5 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

Table E.15.6 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

Table E.15.7 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

Table E.15.8 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case -

Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

Table E.15.9 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

Table E.15.10 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

Table E.15.11 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

E.16 – Far-field Visibility Impacts – Regional Haze Rule – Average Days – Background Data

Table E.16.1 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

Table E.16.2 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

Table E.16.3 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

Table E.16.4 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

Table E.16.5 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

Table E.16.6 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

Table E.16.7 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

Table E.16.8 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case -

Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

Table E.16.9 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

Table E.16.10 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

Table E.16.11 - Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

E.17 – Modeled Visibility Impacts at Wyoming Regional Community Locations

Table E.17.1 - Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

Table E.17.2 - Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

Table E.17.3 - Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

Table E.17.4 - Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

Table E.17.5 - Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

Table E.17.6 - Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

Table E.17.7 - Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

Table E.17.8 - Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

Table E.17.9 - Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

Table E.17.10 - Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

Table E.17.11 - Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

Table E.1.1
Maximum Modeled NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas
from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Bridger WA	0.2211	0.1458	0.1919	0.2211	2.5	8	8.22	100	100
		Fitzpatrick WA	0.0153	0.0112	0.0140	0.0153	2.5	8	8.02	100	100
		Grand Teton NP	0.0045	0.0057	0.0040	0.0057	2.5	8	8.01	100	100
		Gros Venture WA	0.0191	0.0137	0.0147	0.0191	25	8	8.02	100	100
		North Absoroka WA	0.0005	0.0004	0.0004	0.0005	2.5	8	8.00	100	100
		Popo Agie WA	0.0461	0.0344	0.0379	0.0461	25	8	8.05	100	100
		Teton WA	0.0027	0.0020	0.0017	0.0027	2.5	8	8.00	100	100
		Washakie WA	0.0023	0.0017	0.0021	0.0023	2.5	8	8.00	100	100
		Wind River RA	0.0325	0.0170	0.0280	0.0325	25	8	8.03	100	100
		Yellowstone NP	0.0012	0.0014	0.0009	0.0014	2.5	8	8.00	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.1.2
Maximum Modeled NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas
from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Bridger WA	0.3508	0.2347	0.2922	0.3508	2.5	8	8.35	100	100
		Fitzpatrick WA	0.0245	0.0198	0.0232	0.0245	2.5	8	8.02	100	100
		Grand Teton NP	0.0069	0.0107	0.0067	0.0107	2.5	8	8.01	100	100
		Gros Venture WA	0.0303	0.0253	0.0248	0.0303	25	8	8.03	100	100
		North Absoroka WA	0.0008	0.0007	0.0007	0.0008	2.5	8	8.00	100	100
		Popo Agie WA	0.0760	0.0592	0.0623	0.0760	25	8	8.08	100	100
		Teton WA	0.0041	0.0037	0.0027	0.0041	2.5	8	8.00	100	100
		Washakie WA	0.0035	0.0031	0.0032	0.0035	2.5	8	8.00	100	100
		Wind River RA	0.0535	0.0290	0.0435	0.0535	25	8	8.05	100	100
		Yellowstone NP	0.0017	0.0026	0.0014	0.0026	2.5	8	8.00	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.1.3
Maximum Modeled NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1] 2001 (μg/m³)	2002 (μg/m³)	2003 (μg/m³)	Maximum Direct Modeled Impact (μg/m³)	Applicable PSD Increment[2] (μg/m³)	Background Concentration[3] (μg/m³)	Maximum Total Concentration (μg/m³)	WAAQS (μg/m³)	NAAQS (μg/m³)
NO_2	Annual	Bridger WA	0.3442	0.2398	0.3002	0.3442	2.5	8	8.34	100	100
		Fitzpatrick WA	0.0242	0.0197	0.0230	0.0242	2.5	8	8.02	100	100
		Grand Teton NP	0.0077	0.0095	0.0065	0.0095	2.5	8	8.01	100	100
		Gros Venture WA	0.0320	0.0235	0.0247	0.0320	25	8	8.03	100	100
		North Absoroka WA	0.0009	0.0007	0.0008	0.0009	2.5	8	8.00	100	100
		Popo Agie WA	0.0704	0.0546	0.0600	0.0704	25	8	8.07	100	100
		Teton WA	0.0044	0.0034	0.0028	0.0044	2.5	8	8.00	100	100
		Washakie WA	0.0037	0.0029	0.0034	0.0037	2.5	8	8.00	100	100
		Wind River RA	0.0507	0.0283	0.0451	0.0507	25	8	8.05	100	100
		Yellowstone NP	0.0019	0.0023	0.0015	0.0023	2.5	8	8.00	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 μg/m³ from Boulder monitor.

Table E.1.4
Maximum Modeled NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1] 2001 (μg/m³)	2002 (μg/m³)	2003 (μg/m³)	Maximum Direct Modeled Impact (μg/m³)	Applicable PSD Increment[2] (μg/m³)	Background Concentration[3] (μg/m³)	Maximum Total Concentration (μg/m³)	WAAQS (μg/m³)	NAAQS (μg/m³)
NO_2	Annual	Bridger WA	0.2165	0.1504	0.1885	0.2165	2.5	8	8.22	100	100
		Fitzpatrick WA	0.0153	0.0124	0.0145	0.0153	2.5	8	8.02	100	100
		Grand Teton NP	0.0048	0.0060	0.0041	0.0060	2.5	8	8.01	100	100
		Gros Venture WA	0.0201	0.0148	0.0156	0.0201	25	8	8.02	100	100
		North Absoroka WA	0.0005	0.0004	0.0005	0.0005	2.5	8	8.00	100	100
		Popo Agie WA	0.0446	0.0346	0.0379	0.0446	25	8	8.04	100	100
		Teton WA	0.0028	0.0021	0.0018	0.0028	2.5	8	8.00	100	100
		Washakie WA	0.0023	0.0018	0.0021	0.0023	2.5	8	8.00	100	100
		Wind River RA	0.0320	0.0178	0.0284	0.0320	25	8	8.03	100	100
		Yellowstone NP	0.0012	0.0015	0.0009	0.0015	2.5	8	8.00	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 μg/m³ from Boulder monitor.

Table E.1.5
Maximum Modeled NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas
from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Bridger WA	0.0798	0.0536	0.0682	0.0798	2.5	8	8.08	100	100
		Fitzpatrick WA	0.0057	0.0046	0.0054	0.0057	2.5	8	8.01	100	100
		Grand Teton NP	0.0017	0.0023	0.0015	0.0023	2.5	8	8.00	100	100
		Gros Venture WA	0.0073	0.0055	0.0058	0.0073	25	8	8.01	100	100
		North Absoroka WA	0.0002	0.0002	0.0002	0.0002	2.5	8	8.00	100	100
		Popo Agie WA	0.0171	0.0134	0.0145	0.0171	25	8	8.02	100	100
		Teton WA	0.0010	0.0008	0.0007	0.0010	2.5	8	8.00	100	100
		Washakie WA	0.0009	0.0007	0.0008	0.0009	2.5	8	8.00	100	100
		Wind River RA	0.0121	0.0066	0.0103	0.0121	25	8	8.01	100	100
		Yellowstone NP	0.0005	0.0006	0.0004	0.0006	2.5	8	8.00	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.1.6
Maximum Modeled NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas
from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Bridger WA	0.1177	0.0791	0.1031	0.1177	2.5	8	8.12	100	100
		Fitzpatrick WA	0.0093	0.0065	0.0077	0.0093	2.5	8	8.01	100	100
		Grand Teton NP	0.0026	0.0032	0.0024	0.0032	2.5	8	8.00	100	100
		Gros Venture WA	0.0109	0.0079	0.0091	0.0109	25	8	8.01	100	100
		North Absoroka WA	0.0003	0.0003	0.0003	0.0003	2.5	8	8.00	100	100
		Popo Agie WA	0.0265	0.0208	0.0232	0.0265	25	8	8.03	100	100
		Teton WA	0.0016	0.0012	0.0012	0.0016	2.5	8	8.00	100	100
		Washakie WA	0.0015	0.0011	0.0015	0.0015	2.5	8	8.00	100	100
		Wind River RA	0.0190	0.0108	0.0159	0.0190	25	8	8.02	100	100
		Yellowstone NP	0.0008	0.0008	0.0006	0.0008	2.5	8	8.00	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.1.7
Maximum Modeled NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1] 2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	Maximum Direct Modeled Impact ($\mu g/m^3$)	Applicable PSD Increment[2] ($\mu g/m^3$)	Background Concentration[3] ($\mu g/m^3$)	Maximum Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	Annual	Bridger WA	0.3981	0.2649	0.3257	0.3981	2.5	8	8.40	100	100
		Fitzpatrick WA	0.0309	0.0250	0.0285	0.0309	2.5	8	8.03	100	100
		Grand Teton NP	0.0921	0.1157	0.1122	0.1157	2.5	8	8.12	100	100
		Gros Venture WA	0.0403	0.0328	0.0324	0.0403	25	8	8.04	100	100
		North Absoroka WA	0.0016	0.0017	0.0014	0.0017	2.5	8	8.00	100	100
		Popo Agie WA	0.0915	0.0692	0.0766	0.0915	25	8	8.09	100	100
		Teton WA	0.0052	0.0049	0.0039	0.0052	2.5	8	8.01	100	100
		Washakie WA	0.0046	0.0045	0.0044	0.0046	2.5	8	8.00	100	100
		Wind River RA	0.0644	0.0357	0.0509	0.0644	25	8	8.06	100	100
		Yellowstone NP	0.0024	0.0032	0.0020	0.0032	2.5	8	8.00	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.1.8
Maximum Modeled NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1] 2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	Maximum Direct Modeled Impact ($\mu g/m^3$)	Applicable PSD Increment[2] ($\mu g/m^3$)	Background Concentration[3] ($\mu g/m^3$)	Maximum Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	Annual	Bridger WA	0.3914	0.2700	0.3336	0.3914	2.5	8	8.39	100	100
		Fitzpatrick WA	0.0306	0.0248	0.0283	0.0306	2.5	8	8.03	100	100
		Grand Teton NP	0.0923	0.1147	0.1119	0.1147	2.5	8	8.11	100	100
		Gros Venture WA	0.0420	0.0308	0.0322	0.0420	25	8	8.04	100	100
		North Absoroka WA	0.0016	0.0017	0.0015	0.0017	2.5	8	8.00	100	100
		Popo Agie WA	0.0859	0.0649	0.0743	0.0859	25	8	8.09	100	100
		Teton WA	0.0055	0.0045	0.0041	0.0055	2.5	8	8.01	100	100
		Washakie WA	0.0048	0.0042	0.0045	0.0048	2.5	8	8.00	100	100
		Wind River RA	0.0616	0.0350	0.0525	0.0616	25	8	8.06	100	100
		Yellowstone NP	0.0026	0.0029	0.0020	0.0029	2.5	8	8.00	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.1.9
Maximum Modeled NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1] 2001 (μg/m³)	2002 (μg/m³)	2003 (μg/m³)	Maximum Direct Modeled Impact (μg/m³)	Applicable PSD Increment[2] (μg/m³)	Background Concentration[3] (μg/m³)	Maximum Total Concentration (μg/m³)	WAAQS (μg/m³)	NAAQS (μg/m³)
NO_2	Annual	Bridger WA	0.2638	0.1806	0.2220	0.2638	2.5	8	8.26	100	100
		Fitzpatrick WA	0.0217	0.0176	0.0198	0.0217	2.5	8	8.02	100	100
		Grand Teton NP	0.0908	0.1122	0.1103	0.1122	2.5	8	8.11	100	100
		Gros Venture WA	0.0301	0.0222	0.0231	0.0301	25	8	8.03	100	100
		North Absoroka WA	0.0014	0.0015	0.0013	0.0015	2.5	8	8.00	100	100
		Popo Agie WA	0.0601	0.0448	0.0523	0.0601	25	8	8.06	100	100
		Teton WA	0.0039	0.0033	0.0030	0.0039	2.5	8	8.00	100	100
		Washakie WA	0.0034	0.0032	0.0033	0.0034	2.5	8	8.00	100	100
		Wind River RA	0.0429	0.0246	0.0358	0.0429	25	8	8.04	100	100
		Yellowstone NP	0.0019	0.0021	0.0015	0.0021	2.5	8	8.00	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 μg/m³ from Boulder monitor.

Table E.1.10
Maximum Modeled NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1] 2001 (μg/m³)	2002 (μg/m³)	2003 (μg/m³)	Maximum Direct Modeled Impact (μg/m³)	Applicable PSD Increment[2] (μg/m³)	Background Concentration[3] (μg/m³)	Maximum Total Concentration (μg/m³)	WAAQS (μg/m³)	NAAQS (μg/m³)
NO_2	Annual	Bridger WA	0.1270	0.0838	0.1017	0.1270	2.5	8	8.13	100	100
		Fitzpatrick WA	0.0121	0.0098	0.0107	0.0121	2.5	8	8.01	100	100
		Grand Teton NP	0.0892	0.1095	0.1087	0.1095	2.5	8	8.11	100	100
		Gros Venture WA	0.0173	0.0130	0.0138	0.0173	25	8	8.02	100	100
		North Absoroka WA	0.0011	0.0013	0.0011	0.0013	2.5	8	8.00	100	100
		Popo Agie WA	0.0341	0.0237	0.0289	0.0341	25	8	8.03	100	100
		Teton WA	0.0022	0.0020	0.0019	0.0022	2.5	8	8.00	100	100
		Washakie WA	0.0021	0.0021	0.0020	0.0021	2.5	8	8.00	100	100
		Wind River RA	0.0230	0.0134	0.0178	0.0230	25	8	8.02	100	100
		Yellowstone NP	0.0011	0.0012	0.0009	0.0012	2.5	8	8.00	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 μg/m³ from Boulder monitor.

Table E.1.11
Maximum Modeled NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Bridger WA	0.1650	0.1094	0.1366	0.1650	2.5	8	8.16	100	100
		Fitzpatrick WA	0.0155	0.0117	0.0130	0.0155	2.5	8	8.02	100	100
		Grand Teton NP	0.0897	0.1102	0.1092	0.1102	2.5	8	8.11	100	100
		Gros Venture WA	0.0209	0.0154	0.0166	0.0209	25	8	8.02	100	100
		North Absoroka WA	0.0012	0.0014	0.0011	0.0014	2.5	8	8.00	100	100
		Popo Agie WA	0.0422	0.0312	0.0363	0.0422	25	8	8.04	100	100
		Teton WA	0.0028	0.0024	0.0024	0.0028	2.5	8	8.00	100	100
		Washakie WA	0.0027	0.0025	0.0027	0.0027	2.5	8	8.00	100	100
		Wind River RA	0.0300	0.0175	0.0233	0.0300	25	8	8.03	100	100
		Yellowstone NP	0.0014	0.0014	0.0011	0.0014	2.5	8	8.00	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.2.1
Maximum Modeled SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Bridger WA	0.0222	0.0159	0.0204	0.0222	4	9	9.02	60	80
		Fitzpatrick WA	0.0030	0.0023	0.0025	0.0030	4	9	9.00	60	80
		Grand Teton NP	0.0007	0.0009	0.0006	0.0009	4	9	9.00	60	80
		Gros Venture WA	0.0023	0.0019	0.0017	0.0023	17	9	9.00	60	80
		North Absoroka WA	0.0003	0.0003	0.0002	0.0003	4	9	9.00	60	80
		Popo Agie WA	0.0067	0.0062	0.0063	0.0067	17	9	9.01	60	80
		Teton WA	0.0006	0.0005	0.0004	0.0006	4	9	9.00	60	80
		Washakie WA	0.0007	0.0007	0.0006	0.0007	4	9	9.00	60	80
		Wind River RA	0.0050	0.0034	0.0045	0.0050	17	9	9.01	60	80
		Yellowstone NP	0.0003	0.0003	0.0002	0.0003	4	9	9.00	60	80
SO_2	24-hour	Bridger WA	0.1684	0.1642	0.2301	0.2301	5	43	43.23	260	365
		Fitzpatrick WA	0.0308	0.0622	0.0326	0.0622	5	43	43.06	260	365
		Grand Teton NP	0.0158	0.0174	0.0154	0.0174	5	43	43.02	260	365
		Gros Venture WA	0.0288	0.0317	0.0389	0.0389	91	43	43.04	260	365
		North Absoroka WA	0.0047	0.0082	0.0057	0.0082	5	43	43.01	260	365
		Popo Agie WA	0.0431	0.0408	0.0413	0.0431	91	43	43.04	260	365
		Teton WA	0.0101	0.0100	0.0093	0.0101	5	43	43.01	260	365
		Washakie WA	0.0102	0.0086	0.0110	0.0110	5	43	43.01	260	365
		Wind River RA	0.0482	0.0480	0.0486	0.0486	91	43	43.05	260	365
		Yellowstone NP	0.0089	0.0088	0.0073	0.0089	5	43	43.01	260	365
SO_2	3-hour	Bridger WA	0.6693	0.5127	0.8016	0.8016	25	132	132.80	1300	1300
		Fitzpatrick WA	0.1214	0.1947	0.1197	0.1947	25	132	132.19	1300	1300
		Grand Teton NP	0.0695	0.0661	0.0756	0.0756	25	132	132.08	1300	1300
		Gros Venture WA	0.1524	0.1121	0.1705	0.1705	512	132	132.17	1300	1300
		North Absoroka WA	0.0247	0.0305	0.0184	0.0305	25	132	132.03	1300	1300
		Popo Agie WA	0.1510	0.1820	0.1533	0.1820	512	132	132.18	1300	1300
		Teton WA	0.0495	0.0389	0.0380	0.0495	25	132	132.05	1300	1300
		Washakie WA	0.0488	0.0348	0.0437	0.0488	25	132	132.05	1300	1300
		Wind River RA	0.1315	0.1793	0.1851	0.1851	512	132	132.19	1300	1300
		Yellowstone NP	0.0511	0.0275	0.0340	0.0511	25	132	132.05	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.2.2
Maximum Modeled SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas
from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Bridger WA	0.0063	0.0045	0.0055	0.0063	4	9	9.01	60	80
		Fitzpatrick WA	0.0008	0.0007	0.0007	0.0008	4	9	9.00	60	80
		Grand Teton NP	0.0002	0.0003	0.0002	0.0003	4	9	9.00	60	80
		Gros Venture WA	0.0006	0.0006	0.0005	0.0006	17	9	9.00	60	80
		North Absoroka WA	0.0001	0.0001	0.0001	0.0001	4	9	9.00	60	80
		Popo Agie WA	0.0020	0.0019	0.0018	0.0020	17	9	9.00	60	80
		Teton WA	0.0002	0.0002	0.0001	0.0002	4	9	9.00	60	80
		Washakie WA	0.0002	0.0002	0.0002	0.0002	4	9	9.00	60	80
		Wind River RA	0.0015	0.0010	0.0013	0.0015	17	9	9.00	60	80
		Yellowstone NP	0.0001	0.0001	0.0001	0.0001	4	9	9.00	60	80
SO_2	24-hour	Bridger WA	0.0447	0.0442	0.0553	0.0553	5	43	43.06	260	365
		Fitzpatrick WA	0.0075	0.0138	0.0085	0.0138	5	43	43.01	260	365
		Grand Teton NP	0.0036	0.0061	0.0038	0.0061	5	43	43.01	260	365
		Gros Venture WA	0.0095	0.0105	0.0127	0.0127	91	43	43.01	260	365
		North Absoroka WA	0.0013	0.0022	0.0014	0.0022	5	43	43.00	260	365
		Popo Agie WA	0.0136	0.0119	0.0152	0.0152	91	43	43.02	260	365
		Teton WA	0.0028	0.0036	0.0022	0.0036	5	43	43.00	260	365
		Washakie WA	0.0032	0.0029	0.0037	0.0037	5	43	43.00	260	365
		Wind River RA	0.0135	0.0123	0.0172	0.0172	91	43	43.02	260	365
		Yellowstone NP	0.0019	0.0031	0.0018	0.0031	5	43	43.00	260	365
SO_2	3-hour	Bridger WA	0.1490	0.1428	0.2438	0.2438	25	132	132.24	1300	1300
		Fitzpatrick WA	0.0287	0.0471	0.0377	0.0471	25	132	132.05	1300	1300
		Grand Teton NP	0.0143	0.0247	0.0238	0.0247	25	132	132.02	1300	1300
		Gros Venture WA	0.0397	0.0307	0.0546	0.0546	512	132	132.05	1300	1300
		North Absoroka WA	0.0056	0.0086	0.0041	0.0086	25	132	132.01	1300	1300
		Popo Agie WA	0.0494	0.0513	0.0547	0.0547	512	132	132.05	1300	1300
		Teton WA	0.0147	0.0129	0.0094	0.0147	25	132	132.01	1300	1300
		Washakie WA	0.0147	0.0118	0.0128	0.0147	25	132	132.01	1300	1300
		Wind River RA	0.0448	0.0441	0.0675	0.0675	512	132	132.07	1300	1300
		Yellowstone NP	0.0114	0.0095	0.0094	0.0114	25	132	132.01	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.2.3
Maximum Modeled SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Bridger WA	0.0073	0.0053	0.0065	0.0073	4	9	9.01	60	80
		Fitzpatrick WA	0.0010	0.0008	0.0008	0.0010	4	9	9.00	60	80
		Grand Teton NP	0.0002	0.0003	0.0002	0.0003	4	9	9.00	60	80
		Gros Venture WA	0.0008	0.0006	0.0006	0.0008	17	9	9.00	60	80
		North Absoroka WA	0.0001	0.0001	0.0001	0.0001	4	9	9.00	60	80
		Popo Agie WA	0.0022	0.0021	0.0021	0.0022	17	9	9.00	60	80
		Teton WA	0.0002	0.0002	0.0001	0.0002	4	9	9.00	60	80
		Washakie WA	0.0002	0.0002	0.0002	0.0002	4	9	9.00	60	80
		Wind River RA	0.0016	0.0012	0.0015	0.0016	17	9	9.00	60	80
		Yellowstone NP	0.0001	0.0001	0.0001	0.0001	4	9	9.00	60	80
SO_2	24-hour	Bridger WA	0.0492	0.0549	0.0792	0.0792	5	43	43.08	260	365
		Fitzpatrick WA	0.0099	0.0195	0.0087	0.0195	5	43	43.02	260	365
		Grand Teton NP	0.0051	0.0058	0.0049	0.0058	5	43	43.01	260	365
		Gros Venture WA	0.0089	0.0099	0.0123	0.0123	91	43	43.01	260	365
		North Absoroka WA	0.0015	0.0027	0.0019	0.0027	5	43	43.00	260	365
		Popo Agie WA	0.0128	0.0144	0.0143	0.0144	91	43	43.01	260	365
		Teton WA	0.0033	0.0034	0.0030	0.0034	5	43	43.00	260	365
		Washakie WA	0.0034	0.0028	0.0037	0.0037	5	43	43.00	260	365
		Wind River RA	0.0137	0.0152	0.0163	0.0163	91	43	43.02	260	365
		Yellowstone NP	0.0027	0.0030	0.0023	0.0030	5	43	43.00	260	365
SO_2	3-hour	Bridger WA	0.2196	0.1494	0.2339	0.2339	25	132	132.23	1300	1300
		Fitzpatrick WA	0.0344	0.0636	0.0393	0.0636	25	132	132.06	1300	1300
		Grand Teton NP	0.0207	0.0231	0.0235	0.0235	25	132	132.02	1300	1300
		Gros Venture WA	0.0480	0.0328	0.0540	0.0540	512	132	132.05	1300	1300
		North Absoroka WA	0.0080	0.0095	0.0059	0.0095	25	132	132.01	1300	1300
		Popo Agie WA	0.0467	0.0583	0.0518	0.0583	512	132	132.06	1300	1300
		Teton WA	0.0156	0.0122	0.0127	0.0156	25	132	132.02	1300	1300
		Washakie WA	0.0160	0.0112	0.0134	0.0160	25	132	132.02	1300	1300
		Wind River RA	0.0454	0.0581	0.0615	0.0615	512	132	132.06	1300	1300
		Yellowstone NP	0.0164	0.0093	0.0115	0.0164	25	132	132.02	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.2.4
Maximum Modeled SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Bridger WA	0.0215	0.0156	0.0193	0.0215	4	9	9.02	60	80
		Fitzpatrick WA	0.0029	0.0024	0.0024	0.0029	4	9	9.00	60	80
		Grand Teton NP	0.0007	0.0009	0.0006	0.0009	4	9	9.00	60	80
		Gros Venture WA	0.0022	0.0019	0.0017	0.0022	17	9	9.00	60	80
		North Absoroka WA	0.0002	0.0003	0.0002	0.0003	4	9	9.00	60	80
		Popo Agie WA	0.0066	0.0062	0.0063	0.0066	17	9	9.01	60	80
		Teton WA	0.0006	0.0005	0.0004	0.0006	4	9	9.00	60	80
		Washakie WA	0.0007	0.0007	0.0006	0.0007	4	9	9.00	60	80
		Wind River RA	0.0049	0.0034	0.0044	0.0049	17	9	9.00	60	80
		Yellowstone NP	0.0003	0.0003	0.0002	0.0003	4	9	9.00	60	80
SO_2	24-hour	Bridger WA	0.1435	0.1578	0.2349	0.2349	5	43	43.23	260	365
		Fitzpatrick WA	0.0300	0.0597	0.0265	0.0597	5	43	43.06	260	365
		Grand Teton NP	0.0156	0.0171	0.0141	0.0171	5	43	43.02	260	365
		Gros Venture WA	0.0255	0.0282	0.0371	0.0371	91	43	43.04	260	365
		North Absoroka WA	0.0044	0.0082	0.0058	0.0082	5	43	43.01	260	365
		Popo Agie WA	0.0376	0.0422	0.0392	0.0422	91	43	43.04	260	365
		Teton WA	0.0098	0.0098	0.0090	0.0098	5	43	43.01	260	365
		Washakie WA	0.0102	0.0080	0.0108	0.0108	5	43	43.01	260	365
		Wind River RA	0.0396	0.0468	0.0404	0.0468	91	43	43.05	260	365
		Yellowstone NP	0.0083	0.0087	0.0068	0.0087	5	43	43.01	260	365
SO_2	3-hour	Bridger WA	0.6562	0.4741	0.6658	0.6658	25	132	132.67	1300	1300
		Fitzpatrick WA	0.1025	0.1952	0.1154	0.1952	25	132	132.20	1300	1300
		Grand Teton NP	0.0629	0.0670	0.0684	0.0684	25	132	132.07	1300	1300
		Gros Venture WA	0.1456	0.1017	0.1581	0.1581	512	132	132.16	1300	1300
		North Absoroka WA	0.0240	0.0288	0.0178	0.0288	25	132	132.03	1300	1300
		Popo Agie WA	0.1348	0.1773	0.1304	0.1773	512	132	132.18	1300	1300
		Teton WA	0.0470	0.0351	0.0374	0.0470	25	132	132.05	1300	1300
		Washakie WA	0.0486	0.0322	0.0400	0.0486	25	132	132.05	1300	1300
		Wind River RA	0.1224	0.1766	0.1363	0.1766	512	132	132.18	1300	1300
		Yellowstone NP	0.0495	0.0271	0.0348	0.0495	25	132	132.05	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.2.5
Maximum Modeled SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Bridger WA	0.0051	0.0037	0.0045	0.0051	4	9	9.01	60	80
		Fitzpatrick WA	0.0007	0.0006	0.0006	0.0007	4	9	9.00	60	80
		Grand Teton NP	0.0002	0.0002	0.0001	0.0002	4	9	9.00	60	80
		Gros Venture WA	0.0005	0.0005	0.0004	0.0005	17	9	9.00	60	80
		North Absoroka WA	0.0001	0.0001	0.0001	0.0001	4	9	9.00	60	80
		Popo Agie WA	0.0015	0.0015	0.0015	0.0015	17	9	9.00	60	80
		Teton WA	0.0001	0.0001	0.0001	0.0001	4	9	9.00	60	80
		Washakie WA	0.0002	0.0002	0.0001	0.0002	4	9	9.00	60	80
		Wind River RA	0.0011	0.0008	0.0010	0.0011	17	9	9.00	60	80
		Yellowstone NP	0.0001	0.0001	0.0001	0.0001	4	9	9.00	60	80
SO_2	24-hour	Bridger WA	0.0343	0.0384	0.0552	0.0552	5	43	43.06	260	365
		Fitzpatrick WA	0.0069	0.0136	0.0061	0.0136	5	43	43.01	260	365
		Grand Teton NP	0.0036	0.0041	0.0034	0.0041	5	43	43.00	260	365
		Gros Venture WA	0.0062	0.0069	0.0086	0.0086	91	43	43.01	260	365
		North Absoroka WA	0.0010	0.0019	0.0013	0.0019	5	43	43.00	260	365
		Popo Agie WA	0.0090	0.0100	0.0100	0.0100	91	43	43.01	260	365
		Teton WA	0.0023	0.0024	0.0021	0.0024	5	43	43.00	260	365
		Washakie WA	0.0023	0.0019	0.0026	0.0026	5	43	43.00	260	365
		Wind River RA	0.0095	0.0106	0.0114	0.0114	91	43	43.01	260	365
		Yellowstone NP	0.0019	0.0021	0.0016	0.0021	5	43	43.00	260	365
SO_2	3-hour	Bridger WA	0.1530	0.1044	0.1635	0.1635	25	132	132.16	1300	1300
		Fitzpatrick WA	0.0240	0.0443	0.0274	0.0443	25	132	132.04	1300	1300
		Grand Teton NP	0.0145	0.0161	0.0164	0.0164	25	132	132.02	1300	1300
		Gros Venture WA	0.0335	0.0229	0.0377	0.0377	512	132	132.04	1300	1300
		North Absoroka WA	0.0056	0.0066	0.0041	0.0066	25	132	132.01	1300	1300
		Popo Agie WA	0.0326	0.0406	0.0362	0.0406	512	132	132.04	1300	1300
		Teton WA	0.0109	0.0085	0.0089	0.0109	25	132	132.01	1300	1300
		Washakie WA	0.0112	0.0078	0.0093	0.0112	25	132	132.01	1300	1300
		Wind River RA	0.0316	0.0405	0.0434	0.0434	512	132	132.04	1300	1300
		Yellowstone NP	0.0114	0.0065	0.0080	0.0114	25	132	132.01	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.2.6
Maximum Modeled SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Bridger WA	2.47E-04	1.80E-04	2.31E-04	2.47E-04	4	9	9.00	60	80
		Fitzpatrick WA	3.58E-05	2.64E-05	2.68E-05	3.58E-05	4	9	9.00	60	80
		Grand Teton NP	8.92E-06	7.01E-06	5.65E-06	8.92E-06	4	9	9.00	60	80
		Gros Venture WA	2.81E-05	1.98E-05	1.75E-05	2.81E-05	17	9	9.00	60	80
		North Absoroka WA	2.73E-06	2.92E-06	2.65E-06	2.92E-06	4	9	9.00	60	80
		Popo Agie WA	6.57E-05	6.29E-05	6.58E-05	6.58E-05	17	9	9.00	60	80
		Teton WA	6.99E-06	4.61E-06	4.32E-06	6.99E-06	4	9	9.00	60	80
		Washakie WA	7.63E-06	6.00E-06	5.87E-06	7.63E-06	4	9	9.00	60	80
		Wind River RA	5.18E-05	3.65E-05	4.91E-05	5.18E-05	17	9	9.00	60	80
		Yellowstone NP	3.87E-06	2.98E-06	2.92E-06	3.87E-06	4	9	9.00	60	80
SO_2	24-hour	Bridger WA	0.0024	0.0016	0.0024	0.0024	5	43	43.00	260	365
		Fitzpatrick WA	0.0005	0.0009	0.0004	0.0009	5	43	43.00	260	365
		Grand Teton NP	0.0002	0.0002	0.0002	0.0002	5	43	43.00	260	365
		Gros Venture WA	0.0005	0.0004	0.0005	0.0005	91	43	43.00	260	365
		North Absoroka WA	0.0001	0.0001	0.0001	0.0001	5	43	43.00	260	365
		Popo Agie WA	0.0005	0.0006	0.0006	0.0006	91	43	43.00	260	365
		Teton WA	0.0002	0.0001	0.0001	0.0002	5	43	43.00	260	365
		Washakie WA	0.0002	0.0001	0.0002	0.0002	5	43	43.00	260	365
		Wind River RA	0.0006	0.0007	0.0005	0.0007	91	43	43.00	260	365
		Yellowstone NP	0.0001	0.0001	0.0001	0.0001	5	43	43.00	260	365
SO_2	3-hour	Bridger WA	0.0093	0.0073	0.0094	0.0094	25	132	132.01	1300	1300
		Fitzpatrick WA	0.0018	0.0028	0.0017	0.0028	25	132	132.00	1300	1300
		Grand Teton NP	0.0010	0.0005	0.0009	0.0010	25	132	132.00	1300	1300
		Gros Venture WA	0.0022	0.0017	0.0022	0.0022	512	132	132.00	1300	1300
		North Absoroka WA	0.0004	0.0005	0.0003	0.0005	25	132	132.00	1300	1300
		Popo Agie WA	0.0019	0.0023	0.0020	0.0023	512	132	132.00	1300	1300
		Teton WA	0.0008	0.0005	0.0006	0.0008	25	132	132.00	1300	1300
		Washakie WA	0.0008	0.0004	0.0007	0.0008	25	132	132.00	1300	1300
		Wind River RA	0.0015	0.0028	0.0020	0.0028	512	132	132.00	1300	1300
		Yellowstone NP	0.0008	0.0003	0.0006	0.0008	25	132	132.00	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.2.7
Maximum Modeled SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Bridger WA	0.0082	0.0059	0.0069	0.0082	4	9	9.01	60	80
		Fitzpatrick WA	0.0013	0.0012	0.0012	0.0013	4	9	9.00	60	80
		Grand Teton NP	0.0004	0.0005	0.0004	0.0005	4	9	9.00	60	80
		Gros Venture WA	0.0010	0.0010	0.0008	0.0010	17	9	9.00	60	80
		North Absoroka WA	0.0003	0.0003	0.0002	0.0003	4	9	9.00	60	80
		Popo Agie WA	0.0032	0.0031	0.0030	0.0032	17	9	9.00	60	80
		Teton WA	0.0004	0.0003	0.0002	0.0004	4	9	9.00	60	80
		Washakie WA	0.0005	0.0005	0.0004	0.0005	4	9	9.00	60	80
		Wind River RA	0.0022	0.0017	0.0019	0.0022	17	9	9.00	60	80
		Yellowstone NP	0.0002	0.0002	0.0002	0.0002	4	9	9.00	60	80
SO_2	24-hour	Bridger WA	0.0617	0.0632	0.0816	0.0816	5	43	43.08	260	365
		Fitzpatrick WA	0.0105	0.0200	0.0121	0.0200	5	43	43.02	260	365
		Grand Teton NP	0.0062	0.0093	0.0067	0.0093	5	43	43.01	260	365
		Gros Venture WA	0.0121	0.0137	0.0167	0.0167	91	43	43.02	260	365
		North Absoroka WA	0.0075	0.0052	0.0046	0.0075	5	43	43.01	260	365
		Popo Agie WA	0.0165	0.0233	0.0190	0.0233	91	43	43.02	260	365
		Teton WA	0.0062	0.0052	0.0042	0.0062	5	43	43.01	260	365
		Washakie WA	0.0064	0.0052	0.0074	0.0074	5	43	43.01	260	365
		Wind River RA	0.0144	0.0208	0.0211	0.0211	91	43	43.02	260	365
		Yellowstone NP	0.0051	0.0047	0.0033	0.0051	5	43	43.01	260	365
SO_2	3-hour	Bridger WA	0.2098	0.1694	0.2540	0.2540	25	132	132.25	1300	1300
		Fitzpatrick WA	0.0371	0.0681	0.0453	0.0681	25	132	132.07	1300	1300
		Grand Teton NP	0.0217	0.0333	0.0303	0.0333	25	132	132.03	1300	1300
		Gros Venture WA	0.0590	0.0382	0.0716	0.0716	512	132	132.07	1300	1300
		North Absoroka WA	0.0198	0.0155	0.0102	0.0198	25	132	132.02	1300	1300
		Popo Agie WA	0.0554	0.0831	0.0631	0.0831	512	132	132.08	1300	1300
		Teton WA	0.0213	0.0178	0.0178	0.0213	25	132	132.02	1300	1300
		Washakie WA	0.0243	0.0163	0.0216	0.0243	25	132	132.02	1300	1300
		Wind River RA	0.0557	0.0920	0.0728	0.0920	512	132	132.09	1300	1300
		Yellowstone NP	0.0192	0.0132	0.0146	0.0192	25	132	132.02	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.2.8
Maximum Modeled SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Bridger WA	0.0092	0.0067	0.0079	0.0092	4	9	9.01	60	80
		Fitzpatrick WA	0.0015	0.0013	0.0012	0.0015	4	9	9.00	60	80
		Grand Teton NP	0.0005	0.0006	0.0004	0.0006	4	9	9.00	60	80
		Gros Venture WA	0.0012	0.0010	0.0009	0.0012	17	9	9.00	60	80
		North Absoroka WA	0.0003	0.0003	0.0002	0.0003	4	9	9.00	60	80
		Popo Agie WA	0.0034	0.0033	0.0032	0.0034	17	9	9.00	60	80
		Teton WA	0.0004	0.0003	0.0003	0.0004	4	9	9.00	60	80
		Washakie WA	0.0005	0.0005	0.0004	0.0005	4	9	9.00	60	80
		Wind River RA	0.0024	0.0018	0.0020	0.0024	17	9	9.00	60	80
		Yellowstone NP	0.0003	0.0002	0.0002	0.0003	4	9	9.00	60	80
SO_2	24-hour	Bridger WA	0.0620	0.0657	0.0879	0.0879	5	43	43.09	260	365
		Fitzpatrick WA	0.0136	0.0252	0.0138	0.0252	5	43	43.03	260	365
		Grand Teton NP	0.0076	0.0090	0.0064	0.0090	5	43	43.01	260	365
		Gros Venture WA	0.0121	0.0132	0.0181	0.0181	91	43	43.02	260	365
		North Absoroka WA	0.0075	0.0051	0.0052	0.0075	5	43	43.01	260	365
		Popo Agie WA	0.0173	0.0231	0.0185	0.0231	91	43	43.02	260	365
		Teton WA	0.0076	0.0050	0.0046	0.0076	5	43	43.01	260	365
		Washakie WA	0.0074	0.0054	0.0075	0.0075	5	43	43.01	260	365
		Wind River RA	0.0158	0.0249	0.0199	0.0249	91	43	43.02	260	365
		Yellowstone NP	0.0053	0.0047	0.0038	0.0053	5	43	43.01	260	365
SO_2	3-hour	Bridger WA	0.2638	0.1797	0.2959	0.2959	25	132	132.30	1300	1300
		Fitzpatrick WA	0.0409	0.0872	0.0512	0.0872	25	132	132.09	1300	1300
		Grand Teton NP	0.0262	0.0319	0.0292	0.0319	25	132	132.03	1300	1300
		Gros Venture WA	0.0720	0.0418	0.0742	0.0742	512	132	132.07	1300	1300
		North Absoroka WA	0.0200	0.0164	0.0109	0.0200	25	132	132.02	1300	1300
		Popo Agie WA	0.0536	0.0904	0.0629	0.0904	512	132	132.09	1300	1300
		Teton WA	0.0244	0.0170	0.0182	0.0244	25	132	132.02	1300	1300
		Washakie WA	0.0272	0.0166	0.0219	0.0272	25	132	132.03	1300	1300
		Wind River RA	0.0552	0.1018	0.0652	0.1018	512	132	132.10	1300	1300
		Yellowstone NP	0.0237	0.0134	0.0180	0.0237	25	132	132.02	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.2.9
Maximum Modeled SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas
from Pinedale Anticline Project and Regional Sources - Alterntive C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Bridger WA	0.0235	0.0171	0.0207	0.0235	4	9	9.02	60	80
		Fitzpatrick WA	0.0034	0.0028	0.0029	0.0034	4	9	9.00	60	80
		Grand Teton NP	0.0009	0.0011	0.0008	0.0011	4	9	9.00	60	80
		Gros Venture WA	0.0026	0.0023	0.0020	0.0026	17	9	9.00	60	80
		North Absoroka WA	0.0005	0.0005	0.0004	0.0005	4	9	9.00	60	80
		Popo Agie WA	0.0077	0.0074	0.0074	0.0077	17	9	9.01	60	80
		Teton WA	0.0008	0.0007	0.0005	0.0008	4	9	9.00	60	80
		Washakie WA	0.0010	0.0009	0.0008	0.0010	4	9	9.00	60	80
		Wind River RA	0.0056	0.0041	0.0049	0.0056	17	9	9.01	60	80
		Yellowstone NP	0.0005	0.0004	0.0004	0.0005	4	9	9.00	60	80
SO_2	24-hour	Bridger WA	0.1573	0.1686	0.2391	0.2391	5	43	43.24	260	365
		Fitzpatrick WA	0.0338	0.0653	0.0305	0.0653	5	43	43.07	260	365
		Grand Teton NP	0.0180	0.0203	0.0157	0.0203	5	43	43.02	260	365
		Gros Venture WA	0.0290	0.0317	0.0428	0.0428	91	43	43.04	260	365
		North Absoroka WA	0.0079	0.0102	0.0090	0.0102	5	43	43.01	260	365
		Popo Agie WA	0.0403	0.0501	0.0449	0.0501	91	43	43.05	260	365
		Teton WA	0.0139	0.0114	0.0105	0.0139	5	43	43.01	260	365
		Washakie WA	0.0138	0.0105	0.0143	0.0143	5	43	43.01	260	365
		Wind River RA	0.0413	0.0567	0.0427	0.0567	91	43	43.06	260	365
		Yellowstone NP	0.0093	0.0103	0.0084	0.0103	5	43	43.01	260	365
SO_2	3-hour	Bridger WA	0.6995	0.4734	0.7563	0.7563	25	132	132.76	1300	1300
		Fitzpatrick WA	0.1096	0.2194	0.1275	0.2194	25	132	132.22	1300	1300
		Grand Teton NP	0.0684	0.0753	0.0742	0.0753	25	132	132.08	1300	1300
		Gros Venture WA	0.1644	0.1125	0.1777	0.1777	512	132	132.18	1300	1300
		North Absoroka WA	0.0271	0.0343	0.0227	0.0343	25	132	132.03	1300	1300
		Popo Agie WA	0.1408	0.1932	0.1448	0.1932	512	132	132.19	1300	1300
		Teton WA	0.0577	0.0403	0.0420	0.0577	25	132	132.06	1300	1300
		Washakie WA	0.0587	0.0359	0.0472	0.0587	25	132	132.06	1300	1300
		Wind River RA	0.1338	0.1926	0.1484	0.1926	512	132	132.19	1300	1300
		Yellowstone NP	0.0566	0.0311	0.0413	0.0566	25	132	132.06	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.2.10
Maximum Modeled SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Bridger WA	0.0070	0.0051	0.0060	0.0070	4	9	9.01	60	80
		Fitzpatrick WA	0.0012	0.0010	0.0010	0.0012	4	9	9.00	60	80
		Grand Teton NP	0.0004	0.0005	0.0003	0.0005	4	9	9.00	60	80
		Gros Venture WA	0.0009	0.0008	0.0007	0.0009	17	9	9.00	60	80
		North Absoroka WA	0.0003	0.0002	0.0002	0.0003	4	9	9.00	60	80
		Popo Agie WA	0.0027	0.0027	0.0026	0.0027	17	9	9.00	60	80
		Teton WA	0.0003	0.0003	0.0002	0.0003	4	9	9.00	60	80
		Washakie WA	0.0005	0.0004	0.0004	0.0005	4	9	9.00	60	80
		Wind River RA	0.0019	0.0014	0.0016	0.0019	17	9	9.00	60	80
		Yellowstone NP	0.0002	0.0002	0.0002	0.0002	4	9	9.00	60	80
SO_2	24-hour	Bridger WA	0.0478	0.0492	0.0673	0.0673	5	43	43.07	260	365
		Fitzpatrick WA	0.0106	0.0199	0.0111	0.0199	5	43	43.02	260	365
		Grand Teton NP	0.0062	0.0072	0.0050	0.0072	5	43	43.01	260	365
		Gros Venture WA	0.0095	0.0102	0.0142	0.0142	91	43	43.01	260	365
		North Absoroka WA	0.0075	0.0045	0.0045	0.0075	5	43	43.01	260	365
		Popo Agie WA	0.0139	0.0187	0.0145	0.0187	91	43	43.02	260	365
		Teton WA	0.0062	0.0041	0.0041	0.0062	5	43	43.01	260	365
		Washakie WA	0.0064	0.0048	0.0065	0.0065	5	43	43.01	260	365
		Wind River RA	0.0115	0.0206	0.0146	0.0206	91	43	43.02	260	365
		Yellowstone NP	0.0051	0.0040	0.0032	0.0051	5	43	43.01	260	365
SO_2	3-hour	Bridger WA	0.1971	0.1358	0.2405	0.2405	25	132	132.24	1300	1300
		Fitzpatrick WA	0.0325	0.0674	0.0380	0.0674	25	132	132.07	1300	1300
		Grand Teton NP	0.0216	0.0255	0.0221	0.0255	25	132	132.03	1300	1300
		Gros Venture WA	0.0586	0.0315	0.0572	0.0586	512	132	132.06	1300	1300
		North Absoroka WA	0.0198	0.0140	0.0095	0.0198	25	132	132.02	1300	1300
		Popo Agie WA	0.0425	0.0792	0.0483	0.0792	512	132	132.08	1300	1300
		Teton WA	0.0202	0.0133	0.0150	0.0202	25	132	132.02	1300	1300
		Washakie WA	0.0231	0.0141	0.0196	0.0231	25	132	132.02	1300	1300
		Wind River RA	0.0415	0.0889	0.0528	0.0889	512	132	132.09	1300	1300
		Yellowstone NP	0.0192	0.0107	0.0145	0.0192	25	132	132.02	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.2.11
Maximum Modeled SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Bridger WA	0.0022	0.0016	0.0016	0.0022	4	9	9.00	60	80
		Fitzpatrick WA	0.0005	0.0005	0.0004	0.0005	4	9	9.00	60	80
		Grand Teton NP	0.0003	0.0003	0.0002	0.0003	4	9	9.00	60	80
		Gros Venture WA	0.0004	0.0004	0.0003	0.0004	17	9	9.00	60	80
		North Absoroka WA	0.0002	0.0002	0.0001	0.0002	4	9	9.00	60	80
		Popo Agie WA	0.0013	0.0013	0.0012	0.0013	17	9	9.00	60	80
		Teton WA	0.0002	0.0002	0.0001	0.0002	4	9	9.00	60	80
		Washakie WA	0.0003	0.0003	0.0003	0.0003	4	9	9.00	60	80
		Wind River RA	0.0008	0.0007	0.0006	0.0008	17	9	9.00	60	80
		Yellowstone NP	0.0002	0.0001	0.0001	0.0002	4	9	9.00	60	80
SO_2	24-hour	Bridger WA	0.0216	0.0175	0.0314	0.0314	5	43	43.03	260	365
		Fitzpatrick WA	0.0054	0.0103	0.0059	0.0103	5	43	43.01	260	365
		Grand Teton NP	0.0036	0.0032	0.0025	0.0036	5	43	43.00	260	365
		Gros Venture WA	0.0046	0.0046	0.0057	0.0057	91	43	43.01	260	365
		North Absoroka WA	0.0073	0.0037	0.0033	0.0073	5	43	43.01	260	365
		Popo Agie WA	0.0077	0.0087	0.0077	0.0087	91	43	43.01	260	365
		Teton WA	0.0050	0.0026	0.0031	0.0050	5	43	43.01	260	365
		Washakie WA	0.0052	0.0036	0.0058	0.0058	5	43	43.01	260	365
		Wind River RA	0.0063	0.0099	0.0058	0.0099	91	43	43.01	260	365
		Yellowstone NP	0.0032	0.0024	0.0025	0.0032	5	43	43.00	260	365
SO_2	3-hour	Bridger WA	0.0814	0.0702	0.1039	0.1039	25	132	132.10	1300	1300
		Fitzpatrick WA	0.0152	0.0250	0.0156	0.0250	25	132	132.03	1300	1300
		Grand Teton NP	0.0132	0.0124	0.0100	0.0132	25	132	132.01	1300	1300
		Gros Venture WA	0.0297	0.0121	0.0198	0.0297	512	132	132.03	1300	1300
		North Absoroka WA	0.0195	0.0096	0.0079	0.0195	25	132	132.02	1300	1300
		Popo Agie WA	0.0246	0.0551	0.0293	0.0551	512	132	132.06	1300	1300
		Teton WA	0.0145	0.0063	0.0072	0.0145	25	132	132.01	1300	1300
		Washakie WA	0.0194	0.0085	0.0142	0.0194	25	132	132.02	1300	1300
		Wind River RA	0.0192	0.0611	0.0225	0.0611	512	132	132.06	1300	1300
		Yellowstone NP	0.0101	0.0068	0.0070	0.0101	25	132	132.01	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.3.1
Maximum Modeled PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Bridger WA	0.0975	0.0796	0.0931	0.0975	4	9	9.10	50	50
		Fitzpatrick WA	0.0203	0.0193	0.0170	0.0203	4	9	9.02	50	50
		Grand Teton NP	0.0064	0.0080	0.0049	0.0080	4	9	9.01	50	50
		Gros Venture WA	0.0174	0.0146	0.0140	0.0174	17	9	9.02	50	50
		North Absoroka WA	0.0020	0.0034	0.0022	0.0034	4	9	9.00	50	50
		Popo Agie WA	0.0310	0.0350	0.0320	0.0350	17	9	9.04	50	50
		Teton WA	0.0050	0.0047	0.0036	0.0050	4	9	9.01	50	50
		Washakie WA	0.0054	0.0055	0.0044	0.0055	4	9	9.01	50	50
		Wind River RA	0.0260	0.0226	0.0254	0.0260	17	9	9.03	50	50
		Yellowstone NP	0.0028	0.0035	0.0023	0.0035	4	9	9.00	50	50
PM_{10}	24-hour	Bridger WA	1.1785	1.4278	1.7955	1.7955	8	32	33.80	150	150
		Fitzpatrick WA	0.3130	0.6011	0.3779	0.6011	8	32	32.60	150	150
		Grand Teton NP	0.1347	0.1764	0.1265	0.1764	8	32	32.18	150	150
		Gros Venture WA	0.2474	0.3590	0.3275	0.3590	30	32	32.36	150	150
		North Absoroka WA	0.0526	0.1340	0.0577	0.1340	8	32	32.13	150	150
		Popo Agie WA	0.3042	0.3301	0.4596	0.4596	30	32	32.46	150	150
		Teton WA	0.1158	0.1327	0.0777	0.1327	8	32	32.13	150	150
		Washakie WA	0.1710	0.1288	0.1304	0.1710	8	32	32.17	150	150
		Wind River RA	0.2589	0.5398	0.4167	0.5398	30	32	32.54	150	150
		Yellowstone NP	0.0836	0.1178	0.0615	0.1178	8	32	32.12	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.3.2
Maximum Modeled PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Bridger WA	0.1306	0.1086	0.1233	0.1306	4	9	9.13	50	50
		Fitzpatrick WA	0.0270	0.0275	0.0250	0.0275	4	9	9.03	50	50
		Grand Teton NP	0.0089	0.0126	0.0075	0.0126	4	9	9.01	50	50
		Gros Venture WA	0.0242	0.0216	0.0209	0.0242	17	9	9.02	50	50
		North Absoroka WA	0.0028	0.0050	0.0030	0.0050	4	9	9.00	50	50
		Popo Agie WA	0.0428	0.0486	0.0444	0.0486	17	9	9.05	50	50
		Teton WA	0.0070	0.0069	0.0053	0.0070	4	9	9.01	50	50
		Washakie WA	0.0073	0.0079	0.0064	0.0079	4	9	9.01	50	50
		Wind River RA	0.0352	0.0322	0.0349	0.0352	17	9	9.04	50	50
		Yellowstone NP	0.0039	0.0055	0.0034	0.0055	4	9	9.01	50	50
PM_{10}	24-hour	Bridger WA	1.5652	2.4080	2.5413	2.5413	8	32	34.54	150	150
		Fitzpatrick WA	0.4031	0.7500	0.5238	0.7500	8	32	32.75	150	150
		Grand Teton NP	0.1639	0.3127	0.2234	0.3127	8	32	32.31	150	150
		Gros Venture WA	0.3120	0.5987	0.5473	0.5987	30	32	32.60	150	150
		North Absoroka WA	0.0659	0.1636	0.0946	0.1636	8	32	32.16	150	150
		Popo Agie WA	0.4055	0.4923	0.6051	0.6051	30	32	32.61	150	150
		Teton WA	0.1468	0.1787	0.1386	0.1787	8	32	32.18	150	150
		Washakie WA	0.2232	0.1767	0.1914	0.2232	8	32	32.22	150	150
		Wind River RA	0.3324	0.6995	0.6428	0.6995	30	32	32.70	150	150
		Yellowstone NP	0.1027	0.1658	0.0838	0.1658	8	32	32.17	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.3.3
Maximum Modeled PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1] 2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	Maximum Direct Modeled Impact ($\mu g/m^3$)	Applicable PSD Increment[2] ($\mu g/m^3$)	Background Concentration[3] ($\mu g/m^3$)	Maximum Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
PM_{10}	Annual	Bridger WA	0.1323	0.1131	0.1266	0.1323	4	9	9.13	50	50
		Fitzpatrick WA	0.0295	0.0281	0.0253	0.0295	4	9	9.03	50	50
		Grand Teton NP	0.0101	0.0113	0.0071	0.0113	4	9	9.01	50	50
		Gros Venture WA	0.0263	0.0208	0.0202	0.0263	17	9	9.03	50	50
		North Absoroka WA	0.0029	0.0047	0.0031	0.0047	4	9	9.00	50	50
		Popo Agie WA	0.0423	0.0485	0.0442	0.0485	17	9	9.05	50	50
		Teton WA	0.0076	0.0066	0.0053	0.0076	4	9	9.01	50	50
		Washakie WA	0.0078	0.0076	0.0062	0.0078	4	9	9.01	50	50
		Wind River RA	0.0359	0.0324	0.0352	0.0359	17	9	9.04	50	50
		Yellowstone NP	0.0042	0.0050	0.0035	0.0050	4	9	9.01	50	50
PM_{10}	24-hour	Bridger WA	1.8477	1.9583	2.6937	2.6937	8	32	34.69	150	150
		Fitzpatrick WA	0.4749	0.8759	0.5536	0.8759	8	32	32.88	150	150
		Grand Teton NP	0.2049	0.2647	0.1815	0.2647	8	32	32.26	150	150
		Gros Venture WA	0.4181	0.4884	0.4579	0.4884	30	32	32.49	150	150
		North Absoroka WA	0.0779	0.2026	0.0831	0.2026	8	32	32.20	150	150
		Popo Agie WA	0.4669	0.5146	0.7004	0.7004	30	32	32.70	150	150
		Teton WA	0.1797	0.1999	0.1147	0.1999	8	32	32.20	150	150
		Washakie WA	0.2591	0.1938	0.1742	0.2591	8	32	32.26	150	150
		Wind River RA	0.3701	0.8135	0.4781	0.8135	30	32	32.81	150	150
		Yellowstone NP	0.1247	0.1724	0.0974	0.1724	8	32	32.17	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.3.4
Maximum Modeled PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Bridger WA	0.0982	0.0819	0.0932	0.0982	4	9	9.10	50	50
		Fitzpatrick WA	0.0210	0.0199	0.0182	0.0210	4	9	9.02	50	50
		Grand Teton NP	0.0070	0.0081	0.0051	0.0081	4	9	9.01	50	50
		Gros Venture WA	0.0186	0.0150	0.0144	0.0186	17	9	9.02	50	50
		North Absoroka WA	0.0022	0.0034	0.0023	0.0034	4	9	9.00	50	50
		Popo Agie WA	0.0313	0.0352	0.0326	0.0352	17	9	9.04	50	50
		Teton WA	0.0054	0.0047	0.0038	0.0054	4	9	9.01	50	50
		Washakie WA	0.0056	0.0056	0.0045	0.0056	4	9	9.01	50	50
		Wind River RA	0.0263	0.0232	0.0257	0.0263	17	9	9.03	50	50
		Yellowstone NP	0.0030	0.0036	0.0025	0.0036	4	9	9.00	50	50
PM_{10}	24-hour	Bridger WA	1.2963	1.4064	1.9301	1.9301	8	32	33.93	150	150
		Fitzpatrick WA	0.3262	0.6042	0.3757	0.6042	8	32	32.60	150	150
		Grand Teton NP	0.1389	0.1835	0.1244	0.1835	8	32	32.18	150	150
		Gros Venture WA	0.2819	0.3405	0.3159	0.3405	30	32	32.34	150	150
		North Absoroka WA	0.0534	0.1398	0.0583	0.1398	8	32	32.14	150	150
		Popo Agie WA	0.3197	0.3465	0.4763	0.4763	30	32	32.48	150	150
		Teton WA	0.1218	0.1396	0.0784	0.1396	8	32	32.14	150	150
		Washakie WA	0.1774	0.1341	0.1223	0.1774	8	32	32.18	150	150
		Wind River RA	0.2524	0.5578	0.3775	0.5578	30	32	32.56	150	150
		Yellowstone NP	0.0862	0.1208	0.0665	0.1208	8	32	32.12	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.3.5
Maximum Modeled PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Bridger WA	0.0447	0.0357	0.0418	0.0447	4	9	9.04	50	50
		Fitzpatrick WA	0.0090	0.0084	0.0078	0.0090	4	9	9.01	50	50
		Grand Teton NP	0.0029	0.0036	0.0022	0.0036	4	9	9.00	50	50
		Gros Venture WA	0.0079	0.0066	0.0063	0.0079	17	9	9.01	50	50
		North Absoroka WA	0.0009	0.0015	0.0010	0.0015	4	9	9.00	50	50
		Popo Agie WA	0.0144	0.0156	0.0147	0.0156	17	9	9.02	50	50
		Teton WA	0.0023	0.0021	0.0016	0.0023	4	9	9.00	50	50
		Washakie WA	0.0024	0.0025	0.0020	0.0025	4	9	9.00	50	50
		Wind River RA	0.0117	0.0101	0.0115	0.0117	17	9	9.01	50	50
		Yellowstone NP	0.0013	0.0016	0.0011	0.0016	4	9	9.00	50	50
PM_{10}	24-hour	Bridger WA	0.5180	0.5899	0.8475	0.8475	8	32	32.85	150	150
		Fitzpatrick WA	0.1305	0.2472	0.1409	0.2472	8	32	32.25	150	150
		Grand Teton NP	0.0526	0.0768	0.0526	0.0768	8	32	32.08	150	150
		Gros Venture WA	0.1013	0.1439	0.1791	0.1791	30	32	32.18	150	150
		North Absoroka WA	0.0210	0.0576	0.0241	0.0576	8	32	32.06	150	150
		Popo Agie WA	0.1264	0.1381	0.1839	0.1839	30	32	32.18	150	150
		Teton WA	0.0483	0.0581	0.0309	0.0581	8	32	32.06	150	150
		Washakie WA	0.0712	0.0557	0.0519	0.0712	8	32	32.07	150	150
		Wind River RA	0.1021	0.2217	0.1622	0.2217	30	32	32.22	150	150
		Yellowstone NP	0.0350	0.0511	0.0250	0.0511	8	32	32.05	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.3.6
Maximum Modeled PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1] 2001 (μg/m³)	2002 (μg/m³)	2003 (μg/m³)	Maximum Direct Modeled Impact (μg/m³)	Applicable PSD Increment[2] (μg/m³)	Background Concentration[3] (μg/m³)	Maximum Total Concentration (μg/m³)	WAAQS (μg/m³)	NAAQS (μg/m³)
PM_{10}	Annual	Bridger WA	0.0396	0.0333	0.0391	0.0396	4	9	9.04	50	50
		Fitzpatrick WA	0.0097	0.0089	0.0072	0.0097	4	9	9.01	50	50
		Grand Teton NP	0.0035	0.0037	0.0025	0.0037	4	9	9.00	50	50
		Gros Venture WA	0.0084	0.0067	0.0059	0.0084	17	9	9.01	50	50
		North Absoroka WA	0.0011	0.0017	0.0011	0.0017	4	9	9.00	50	50
		Popo Agie WA	0.0144	0.0162	0.0152	0.0162	17	9	9.02	50	50
		Teton WA	0.0027	0.0024	0.0017	0.0027	4	9	9.00	50	50
		Washakie WA	0.0029	0.0028	0.0021	0.0029	4	9	9.00	50	50
		Wind River RA	0.0113	0.0104	0.0110	0.0113	17	9	9.01	50	50
		Yellowstone NP	0.0015	0.0018	0.0012	0.0018	4	9	9.00	50	50
PM_{10}	24-hour	Bridger WA	0.4305	0.4090	0.5468	0.5468	8	32	32.55	150	150
		Fitzpatrick WA	0.1767	0.3689	0.1526	0.3689	8	32	32.37	150	150
		Grand Teton NP	0.0710	0.0987	0.0655	0.0987	8	32	32.10	150	150
		Gros Venture WA	0.1206	0.1461	0.1033	0.1461	30	32	32.15	150	150
		North Absoroka WA	0.0305	0.0666	0.0331	0.0666	8	32	32.07	150	150
		Popo Agie WA	0.1420	0.1943	0.2461	0.2461	30	32	32.25	150	150
		Teton WA	0.0660	0.0750	0.0408	0.0750	8	32	32.08	150	150
		Washakie WA	0.0995	0.0754	0.0495	0.0995	8	32	32.10	150	150
		Wind River RA	0.1435	0.3024	0.1586	0.3024	30	32	32.30	150	150
		Yellowstone NP	0.0466	0.0646	0.0314	0.0646	8	32	32.06	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 μg/m³ and 9 μg/m³, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.3.7
Maximum Modeled PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1] 2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	Maximum Direct Modeled Impact ($\mu g/m^3$)	Applicable PSD Increment[2] ($\mu g/m^3$)	Background Concentration[3] ($\mu g/m^3$)	Maximum Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
PM_{10}	Annual	Bridger WA	0.1745	0.1415	0.1576	0.1745	4	9	9.17	50	50
		Fitzpatrick WA	0.0415	0.0427	0.0366	0.0427	4	9	9.04	50	50
		Grand Teton NP	0.0587	0.0664	0.0589	0.0664	4	9	9.07	50	50
		Gros Venture WA	0.0377	0.0328	0.0310	0.0377	17	9	9.04	50	50
		North Absoroka WA	0.0068	0.0098	0.0061	0.0098	4	9	9.01	50	50
		Popo Agie WA	0.0723	0.0824	0.0736	0.0824	17	9	9.08	50	50
		Teton WA	0.0382	0.0280	0.0259	0.0382	4	9	9.04	50	50
		Washakie WA	0.0168	0.0184	0.0145	0.0184	4	9	9.02	50	50
		Wind River RA	0.0727	0.0840	0.0617	0.0840	17	9	9.08	50	50
		Yellowstone NP	0.0081	0.0100	0.0067	0.0100	4	9	9.01	50	50
PM_{10}	24-hour	Bridger WA	2.0930	2.6174	3.2829	3.2829	8	32	35.28	150	150
		Fitzpatrick WA	0.6635	1.0481	0.6226	1.0481	8	32	33.05	150	150
		Grand Teton NP	0.8063	0.9971	0.4964	0.9971	8	32	33.00	150	150
		Gros Venture WA	0.4858	0.6355	0.6971	0.6971	30	32	32.70	150	150
		North Absoroka WA	0.1332	0.2743	0.1518	0.2743	8	32	32.27	150	150
		Popo Agie WA	0.6784	0.8346	0.8941	0.8941	30	32	32.89	150	150
		Teton WA	0.5616	0.4346	0.3423	0.5616	8	32	32.56	150	150
		Washakie WA	0.3794	0.2997	0.2809	0.3794	8	32	32.38	150	150
		Wind River RA	0.6074	1.1387	0.7050	1.1387	30	32	33.14	150	150
		Yellowstone NP	0.2009	0.2687	0.1291	0.2687	8	32	32.27	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.3.8
Maximum Modeled PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1] 2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	Maximum Direct Modeled Impact ($\mu g/m^3$)	Applicable PSD Increment[2] ($\mu g/m^3$)	Background Concentration[3] ($\mu g/m^3$)	Maximum Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
PM_{10}	Annual	Bridger WA	0.1762	0.1461	0.1609	0.1762	4	9	9.18	50	50
		Fitzpatrick WA	0.0440	0.0433	0.0369	0.0440	4	9	9.04	50	50
		Grand Teton NP	0.0598	0.0651	0.0586	0.0651	4	9	9.07	50	50
		Gros Venture WA	0.0398	0.0317	0.0302	0.0398	17	9	9.04	50	50
		North Absoroka WA	0.0069	0.0095	0.0062	0.0095	4	9	9.01	50	50
		Popo Agie WA	0.0718	0.0822	0.0734	0.0822	17	9	9.08	50	50
		Teton WA	0.0388	0.0277	0.0259	0.0388	4	9	9.04	50	50
		Washakie WA	0.0173	0.0181	0.0143	0.0181	4	9	9.02	50	50
		Wind River RA	0.0735	0.0841	0.0617	0.0841	17	9	9.08	50	50
		Yellowstone NP	0.0084	0.0095	0.0068	0.0095	4	9	9.01	50	50
PM_{10}	24-hour	Bridger WA	2.3755	2.1662	2.9791	2.9791	8	32	34.98	150	150
		Fitzpatrick WA	0.7245	1.1117	0.6507	1.1117	8	32	33.11	150	150
		Grand Teton NP	0.8736	0.9995	0.4964	0.9995	8	32	33.00	150	150
		Gros Venture WA	0.5039	0.5552	0.5669	0.5669	30	32	32.57	150	150
		North Absoroka WA	0.1386	0.3067	0.1548	0.3067	8	32	32.31	150	150
		Popo Agie WA	0.7506	0.8655	0.9889	0.9889	30	32	32.99	150	150
		Teton WA	0.5601	0.4191	0.3461	0.5601	8	32	32.56	150	150
		Washakie WA	0.4167	0.3253	0.2438	0.4167	8	32	32.42	150	150
		Wind River RA	0.6586	1.2562	0.6514	1.2562	30	32	33.26	150	150
		Yellowstone NP	0.2179	0.2413	0.1236	0.2413	8	32	32.24	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.3.9
Maximum Modeled PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Bridger WA	0.1421	0.1148	0.1276	0.1421	4	9	9.14	50	50
		Fitzpatrick WA	0.0356	0.0351	0.0298	0.0356	4	9	9.04	50	50
		Grand Teton NP	0.0570	0.0620	0.0567	0.0620	4	9	9.06	50	50
		Gros Venture WA	0.0322	0.0280	0.0245	0.0322	17	9	9.03	50	50
		North Absoroka WA	0.0062	0.0082	0.0054	0.0082	4	9	9.01	50	50
		Popo Agie WA	0.0608	0.0691	0.0619	0.0691	17	9	9.07	50	50
		Teton WA	0.0365	0.0259	0.0244	0.0365	4	9	9.04	50	50
		Washakie WA	0.0153	0.0160	0.0128	0.0160	4	9	9.02	50	50
		Wind River RA	0.0684	0.0779	0.0577	0.0779	17	9	9.08	50	50
		Yellowstone NP	0.0072	0.0081	0.0058	0.0081	4	9	9.01	50	50
PM_{10}	24-hour	Bridger WA	1.8241	1.6143	2.2155	2.2155	8	32	34.22	150	150
		Fitzpatrick WA	0.5858	0.8887	0.4926	0.8887	8	32	32.89	150	150
		Grand Teton NP	0.7227	0.9734	0.4964	0.9734	8	32	32.97	150	150
		Gros Venture WA	0.4806	0.4427	0.4448	0.4806	30	32	32.48	150	150
		North Absoroka WA	0.1212	0.2462	0.1331	0.2462	8	32	32.25	150	150
		Popo Agie WA	0.5931	0.7227	0.7658	0.7658	30	32	32.77	150	150
		Teton WA	0.5601	0.4060	0.3394	0.5601	8	32	32.56	150	150
		Washakie WA	0.3351	0.2718	0.2110	0.3351	8	32	32.34	150	150
		Wind River RA	0.5936	1.0107	0.5099	1.0107	30	32	33.01	150	150
		Yellowstone NP	0.1825	0.1850	0.1021	0.1850	8	32	32.19	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.3.10
Maximum Modeled PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1] 2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	Maximum Direct Modeled Impact ($\mu g/m^3$)	Applicable PSD Increment[2] ($\mu g/m^3$)	Background Concentration[3] ($\mu g/m^3$)	Maximum Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
PM_{10}	Annual	Bridger WA	0.0886	0.0686	0.0761	0.0886	4	9	9.09	50	50
		Fitzpatrick WA	0.0238	0.0240	0.0197	0.0240	4	9	9.02	50	50
		Grand Teton NP	0.0531	0.0578	0.0541	0.0578	4	9	9.06	50	50
		Gros Venture WA	0.0215	0.0233	0.0187	0.0233	17	9	9.02	50	50
		North Absoroka WA	0.0050	0.0064	0.0042	0.0064	4	9	9.01	50	50
		Popo Agie WA	0.0439	0.0501	0.0440	0.0501	17	9	9.05	50	50
		Teton WA	0.0335	0.0232	0.0223	0.0335	4	9	9.03	50	50
		Washakie WA	0.0124	0.0129	0.0106	0.0129	4	9	9.01	50	50
		Wind River RA	0.0607	0.0689	0.0513	0.0689	17	9	9.07	50	50
		Yellowstone NP	0.0055	0.0061	0.0044	0.0061	4	9	9.01	50	50
PM_{10}	24-hour	Bridger WA	1.0458	0.7977	1.1329	1.1329	8	32	33.13	150	150
		Fitzpatrick WA	0.3929	0.6911	0.2655	0.6911	8	32	32.69	150	150
		Grand Teton NP	0.6331	0.8700	0.4963	0.8700	8	32	32.87	150	150
		Gros Venture WA	0.4503	0.3637	0.4080	0.4503	30	32	32.45	150	150
		North Absoroka WA	0.0994	0.1682	0.0897	0.1682	8	32	32.17	150	150
		Popo Agie WA	0.4591	0.6429	0.4745	0.6429	30	32	32.64	150	150
		Teton WA	0.5582	0.3377	0.3300	0.5582	8	32	32.56	150	150
		Washakie WA	0.2274	0.2246	0.1555	0.2274	8	32	32.23	150	150
		Wind River RA	0.5250	0.7029	0.4328	0.7029	30	32	32.70	150	150
		Yellowstone NP	0.1301	0.1251	0.0705	0.1301	8	32	32.13	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.3.11
Maximum Modeled PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1] 2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	Maximum Direct Modeled Impact ($\mu g/m^3$)	Applicable PSD Increment[2] ($\mu g/m^3$)	Background Concentration[3] ($\mu g/m^3$)	Maximum Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
PM_{10}	Annual	Bridger WA	0.0835	0.0662	0.0734	0.0835	4	9	9.08	50	50
		Fitzpatrick WA	0.0244	0.0247	0.0190	0.0247	4	9	9.02	50	50
		Grand Teton NP	0.0536	0.0579	0.0543	0.0579	4	9	9.06	50	50
		Gros Venture WA	0.0219	0.0234	0.0190	0.0234	17	9	9.02	50	50
		North Absoroka WA	0.0051	0.0066	0.0043	0.0066	4	9	9.01	50	50
		Popo Agie WA	0.0439	0.0508	0.0445	0.0508	17	9	9.05	50	50
		Teton WA	0.0339	0.0235	0.0224	0.0339	4	9	9.03	50	50
		Washakie WA	0.0127	0.0133	0.0107	0.0133	4	9	9.01	50	50
		Wind River RA	0.0612	0.0696	0.0512	0.0696	17	9	9.07	50	50
		Yellowstone NP	0.0057	0.0063	0.0045	0.0063	4	9	9.01	50	50
PM_{10}	24-hour	Bridger WA	0.9275	0.6761	0.9693	0.9693	8	32	32.97	150	150
		Fitzpatrick WA	0.4421	0.7285	0.2803	0.7285	8	32	32.73	150	150
		Grand Teton NP	0.6331	0.8924	0.4963	0.8924	8	32	32.89	150	150
		Gros Venture WA	0.4574	0.3637	0.4080	0.4574	30	32	32.46	150	150
		North Absoroka WA	0.1076	0.1947	0.0987	0.1947	8	32	32.19	150	150
		Popo Agie WA	0.4662	0.6693	0.5338	0.6693	30	32	32.67	150	150
		Teton WA	0.5571	0.3574	0.3320	0.5571	8	32	32.56	150	150
		Washakie WA	0.2561	0.2256	0.1679	0.2561	8	32	32.26	150	150
		Wind River RA	0.5492	0.7540	0.4280	0.7540	30	32	32.75	150	150
		Yellowstone NP	0.1466	0.1428	0.0777	0.1466	8	32	32.15	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.4.1
Maximum Modeled $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Bridger WA	0.0975	0.0796	0.0931	0.0975	6	6.10	15	15
		Fitzpatrick WA	0.0203	0.0193	0.0170	0.0203	6	6.02	15	15
		Grand Teton NP	0.0064	0.0080	0.0049	0.0080	6	6.01	15	15
		Gros Venture WA	0.0174	0.0146	0.0140	0.0174	6	6.02	15	15
		North Absoroka WA	0.0020	0.0034	0.0022	0.0034	6	6.00	15	15
		Popo Agie WA	0.0310	0.0350	0.0320	0.0350	6	6.04	15	15
		Teton WA	0.0050	0.0047	0.0036	0.0050	6	6.01	15	15
		Washakie WA	0.0054	0.0055	0.0044	0.0055	6	6.01	15	15
		Wind River RA	0.0260	0.0226	0.0254	0.0260	6	6.03	15	15
		Yellowstone NP	0.0028	0.0035	0.0023	0.0035	6	6.00	15	15
$PM_{2.5}$	24-hour	Bridger WA	0.5993	0.4762	0.7221	0.7221	15	15.72	65(35)[2]	65(35)[2]
		Fitzpatrick WA	0.1845	0.1881	0.1544	0.1881	15	15.19	65(35)[2]	65(35)[2]
		Grand Teton NP	0.0669	0.1124	0.0565	0.1124	15	15.11	65(35)[2]	65(35)[2]
		Gros Venture WA	0.1429	0.1540	0.1450	0.1540	15	15.15	65(35)[2]	65(35)[2]
		North Absoroka WA	0.0212	0.0497	0.0275	0.0497	15	15.05	65(35)[2]	65(35)[2]
		Popo Agie WA	0.2038	0.1818	0.2562	0.2562	15	15.26	65(35)[2]	65(35)[2]
		Teton WA	0.0583	0.0616	0.0393	0.0616	15	15.06	65(35)[2]	65(35)[2]
		Washakie WA	0.0487	0.0654	0.0550	0.0654	15	15.07	65(35)[2]	65(35)[2]
		Wind River RA	0.1738	0.1769	0.2582	0.2582	15	15.26	65(35)[2]	65(35)[2]
		Yellowstone NP	0.0395	0.0563	0.0276	0.0563	15	15.06	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.4.2
Maximum Modeled $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Bridger WA	0.1306	0.1086	0.1233	0.1306	6	6.13	15	15
		Fitzpatrick WA	0.0270	0.0275	0.0250	0.0275	6	6.03	15	15
		Grand Teton NP	0.0089	0.0126	0.0075	0.0126	6	6.01	15	15
		Gros Venture WA	0.0242	0.0216	0.0209	0.0242	6	6.02	15	15
		North Absoroka WA	0.0028	0.0050	0.0030	0.0050	6	6.00	15	15
		Popo Agie WA	0.0428	0.0486	0.0444	0.0486	6	6.05	15	15
		Teton WA	0.0070	0.0069	0.0053	0.0070	6	6.01	15	15
		Washakie WA	0.0073	0.0079	0.0064	0.0079	6	6.01	15	15
		Wind River RA	0.0352	0.0322	0.0349	0.0352	6	6.04	15	15
		Yellowstone NP	0.0039	0.0055	0.0034	0.0055	6	6.01	15	15
$PM_{2.5}$	24-hour	Bridger WA	0.7763	0.6560	0.9605	0.9605	15	15.96	65(35)[2]	65(35)[2]
		Fitzpatrick WA	0.2299	0.2376	0.2046	0.2376	15	15.24	65(35)[2]	65(35)[2]
		Grand Teton NP	0.0951	0.1825	0.0768	0.1825	15	15.18	65(35)[2]	65(35)[2]
		Gros Venture WA	0.2072	0.2504	0.2054	0.2504	15	15.25	65(35)[2]	65(35)[2]
		North Absoroka WA	0.0281	0.0663	0.0365	0.0663	15	15.07	65(35)[2]	65(35)[2]
		Popo Agie WA	0.2802	0.2547	0.3102	0.3102	15	15.31	65(35)[2]	65(35)[2]
		Teton WA	0.0760	0.1090	0.0508	0.1090	15	15.11	65(35)[2]	65(35)[2]
		Washakie WA	0.0670	0.0969	0.0780	0.0969	15	15.10	65(35)[2]	65(35)[2]
		Wind River RA	0.2723	0.2550	0.3067	0.3067	15	15.31	65(35)[2]	65(35)[2]
		Yellowstone NP	0.0509	0.0898	0.0399	0.0898	15	15.09	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.4.3
Maximum Modeled $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Bridger WA	0.1323	0.1131	0.1266	0.1323	6	6.13	15	15
		Fitzpatrick WA	0.0295	0.0281	0.0253	0.0295	6	6.03	15	15
		Grand Teton NP	0.0101	0.0113	0.0071	0.0113	6	6.01	15	15
		Gros Venture WA	0.0263	0.0208	0.0202	0.0263	6	6.03	15	15
		North Absoroka WA	0.0029	0.0047	0.0031	0.0047	6	6.00	15	15
		Popo Agie WA	0.0423	0.0485	0.0442	0.0485	6	6.05	15	15
		Teton WA	0.0076	0.0066	0.0053	0.0076	6	6.01	15	15
		Washakie WA	0.0078	0.0076	0.0062	0.0078	6	6.01	15	15
		Wind River RA	0.0359	0.0324	0.0352	0.0359	6	6.04	15	15
		Yellowstone NP	0.0042	0.0050	0.0035	0.0050	6	6.01	15	15
$PM_{2.5}$	24-hour	Bridger WA	0.8843	0.7333	1.0768	1.0768	15	16.08	65(35)[2]	65(35)[2]
		Fitzpatrick WA	0.2728	0.2463	0.2379	0.2728	15	15.27	65(35)[2]	65(35)[2]
		Grand Teton NP	0.1209	0.1585	0.0900	0.1585	15	15.16	65(35)[2]	65(35)[2]
		Gros Venture WA	0.2026	0.2108	0.2153	0.2153	15	15.22	65(35)[2]	65(35)[2]
		North Absoroka WA	0.0318	0.0753	0.0407	0.0753	15	15.08	65(35)[2]	65(35)[2]
		Popo Agie WA	0.3153	0.2687	0.3154	0.3154	15	15.32	65(35)[2]	65(35)[2]
		Teton WA	0.0889	0.0891	0.0578	0.0891	15	15.09	65(35)[2]	65(35)[2]
		Washakie WA	0.0751	0.0961	0.0774	0.0961	15	15.10	65(35)[2]	65(35)[2]
		Wind River RA	0.2477	0.2416	0.3189	0.3189	15	15.32	65(35)[2]	65(35)[2]
		Yellowstone NP	0.0658	0.0846	0.0424	0.0846	15	15.08	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.4.4
Maximum Modeled $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Bridger WA	0.0982	0.0819	0.0932	0.0982	6	6.10	15	15
		Fitzpatrick WA	0.0210	0.0199	0.0182	0.0210	6	6.02	15	15
		Grand Teton NP	0.0070	0.0081	0.0051	0.0081	6	6.01	15	15
		Gros Venture WA	0.0186	0.0150	0.0144	0.0186	6	6.02	15	15
		North Absoroka WA	0.0022	0.0034	0.0023	0.0034	6	6.00	15	15
		Popo Agie WA	0.0313	0.0352	0.0326	0.0352	6	6.04	15	15
		Teton WA	0.0054	0.0047	0.0038	0.0054	6	6.01	15	15
		Washakie WA	0.0056	0.0056	0.0045	0.0056	6	6.01	15	15
		Wind River RA	0.0263	0.0232	0.0257	0.0263	6	6.03	15	15
		Yellowstone NP	0.0030	0.0036	0.0025	0.0036	6	6.00	15	15
$PM_{2.5}$	24-hour	Bridger WA	0.6247	0.5083	0.7729	0.7729	15	15.77	65(35)[2]	65(35)[2]
		Fitzpatrick WA	0.1856	0.1740	0.1627	0.1856	15	15.19	65(35)[2]	65(35)[2]
		Grand Teton NP	0.0815	0.1084	0.0615	0.1084	15	15.11	65(35)[2]	65(35)[2]
		Gros Venture WA	0.1510	0.1551	0.1570	0.1570	15	15.16	65(35)[2]	65(35)[2]
		North Absoroka WA	0.0221	0.0528	0.0289	0.0528	15	15.05	65(35)[2]	65(35)[2]
		Popo Agie WA	0.2183	0.1880	0.2200	0.2200	15	15.22	65(35)[2]	65(35)[2]
		Teton WA	0.0613	0.0613	0.0401	0.0613	15	15.06	65(35)[2]	65(35)[2]
		Washakie WA	0.0511	0.0679	0.0545	0.0679	15	15.07	65(35)[2]	65(35)[2]
		Wind River RA	0.1718	0.1666	0.2215	0.2215	15	15.22	65(35)[2]	65(35)[2]
		Yellowstone NP	0.0442	0.0604	0.0281	0.0604	15	15.06	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.4.5
Maximum Modeled $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Bridger WA	0.0447	0.0357	0.0418	0.0447	6	6.04	15	15
		Fitzpatrick WA	0.0090	0.0084	0.0078	0.0090	6	6.01	15	15
		Grand Teton NP	0.0029	0.0036	0.0022	0.0036	6	6.00	15	15
		Gros Venture WA	0.0079	0.0066	0.0063	0.0079	6	6.01	15	15
		North Absoroka WA	0.0009	0.0015	0.0010	0.0015	6	6.00	15	15
		Popo Agie WA	0.0144	0.0156	0.0147	0.0156	6	6.02	15	15
		Teton WA	0.0023	0.0021	0.0016	0.0023	6	6.00	15	15
		Washakie WA	0.0024	0.0025	0.0020	0.0025	6	6.00	15	15
		Wind River RA	0.0117	0.0101	0.0115	0.0117	6	6.01	15	15
		Yellowstone NP	0.0013	0.0016	0.0011	0.0016	6	6.00	15	15
$PM_{2.5}$	24-hour	Bridger WA	0.2559	0.1952	0.3222	0.3222	15	15.32	65(35)[2]	65(35)[2]
		Fitzpatrick WA	0.0732	0.0720	0.0630	0.0732	15	15.07	65(35)[2]	65(35)[2]
		Grand Teton NP	0.0306	0.0505	0.0245	0.0505	15	15.05	65(35)[2]	65(35)[2]
		Gros Venture WA	0.0621	0.0706	0.0649	0.0706	15	15.07	65(35)[2]	65(35)[2]
		North Absoroka WA	0.0092	0.0227	0.0126	0.0227	15	15.02	65(35)[2]	65(35)[2]
		Popo Agie WA	0.0897	0.0766	0.0935	0.0935	15	15.09	65(35)[2]	65(35)[2]
		Teton WA	0.0252	0.0262	0.0173	0.0262	15	15.03	65(35)[2]	65(35)[2]
		Washakie WA	0.0221	0.0298	0.0232	0.0298	15	15.03	65(35)[2]	65(35)[2]
		Wind River RA	0.0773	0.0695	0.0912	0.0912	15	15.09	65(35)[2]	65(35)[2]
		Yellowstone NP	0.0168	0.0257	0.0118	0.0257	15	15.03	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.4.6
Maximum Modeled $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Bridger WA	0.0396	0.0333	0.0391	0.0396	6	6.04	15	15
		Fitzpatrick WA	0.0097	0.0089	0.0072	0.0097	6	6.01	15	15
		Grand Teton NP	0.0035	0.0037	0.0025	0.0037	6	6.00	15	15
		Gros Venture WA	0.0084	0.0067	0.0059	0.0084	6	6.01	15	15
		North Absoroka WA	0.0011	0.0017	0.0011	0.0017	6	6.00	15	15
		Popo Agie WA	0.0144	0.0162	0.0152	0.0162	6	6.02	15	15
		Teton WA	0.0027	0.0024	0.0017	0.0027	6	6.00	15	15
		Washakie WA	0.0029	0.0028	0.0021	0.0029	6	6.00	15	15
		Wind River RA	0.0113	0.0104	0.0110	0.0113	6	6.01	15	15
		Yellowstone NP	0.0015	0.0018	0.0012	0.0018	6	6.00	15	15
$PM_{2.5}$	24-hour	Bridger WA	0.2644	0.2308	0.3241	0.3241	15	15.32	65(35)[2]	65(35)[2]
		Fitzpatrick WA	0.1050	0.0804	0.0653	0.1050	15	15.10	65(35)[2]	65(35)[2]
		Grand Teton NP	0.0396	0.0462	0.0339	0.0462	15	15.05	65(35)[2]	65(35)[2]
		Gros Venture WA	0.0713	0.0827	0.0655	0.0827	15	15.08	65(35)[2]	65(35)[2]
		North Absoroka WA	0.0125	0.0237	0.0157	0.0237	15	15.02	65(35)[2]	65(35)[2]
		Popo Agie WA	0.0975	0.1012	0.1020	0.1020	15	15.10	65(35)[2]	65(35)[2]
		Teton WA	0.0308	0.0355	0.0219	0.0355	15	15.04	65(35)[2]	65(35)[2]
		Washakie WA	0.0326	0.0411	0.0274	0.0411	15	15.04	65(35)[2]	65(35)[2]
		Wind River RA	0.0885	0.0758	0.1075	0.1075	15	15.11	65(35)[2]	65(35)[2]
		Yellowstone NP	0.0219	0.0313	0.0168	0.0313	15	15.03	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.4.7
Maximum Modeled $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Bridger WA	0.1673	0.1374	0.1526	0.1673	6	6.17	15	15
		Fitzpatrick WA	0.0403	0.0416	0.0357	0.0416	6	6.04	15	15
		Grand Teton NP	0.0585	0.0660	0.0587	0.0660	6	6.07	15	15
		Gros Venture WA	0.0369	0.0324	0.0302	0.0369	6	6.04	15	15
		North Absoroka WA	0.0067	0.0097	0.0060	0.0097	6	6.01	15	15
		Popo Agie WA	0.0692	0.0798	0.0707	0.0798	6	6.08	15	15
		Teton WA	0.0379	0.0278	0.0258	0.0379	6	6.04	15	15
		Washakie WA	0.0165	0.0181	0.0142	0.0181	6	6.02	15	15
		Wind River RA	0.0718	0.0831	0.0610	0.0831	6	6.08	15	15
		Yellowstone NP	0.0080	0.0098	0.0066	0.0098	6	6.01	15	15
$PM_{2.5}$	24-hour	Bridger WA	0.9618	0.8374	1.0756	1.0756	15	16.08	65(35)[2]	65(35)[2]
		Fitzpatrick WA	0.3221	0.3343	0.2873	0.3343	15	15.33	65(35)[2]	65(35)[2]
		Grand Teton NP	0.2969	0.4108	0.2699	0.4108	15	15.41	65(35)[2]	65(35)[2]
		Gros Venture WA	0.3154	0.3148	0.2802	0.3154	15	15.32	65(35)[2]	65(35)[2]
		North Absoroka WA	0.0613	0.1026	0.0772	0.1026	15	15.10	65(35)[2]	65(35)[2]
		Popo Agie WA	0.4086	0.4924	0.4003	0.4924	15	15.49	65(35)[2]	65(35)[2]
		Teton WA	0.3025	0.2551	0.1924	0.3025	15	15.30	65(35)[2]	65(35)[2]
		Washakie WA	0.1123	0.1463	0.1252	0.1463	15	15.15	65(35)[2]	65(35)[2]
		Wind River RA	0.3470	0.5507	0.4191	0.5507	15	15.55	65(35)[2]	65(35)[2]
		Yellowstone NP	0.0735	0.1290	0.0643	0.1290	15	15.13	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.4.8
Maximum Modeled $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Bridger WA	0.1690	0.1420	0.1560	0.1690	6	6.17	15	15
		Fitzpatrick WA	0.0428	0.0423	0.0360	0.0428	6	6.04	15	15
		Grand Teton NP	0.0596	0.0647	0.0584	0.0647	6	6.06	15	15
		Gros Venture WA	0.0390	0.0309	0.0295	0.0390	6	6.04	15	15
		North Absoroka WA	0.0068	0.0093	0.0061	0.0093	6	6.01	15	15
		Popo Agie WA	0.0687	0.0797	0.0705	0.0797	6	6.08	15	15
		Teton WA	0.0385	0.0275	0.0258	0.0385	6	6.04	15	15
		Washakie WA	0.0171	0.0178	0.0141	0.0178	6	6.02	15	15
		Wind River RA	0.0726	0.0832	0.0610	0.0832	6	6.08	15	15
		Yellowstone NP	0.0083	0.0093	0.0067	0.0093	6	6.01	15	15
$PM_{2.5}$	24-hour	Bridger WA	1.0145	0.9169	1.2520	1.2520	15	16.25	65(35)[2]	65(35)[2]
		Fitzpatrick WA	0.3608	0.3269	0.3217	0.3608	15	15.36	65(35)[2]	65(35)[2]
		Grand Teton NP	0.3193	0.4108	0.2635	0.4108	15	15.41	65(35)[2]	65(35)[2]
		Gros Venture WA	0.3254	0.3289	0.2909	0.3289	15	15.33	65(35)[2]	65(35)[2]
		North Absoroka WA	0.0592	0.1125	0.0719	0.1125	15	15.11	65(35)[2]	65(35)[2]
		Popo Agie WA	0.4369	0.5206	0.3950	0.5206	15	15.52	65(35)[2]	65(35)[2]
		Teton WA	0.2994	0.2638	0.2017	0.2994	15	15.30	65(35)[2]	65(35)[2]
		Washakie WA	0.1320	0.1580	0.1398	0.1580	15	15.16	65(35)[2]	65(35)[2]
		Wind River RA	0.3610	0.5777	0.4045	0.5777	15	15.58	65(35)[2]	65(35)[2]
		Yellowstone NP	0.0802	0.1262	0.0639	0.1262	15	15.13	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.4.9
Maximum Modeled $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Bridger WA	0.1348	0.1107	0.1226	0.1348	6	6.13	15	15
		Fitzpatrick WA	0.0344	0.0341	0.0289	0.0344	6	6.03	15	15
		Grand Teton NP	0.0567	0.0617	0.0565	0.0617	6	6.06	15	15
		Gros Venture WA	0.0313	0.0276	0.0238	0.0313	6	6.03	15	15
		North Absoroka WA	0.0061	0.0081	0.0053	0.0081	6	6.01	15	15
		Popo Agie WA	0.0578	0.0666	0.0589	0.0666	6	6.07	15	15
		Teton WA	0.0363	0.0256	0.0242	0.0363	6	6.04	15	15
		Washakie WA	0.0150	0.0157	0.0126	0.0157	6	6.02	15	15
		Wind River RA	0.0675	0.0770	0.0570	0.0770	6	6.08	15	15
		Yellowstone NP	0.0071	0.0079	0.0057	0.0079	6	6.01	15	15
$PM_{2.5}$	24-hour	Bridger WA	0.7906	0.7166	0.9541	0.9541	15	15.95	65(35)[2]	65(35)[2]
		Fitzpatrick WA	0.2732	0.2531	0.2445	0.2732	15	15.27	65(35)[2]	65(35)[2]
		Grand Teton NP	0.2948	0.4031	0.2579	0.4031	15	15.40	65(35)[2]	65(35)[2]
		Gros Venture WA	0.2733	0.2710	0.2294	0.2733	15	15.27	65(35)[2]	65(35)[2]
		North Absoroka WA	0.0506	0.0900	0.0601	0.0900	15	15.09	65(35)[2]	65(35)[2]
		Popo Agie WA	0.3310	0.4454	0.3195	0.4454	15	15.45	65(35)[2]	65(35)[2]
		Teton WA	0.2995	0.2361	0.1918	0.2995	15	15.30	65(35)[2]	65(35)[2]
		Washakie WA	0.0990	0.1273	0.1105	0.1273	15	15.13	65(35)[2]	65(35)[2]
		Wind River RA	0.3237	0.4992	0.3120	0.4992	15	15.50	65(35)[2]	65(35)[2]
		Yellowstone NP	0.0638	0.1013	0.0521	0.1013	15	15.10	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.4.10
Maximum Modeled $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Bridger WA	0.0814	0.0645	0.0712	0.0814	6	6.08	15	15
		Fitzpatrick WA	0.0226	0.0230	0.0187	0.0230	6	6.02	15	15
		Grand Teton NP	0.0529	0.0574	0.0539	0.0574	6	6.06	15	15
		Gros Venture WA	0.0207	0.0228	0.0185	0.0228	6	6.02	15	15
		North Absoroka WA	0.0049	0.0062	0.0041	0.0062	6	6.01	15	15
		Popo Agie WA	0.0408	0.0477	0.0411	0.0477	6	6.05	15	15
		Teton WA	0.0332	0.0230	0.0221	0.0332	6	6.03	15	15
		Washakie WA	0.0121	0.0127	0.0104	0.0127	6	6.01	15	15
		Wind River RA	0.0598	0.0680	0.0506	0.0680	6	6.07	15	15
		Yellowstone NP	0.0054	0.0059	0.0043	0.0059	6	6.01	15	15
$PM_{2.5}$	24-hour	Bridger WA	0.4561	0.3908	0.5083	0.5083	15	15.51	65(35)[2]	65(35)[2]
		Fitzpatrick WA	0.1586	0.1925	0.1484	0.1925	15	15.19	65(35)[2]	65(35)[2]
		Grand Teton NP	0.2858	0.3595	0.2499	0.3595	15	15.36	65(35)[2]	65(35)[2]
		Gros Venture WA	0.1709	0.1699	0.1405	0.1709	15	15.17	65(35)[2]	65(35)[2]
		North Absoroka WA	0.0375	0.0599	0.0443	0.0599	15	15.06	65(35)[2]	65(35)[2]
		Popo Agie WA	0.2351	0.3374	0.2125	0.3374	15	15.34	65(35)[2]	65(35)[2]
		Teton WA	0.2804	0.2327	0.1710	0.2804	15	15.28	65(35)[2]	65(35)[2]
		Washakie WA	0.0820	0.0897	0.0938	0.0938	15	15.09	65(35)[2]	65(35)[2]
		Wind River RA	0.3068	0.4429	0.2994	0.4429	15	15.44	65(35)[2]	65(35)[2]
		Yellowstone NP	0.0422	0.0657	0.0359	0.0657	15	15.07	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.4.11
Maximum Modeled $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Bridger WA	0.0762	0.0621	0.0684	0.0762	6	6.08	15	15
		Fitzpatrick WA	0.0232	0.0237	0.0181	0.0237	6	6.02	15	15
		Grand Teton NP	0.0534	0.0575	0.0541	0.0575	6	6.06	15	15
		Gros Venture WA	0.0211	0.0229	0.0187	0.0229	6	6.02	15	15
		North Absoroka WA	0.0050	0.0064	0.0042	0.0064	6	6.01	15	15
		Popo Agie WA	0.0408	0.0484	0.0415	0.0484	6	6.05	15	15
		Teton WA	0.0336	0.0232	0.0222	0.0336	6	6.03	15	15
		Washakie WA	0.0125	0.0130	0.0105	0.0130	6	6.01	15	15
		Wind River RA	0.0603	0.0687	0.0505	0.0687	6	6.07	15	15
		Yellowstone NP	0.0056	0.0062	0.0044	0.0062	6	6.01	15	15
$PM_{2.5}$	24-hour	Bridger WA	0.5091	0.4093	0.5009	0.5091	15	15.51	65(35)[2]	65(35)[2]
		Fitzpatrick WA	0.1904	0.1925	0.1510	0.1925	15	15.19	65(35)[2]	65(35)[2]
		Grand Teton NP	0.2850	0.3595	0.2500	0.3595	15	15.36	65(35)[2]	65(35)[2]
		Gros Venture WA	0.1774	0.1738	0.1493	0.1774	15	15.18	65(35)[2]	65(35)[2]
		North Absoroka WA	0.0402	0.0684	0.0468	0.0684	15	15.07	65(35)[2]	65(35)[2]
		Popo Agie WA	0.2359	0.3710	0.2260	0.3710	15	15.37	65(35)[2]	65(35)[2]
		Teton WA	0.2948	0.2318	0.1805	0.2948	15	15.29	65(35)[2]	65(35)[2]
		Washakie WA	0.0864	0.1032	0.0933	0.1032	15	15.10	65(35)[2]	65(35)[2]
		Wind River RA	0.3107	0.4494	0.3026	0.4494	15	15.45	65(35)[2]	65(35)[2]
		Yellowstone NP	0.0477	0.0698	0.0394	0.0698	15	15.07	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.5.1
Maximum Modeled NO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Boulder	2.10	1.26	1.85	2.10	25	8	10.10	100	100
		Cora	0.20	0.27	0.20	0.27	25	8	8.27	100	100
		Pinedale	0.49	0.48	0.43	0.49	25	8	8.49	100	100
		PAPA	30.00	31.60	29.82	31.60	25	8	39.60	100	100
		10km Regional Grid	1.99	2.37	2.26	2.37	25	8	10.37	100	100
		Jonah Monitor	1.01	1.12	1.06	1.12	25	8	9.12	100	100
		Boulder Monitor	4.99	3.02	4.22	4.99	25	8	12.99	100	100
		Daniel Monitor	0.52	0.54	0.39	0.54	25	8	8.54	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.5.2
Maximum Modeled NO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Boulder	3.23	2.08	2.81	3.23	25	8	11.23	100	100
		Cora	0.44	0.54	0.43	0.54	25	8	8.54	100	100
		Pinedale	1.67	1.54	1.69	1.69	25	8	9.69	100	100
		PAPA	48.18	42.84	52.76	52.76	25	8	60.76	100	100
		10km Regional Grid	4.67	5.22	5.07	5.22	25	8	13.22	100	100
		Jonah Monitor	1.88	2.14	2.01	2.14	25	8	10.14	100	100
		Boulder Monitor	7.14	5.08	6.35	7.14	25	8	15.14	100	100
		Daniel Monitor	1.01	1.14	0.80	1.14	25	8	9.14	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.5.3
Maximum Modeled NO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Boulder	3.39	2.22	3.08	3.39	25	8	11.39	100	100
		Cora	0.49	0.56	0.45	0.56	25	8	8.56	100	100
		Pinedale	1.75	1.45	1.67	1.75	25	8	9.75	100	100
		PAPA	54.11	48.69	60.48	60.48	25	8	68.48	100	100
		10km Regional Grid	3.82	4.35	4.09	4.35	25	8	12.35	100	100
		Jonah Monitor	1.62	1.81	1.66	1.81	25	8	9.81	100	100
		Boulder Monitor	7.31	5.45	6.80	7.31	25	8	15.31	100	100
		Daniel Monitor	1.05	1.12	0.81	1.12	25	8	9.12	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.5.4
Maximum Modeled NO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Boulder	2.12	1.38	1.92	2.12	25	8	10.12	100	100
		Cora	0.30	0.35	0.28	0.35	25	8	8.35	100	100
		Pinedale	1.10	0.91	1.04	1.10	25	8	9.10	100	100
		PAPA	33.09	30.04	37.02	37.02	25	8	45.02	100	100
		10km Regional Grid	2.44	2.78	2.61	2.78	25	8	10.78	100	100
		Jonah Monitor	1.03	1.15	1.05	1.15	25	8	9.15	100	100
		Boulder Monitor	4.61	3.41	4.28	4.61	25	8	12.61	100	100
		Daniel Monitor	0.65	0.70	0.50	0.70	25	8	8.70	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.5.5
Maximum Modeled NO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Boulder	0.75	0.46	0.67	0.75	25	8	8.75	100	100
		Cora	0.10	0.12	0.09	0.12	25	8	8.12	100	100
		Pinedale	0.40	0.33	0.38	0.40	25	8	8.40	100	100
		PAPA	9.11	9.31	10.31	10.31	25	8	18.31	100	100
		10km Regional Grid	1.03	1.17	1.10	1.17	25	8	9.17	100	100
		Jonah Monitor	0.40	0.46	0.42	0.46	25	8	8.46	100	100
		Boulder Monitor	1.76	1.20	1.60	1.76	25	8	9.76	100	100
		Daniel Monitor	0.22	0.24	0.17	0.24	25	8	8.24	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.5.6
Maximum Modeled NO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Boulder	0.77	0.42	0.67	0.77	25	8	8.77	100	100
		Cora	0.10	0.12	0.09	0.12	25	8	8.12	100	100
		Pinedale	0.32	0.27	0.29	0.32	25	8	8.32	100	100
		PAPA	7.43	8.29	6.90	8.29	25	8	16.29	100	100
		10km Regional Grid	1.09	1.24	1.17	1.24	25	8	9.24	100	100
		Jonah Monitor	0.47	0.51	0.49	0.51	25	8	8.51	100	100
		Boulder Monitor	1.75	1.06	1.56	1.75	25	8	9.75	100	100
		Daniel Monitor	0.24	0.24	0.17	0.24	25	8	8.24	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.5.7
Maximum Modeled NO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Boulder	3.39	2.18	2.95	3.39	25	8	11.39	100	100
		Cora	0.48	0.58	0.46	0.58	25	8	8.58	100	100
		Pinedale	1.73	1.60	1.75	1.75	25	8	9.75	100	100
		PAPA	48.50	43.19	53.05	53.05	25	8	61.05	100	100
		10km Regional Grid	8.41	8.89	9.10	9.10	25	8	17.10	100	100
		Jonah Monitor	4.58	4.60	4.57	4.60	25	8	12.60	100	100
		Boulder Monitor	7.44	5.29	6.63	7.44	25	8	15.44	100	100
		Daniel Monitor	1.09	1.24	0.87	1.24	25	8	9.24	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.5.8
Maximum Modeled NO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Boulder	3.55	2.32	3.22	3.55	25	8	11.55	100	100
		Cora	0.53	0.60	0.49	0.60	25	8	8.60	100	100
		Pinedale	1.81	1.51	1.72	1.81	25	8	9.81	100	100
		PAPA	54.43	49.04	60.77	60.77	25	8	68.77	100	100
		10km Regional Grid	7.56	8.03	8.13	8.13	25	8	16.13	100	100
		Jonah Monitor	4.32	4.27	4.22	4.32	25	8	12.32	100	100
		Boulder Monitor	7.61	5.66	7.08	7.61	25	8	15.61	100	100
		Daniel Monitor	1.13	1.22	0.89	1.22	25	8	9.22	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.5.9
Maximum Modeled NO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Boulder	2.28	1.48	2.06	2.28	25	8	10.28	100	100
		Cora	0.34	0.39	0.32	0.39	25	8	8.39	100	100
		Pinedale	1.16	0.97	1.10	1.16	25	8	9.16	100	100
		PAPA	33.42	30.39	37.31	37.31	25	8	45.31	100	100
		10km Regional Grid	6.18	6.45	6.65	6.65	25	8	14.65	100	100
		Jonah Monitor	3.73	3.61	3.61	3.73	25	8	11.73	100	100
		Boulder Monitor	4.91	3.62	4.56	4.91	25	8	12.91	100	100
		Daniel Monitor	0.74	0.80	0.58	0.80	25	8	8.80	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.5.10
Maximum Modeled NO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Boulder	0.91	0.56	0.81	0.91	25	8	8.91	100	100
		Cora	0.13	0.16	0.13	0.16	25	8	8.16	100	100
		Pinedale	0.46	0.39	0.44	0.46	25	8	8.46	100	100
		PAPA	9.43	10.00	10.60	10.60	25	8	18.60	100	100
		10km Regional Grid	4.77	4.85	5.14	5.14	25	8	13.14	100	100
		Jonah Monitor	3.10	2.92	2.97	3.10	25	8	11.10	100	100
		Boulder Monitor	2.06	1.41	1.88	2.06	25	8	10.06	100	100
		Daniel Monitor	0.31	0.34	0.25	0.34	25	8	8.34	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.5.11
Maximum Modeled NO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Boulder	0.93	0.53	0.81	0.93	25	8	8.93	100	100
		Cora	0.14	0.16	0.13	0.16	25	8	8.16	100	100
		Pinedale	0.38	0.33	0.34	0.38	25	8	8.38	100	100
		PAPA	8.63	9.24	7.86	9.24	25	8	17.24	100	100
		10km Regional Grid	4.82	4.91	5.20	5.20	25	8	13.20	100	100
		Jonah Monitor	3.18	2.97	3.04	3.18	25	8	11.18	100	100
		Boulder Monitor	2.05	1.27	1.84	2.05	25	8	10.05	100	100
		Daniel Monitor	0.32	0.33	0.24	0.33	25	8	8.33	100	100

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Annual background NO_2 concentration value of 8 $\mu g/m^3$ from Boulder monitor.

Table E.6.1
Maximum Modeled SO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Boulder	0.151	0.096	0.133	0.151	20	9	9.15	60	80
		Cora	0.017	0.022	0.016	0.022	20	9	9.02	60	80
		Pinedale	0.035	0.037	0.031	0.037	20	9	9.04	60	80
		PAPA	2.258	2.205	2.085	2.258	20	9	11.26	60	80
		10km Regional Grid	0.144	0.180	0.168	0.180	20	9	9.18	60	80
		Jonah Monitor	0.087	0.096	0.090	0.096	20	9	9.10	60	80
		Boulder Monitor	0.343	0.216	0.288	0.343	20	9	9.34	60	80
		Daniel Monitor	0.039	0.040	0.029	0.040	20	9	9.04	60	80
SO_2	24-hour	Boulder	1.590	0.918	1.127	1.590	91	43	44.59	260	365
		Cora	0.262	0.374	0.305	0.374	91	43	43.37	260	365
		Pinedale	0.516	0.561	0.480	0.561	91	43	43.56	260	365
		PAPA	14.862	10.407	11.681	14.862	91	43	57.86	260	365
		10km Regional Grid	0.964	1.169	0.885	1.169	91	43	44.17	260	365
		Jonah Monitor	0.754	0.676	0.582	0.754	91	43	43.75	260	365
		Boulder Monitor	2.941	1.412	2.017	2.941	91	43	45.94	260	365
		Daniel Monitor	0.450	0.422	0.417	0.450	91	43	43.45	260	365
SO_2	3-hour	Boulder	5.591	4.007	3.512	5.591	512	132	137.59	1300	1300
		Cora	1.041	1.592	1.352	1.592	512	132	133.59	1300	1300
		Pinedale	2.345	2.697	2.136	2.697	512	132	134.70	1300	1300
		PAPA	69.427	76.139	52.138	76.139	512	132	208.14	1300	1300
		10km Regional Grid	4.264	4.872	4.421	4.872	512	132	136.87	1300	1300
		Jonah Monitor	3.318	2.554	2.674	3.318	512	132	135.32	1300	1300
		Boulder Monitor	8.387	5.578	8.991	8.991	512	132	140.99	1300	1300
		Daniel Monitor	2.033	1.950	1.720	2.033	512	132	134.03	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.6.2
Maximum Modeled SO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Boulder	0.044	0.029	0.037	0.044	20	9	9.04	60	80
		Cora	0.006	0.008	0.006	0.008	20	9	9.01	60	80
		Pinedale	0.024	0.022	0.024	0.024	20	9	9.02	60	80
		PAPA	0.737	0.738	0.737	0.738	20	9	9.74	60	80
		10km Regional Grid	0.067	0.075	0.073	0.075	20	9	9.07	60	80
		Jonah Monitor	0.029	0.033	0.030	0.033	20	9	9.03	60	80
		Boulder Monitor	0.097	0.069	0.085	0.097	20	9	9.10	60	80
		Daniel Monitor	0.012	0.014	0.010	0.014	20	9	9.01	60	80
SO_2	24-hour	Boulder	0.327	0.296	0.262	0.327	91	43	43.33	260	365
		Cora	0.066	0.133	0.089	0.133	91	43	43.13	260	365
		Pinedale	0.148	0.243	0.247	0.247	91	43	43.25	260	365
		PAPA	4.802	3.716	5.293	5.293	91	43	48.29	260	365
		10km Regional Grid	0.274	0.298	0.282	0.298	91	43	43.30	260	365
		Jonah Monitor	0.159	0.170	0.148	0.170	91	43	43.17	260	365
		Boulder Monitor	0.849	0.585	0.445	0.849	91	43	43.85	260	365
		Daniel Monitor	0.112	0.130	0.106	0.130	91	43	43.13	260	365
SO_2	3-hour	Boulder	1.312	1.117	0.901	1.312	512	132	133.31	1300	1300
		Cora	0.410	0.465	0.496	0.496	512	132	132.50	1300	1300
		Pinedale	0.749	0.796	1.101	1.101	512	132	133.10	1300	1300
		PAPA	19.208	19.574	32.766	32.766	512	132	164.77	1300	1300
		10km Regional Grid	1.059	1.003	1.317	1.317	512	132	133.32	1300	1300
		Jonah Monitor	0.635	0.589	0.747	0.747	512	132	132.75	1300	1300
		Boulder Monitor	4.977	2.734	1.687	4.977	512	132	136.98	1300	1300
		Daniel Monitor	0.495	0.573	0.334	0.573	512	132	132.57	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.6.3
Maximum Modeled SO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Boulder	0.051	0.034	0.044	0.051	20	9	9.05	60	80
		Cora	0.007	0.009	0.007	0.009	20	9	9.01	60	80
		Pinedale	0.028	0.024	0.027	0.028	20	9	9.03	60	80
		PAPA	0.706	0.700	0.744	0.744	20	9	9.74	60	80
		10km Regional Grid	0.074	0.083	0.078	0.083	20	9	9.08	60	80
		Jonah Monitor	0.033	0.037	0.034	0.037	20	9	9.04	60	80
		Boulder Monitor	0.112	0.082	0.100	0.112	20	9	9.11	60	80
		Daniel Monitor	0.014	0.016	0.011	0.016	20	9	9.02	60	80
SO_2	24-hour	Boulder	0.367	0.283	0.365	0.367	91	43	43.37	260	365
		Cora	0.091	0.126	0.108	0.126	91	43	43.13	260	365
		Pinedale	0.208	0.309	0.279	0.309	91	43	43.31	260	365
		PAPA	4.678	3.815	5.443	5.443	91	43	48.44	260	365
		10km Regional Grid	0.329	0.406	0.325	0.406	91	43	43.41	260	365
		Jonah Monitor	0.225	0.243	0.169	0.243	91	43	43.24	260	365
		Boulder Monitor	0.828	0.549	0.604	0.828	91	43	43.83	260	365
		Daniel Monitor	0.114	0.123	0.122	0.123	91	43	43.12	260	365
SO_2	3-hour	Boulder	1.282	1.266	0.924	1.282	512	132	133.28	1300	1300
		Cora	0.424	0.474	0.534	0.534	512	132	132.53	1300	1300
		Pinedale	0.802	1.065	1.178	1.178	512	132	133.18	1300	1300
		PAPA	19.367	19.389	32.591	32.591	512	132	164.59	1300	1300
		10km Regional Grid	1.106	1.100	1.202	1.202	512	132	133.20	1300	1300
		Jonah Monitor	0.940	0.635	0.698	0.940	512	132	132.94	1300	1300
		Boulder Monitor	4.840	2.711	2.312	4.840	512	132	136.84	1300	1300
		Daniel Monitor	0.480	0.548	0.467	0.548	512	132	132.55	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.6.4
Maximum Modeled Change in SO_2 Concentration Impacts from Year 2005 at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Boulder	0.148	0.099	0.127	0.148	20	9	9.15	60	80
		Cora	0.021	0.025	0.020	0.025	20	9	9.02	60	80
		Pinedale	0.076	0.068	0.075	0.076	20	9	9.08	60	80
		PAPA	2.095	2.089	2.279	2.279	20	9	11.28	60	80
		10km Regional Grid	0.219	0.243	0.233	0.243	20	9	9.24	60	80
		Jonah Monitor	0.100	0.110	0.101	0.110	20	9	9.11	60	80
		Boulder Monitor	0.316	0.236	0.283	0.316	20	9	9.32	60	80
		Daniel Monitor	0.040	0.045	0.032	0.045	20	9	9.05	60	80
SO_2	24-hour	Boulder	1.173	0.870	1.097	1.173	91	43	44.17	260	365
		Cora	0.261	0.355	0.318	0.355	91	43	43.35	260	365
		Pinedale	0.634	0.943	0.880	0.943	91	43	43.94	260	365
		PAPA	15.780	12.502	18.188	18.188	91	43	61.19	260	365
		10km Regional Grid	1.032	1.207	1.002	1.207	91	43	44.21	260	365
		Jonah Monitor	0.713	0.779	0.517	0.779	91	43	43.78	260	365
		Boulder Monitor	2.591	1.638	1.950	2.591	91	43	45.59	260	365
		Daniel Monitor	0.351	0.364	0.350	0.364	91	43	43.36	260	365
SO_2	3-hour	Boulder	4.139	4.276	2.775	4.276	512	132	136.28	1300	1300
		Cora	1.323	1.462	1.587	1.587	512	132	133.59	1300	1300
		Pinedale	2.722	3.342	3.881	3.881	512	132	135.88	1300	1300
		PAPA	66.536	66.686	112.560	112.560	512	132	244.56	1300	1300
		10km Regional Grid	3.607	3.474	3.700	3.700	512	132	135.70	1300	1300
		Jonah Monitor	2.870	1.962	2.095	2.870	512	132	134.87	1300	1300
		Boulder Monitor	15.943	8.789	7.675	15.943	512	132	147.94	1300	1300
		Daniel Monitor	1.415	1.586	1.406	1.586	512	132	133.59	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.6.5
Maximum Modeled SO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1] 2001 (μg/m³)	2002 (μg/m³)	2003 (μg/m³)	Maximum Direct Modeled Impact (μg/m³)	Applicable PSD Increment[2] (μg/m³)	Background Concentration[3] (μg/m³)	Maximum Total Concentration (μg/m³)	WAAQS (μg/m³)	NAAQS (μg/m³)
SO_2	Annual	Boulder	0.036	0.024	0.031	0.036	20	9	9.04	60	80
		Cora	0.005	0.006	0.005	0.006	20	9	9.01	60	80
		Pinedale	0.019	0.017	0.019	0.019	20	9	9.02	60	80
		PAPA	0.492	0.490	0.519	0.519	20	9	9.52	60	80
		10km Regional Grid	0.051	0.058	0.055	0.058	20	9	9.06	60	80
		Jonah Monitor	0.023	0.026	0.023	0.026	20	9	9.03	60	80
		Boulder Monitor	0.078	0.057	0.070	0.078	20	9	9.08	60	80
		Daniel Monitor	0.010	0.011	0.008	0.011	20	9	9.01	60	80
SO_2	24-hour	Boulder	0.255	0.197	0.254	0.255	91	43	43.26	260	365
		Cora	0.064	0.088	0.075	0.088	91	43	43.09	260	365
		Pinedale	0.145	0.215	0.195	0.215	91	43	43.22	260	365
		PAPA	3.250	2.654	3.783	3.783	91	43	46.78	260	365
		10km Regional Grid	0.230	0.283	0.227	0.283	91	43	43.28	260	365
		Jonah Monitor	0.157	0.169	0.118	0.169	91	43	43.17	260	365
		Boulder Monitor	0.577	0.383	0.420	0.577	91	43	43.58	260	365
		Daniel Monitor	0.079	0.085	0.085	0.085	91	43	43.09	260	365
SO_2	3-hour	Boulder	0.892	0.880	0.645	0.892	512	132	132.89	1300	1300
		Cora	0.295	0.331	0.373	0.373	512	132	132.37	1300	1300
		Pinedale	0.557	0.742	0.819	0.819	512	132	132.82	1300	1300
		PAPA	13.446	13.461	22.623	22.623	512	132	154.62	1300	1300
		10km Regional Grid	0.770	0.766	0.840	0.840	512	132	132.84	1300	1300
		Jonah Monitor	0.655	0.443	0.487	0.655	512	132	132.66	1300	1300
		Boulder Monitor	3.366	1.886	1.606	3.366	512	132	135.37	1300	1300
		Daniel Monitor	0.335	0.383	0.326	0.383	512	132	132.38	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 μg/m³, 43 μg/m³ and 9μg/m³, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.6.6
Maximum Modeled SO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline
Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Boulder	0.002	0.001	0.002	0.002	20	9	9.00	60	80
		Cora	0.000	0.000	0.000	0.000	20	9	9.00	60	80
		Pinedale	0.001	0.001	0.001	0.001	20	9	9.00	60	80
		PAPA	0.025	0.031	0.029	0.031	20	9	9.03	60	80
		10km Regional Grid	0.002	0.003	0.002	0.003	20	9	9.00	60	80
		Jonah Monitor	0.001	0.001	0.001	0.001	20	9	9.00	60	80
		Boulder Monitor	0.004	0.003	0.004	0.004	20	9	9.00	60	80
		Daniel Monitor	0.000	0.000	0.000	0.000	20	9	9.00	60	80
SO_2	24-hour	Boulder	0.020	0.011	0.019	0.020	91	43	43.02	260	365
		Cora	0.005	0.007	0.006	0.007	91	43	43.01	260	365
		Pinedale	0.013	0.011	0.015	0.015	91	43	43.02	260	365
		PAPA	0.125	0.142	0.139	0.142	91	43	43.14	260	365
		10km Regional Grid	0.013	0.021	0.016	0.021	91	43	43.02	260	365
		Jonah Monitor	0.009	0.009	0.008	0.009	91	43	43.01	260	365
		Boulder Monitor	0.033	0.023	0.029	0.033	91	43	43.03	260	365
		Daniel Monitor	0.005	0.005	0.004	0.005	91	43	43.01	260	365
SO_2	3-hour	Boulder	0.056	0.039	0.045	0.056	512	132	132.06	1300	1300
		Cora	0.018	0.028	0.019	0.028	512	132	132.03	1300	1300
		Pinedale	0.043	0.039	0.039	0.043	512	132	132.04	1300	1300
		PAPA	0.361	0.435	0.462	0.462	512	132	132.46	1300	1300
		10km Regional Grid	0.048	0.043	0.041	0.048	512	132	132.05	1300	1300
		Jonah Monitor	0.038	0.027	0.025	0.038	512	132	132.04	1300	1300
		Boulder Monitor	0.094	0.061	0.055	0.094	512	132	132.09	1300	1300
		Daniel Monitor	0.017	0.023	0.019	0.023	512	132	132.02	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.6.7
Maximum Modeled SO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Boulder	0.048	0.032	0.041	0.048	20	9	9.05	60	80
		Cora	0.008	0.009	0.007	0.009	20	9	9.01	60	80
		Pinedale	0.026	0.024	0.026	0.026	20	9	9.03	60	80
		PAPA	0.754	0.753	0.751	0.754	20	9	9.75	60	80
		10km Regional Grid	0.276	0.375	0.375	0.375	20	9	9.38	60	80
		Jonah Monitor	0.154	0.147	0.148	0.154	20	9	9.15	60	80
		Boulder Monitor	0.102	0.074	0.090	0.102	20	9	9.10	60	80
		Daniel Monitor	0.015	0.018	0.012	0.018	20	9	9.02	60	80
SO_2	24-hour	Boulder	0.340	0.296	0.277	0.340	91	43	43.34	260	365
		Cora	0.072	0.154	0.105	0.154	91	43	43.15	260	365
		Pinedale	0.160	0.263	0.266	0.266	91	43	43.27	260	365
		PAPA	4.818	3.745	5.295	5.295	91	43	48.30	260	365
		10km Regional Grid	2.769	3.277	2.621	3.277	91	43	46.28	260	365
		Jonah Monitor	0.738	0.479	0.605	0.738	91	43	43.74	260	365
		Boulder Monitor	0.840	0.607	0.498	0.840	91	43	43.84	260	365
		Daniel Monitor	0.126	0.150	0.119	0.150	91	43	43.15	260	365
SO_2	3-hour	Boulder	1.391	1.186	0.917	1.391	512	132	133.39	1300	1300
		Cora	0.417	0.518	0.551	0.551	512	132	132.55	1300	1300
		Pinedale	0.750	0.881	1.161	1.161	512	132	133.16	1300	1300
		PAPA	19.232	19.574	32.767	32.767	512	132	164.77	1300	1300
		10km Regional Grid	15.901	13.942	10.322	15.901	512	132	147.90	1300	1300
		Jonah Monitor	2.408	1.635	2.168	2.408	512	132	134.41	1300	1300
		Boulder Monitor	4.981	2.739	1.836	4.981	512	132	136.98	1300	1300
		Daniel Monitor	0.514	0.593	0.349	0.593	512	132	132.59	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.6.8
Maximum Modeled SO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Boulder	0.055	0.037	0.048	0.055	20	9	9.05	60	80
		Cora	0.009	0.010	0.008	0.010	20	9	9.01	60	80
		Pinedale	0.030	0.026	0.029	0.030	20	9	9.03	60	80
		PAPA	0.723	0.715	0.752	0.752	20	9	9.75	60	80
		10km Regional Grid	0.276	0.375	0.375	0.375	20	9	9.38	60	80
		Jonah Monitor	0.159	0.151	0.151	0.159	20	9	9.16	60	80
		Boulder Monitor	0.117	0.087	0.106	0.117	20	9	9.12	60	80
		Daniel Monitor	0.016	0.019	0.013	0.019	20	9	9.02	60	80
SO_2	24-hour	Boulder	0.406	0.301	0.379	0.406	91	43	43.41	260	365
		Cora	0.101	0.145	0.125	0.145	91	43	43.14	260	365
		Pinedale	0.216	0.342	0.301	0.342	91	43	43.34	260	365
		PAPA	4.694	3.844	5.446	5.446	91	43	48.45	260	365
		10km Regional Grid	2.769	3.277	2.621	3.277	91	43	46.28	260	365
		Jonah Monitor	0.815	0.553	0.638	0.815	91	43	43.82	260	365
		Boulder Monitor	0.820	0.571	0.656	0.820	91	43	43.82	260	365
		Daniel Monitor	0.122	0.143	0.133	0.143	91	43	43.14	260	365
SO_2	3-hour	Boulder	1.427	1.310	1.024	1.427	512	132	133.43	1300	1300
		Cora	0.470	0.551	0.586	0.586	512	132	132.59	1300	1300
		Pinedale	0.851	1.175	1.254	1.254	512	132	133.25	1300	1300
		PAPA	19.391	19.389	32.592	32.592	512	132	164.59	1300	1300
		10km Regional Grid	15.901	13.942	10.322	15.901	512	132	147.90	1300	1300
		Jonah Monitor	2.456	1.847	2.271	2.456	512	132	134.46	1300	1300
		Boulder Monitor	4.845	2.717	2.301	4.845	512	132	136.85	1300	1300
		Daniel Monitor	0.499	0.568	0.472	0.568	512	132	132.57	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.6.9
Maximum Modeled SO_2 Concentration Impacts at Mid-Field and In-Field Locations from
Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Boulder	0.152	0.102	0.131	0.152	20	9	9.15	60	80
		Cora	0.023	0.026	0.021	0.026	20	9	9.03	60	80
		Pinedale	0.079	0.071	0.077	0.079	20	9	9.08	60	80
		PAPA	2.113	2.130	2.288	2.288	20	9	11.29	60	80
		10km Regional Grid	0.415	0.434	0.450	0.450	20	9	9.45	60	80
		Jonah Monitor	0.226	0.225	0.218	0.226	20	9	9.23	60	80
		Boulder Monitor	0.320	0.241	0.288	0.320	20	9	9.32	60	80
		Daniel Monitor	0.043	0.048	0.035	0.048	20	9	9.05	60	80
SO_2	24-hour	Boulder	1.212	0.893	1.111	1.212	91	43	44.21	260	365
		Cora	0.271	0.356	0.337	0.356	91	43	43.36	260	365
		Pinedale	0.642	0.979	0.902	0.979	91	43	43.98	260	365
		PAPA	15.796	12.530	18.190	18.190	91	43	61.19	260	365
		10km Regional Grid	2.769	3.277	2.621	3.277	91	43	46.28	260	365
		Jonah Monitor	1.184	1.088	0.941	1.184	91	43	44.18	260	365
		Boulder Monitor	2.582	1.660	2.002	2.582	91	43	45.58	260	365
		Daniel Monitor	0.352	0.384	0.361	0.384	91	43	43.38	260	365
SO_2	3-hour	Boulder	4.284	4.320	2.827	4.320	512	132	136.32	1300	1300
		Cora	1.369	1.532	1.640	1.640	512	132	133.64	1300	1300
		Pinedale	2.727	3.452	3.957	3.957	512	132	135.96	1300	1300
		PAPA	66.560	66.686	112.560	112.560	512	132	244.56	1300	1300
		10km Regional Grid	15.901	13.942	10.322	15.901	512	132	147.90	1300	1300
		Jonah Monitor	3.915	2.440	3.514	3.915	512	132	135.92	1300	1300
		Boulder Monitor	15.947	8.794	7.612	15.947	512	132	147.95	1300	1300
		Daniel Monitor	1.434	1.606	1.411	1.606	512	132	133.61	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.6.10
Maximum Modeled SO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Boulder	0.039	0.027	0.034	0.039	20	9	9.04	60	80
		Cora	0.006	0.007	0.006	0.007	20	9	9.01	60	80
		Pinedale	0.022	0.019	0.021	0.022	20	9	9.02	60	80
		PAPA	0.510	0.505	0.527	0.527	20	9	9.53	60	80
		10km Regional Grid	0.276	0.375	0.375	0.375	20	9	9.38	60	80
		Jonah Monitor	0.149	0.140	0.141	0.149	20	9	9.15	60	80
		Boulder Monitor	0.083	0.063	0.075	0.083	20	9	9.08	60	80
		Daniel Monitor	0.012	0.014	0.010	0.014	20	9	9.01	60	80
SO_2	24-hour	Boulder	0.295	0.217	0.269	0.295	91	43	43.29	260	365
		Cora	0.073	0.108	0.093	0.108	91	43	43.11	260	365
		Pinedale	0.153	0.248	0.216	0.248	91	43	43.25	260	365
		PAPA	3.266	2.682	3.785	3.785	91	43	46.79	260	365
		10km Regional Grid	2.769	3.277	2.621	3.277	91	43	46.28	260	365
		Jonah Monitor	0.734	0.480	0.611	0.734	91	43	43.73	260	365
		Boulder Monitor	0.568	0.405	0.473	0.568	91	43	43.57	260	365
		Daniel Monitor	0.089	0.106	0.096	0.106	91	43	43.11	260	365
SO_2	3-hour	Boulder	1.037	0.924	0.735	1.037	512	132	133.04	1300	1300
		Cora	0.342	0.405	0.425	0.425	512	132	132.42	1300	1300
		Pinedale	0.611	0.852	0.895	0.895	512	132	132.90	1300	1300
		PAPA	13.470	13.461	22.624	22.624	512	132	154.62	1300	1300
		10km Regional Grid	15.901	13.942	10.322	15.901	512	132	147.90	1300	1300
		Jonah Monitor	2.391	1.635	2.177	2.391	512	132	134.39	1300	1300
		Boulder Monitor	3.370	1.892	1.582	3.370	512	132	135.37	1300	1300
		Daniel Monitor	0.354	0.406	0.331	0.406	512	132	132.41	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.6.11
Maximum Modeled SO_2 Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Boulder	0.005	0.004	0.005	0.005	20	9	9.01	60	80
		Cora	0.002	0.002	0.002	0.002	20	9	9.00	60	80
		Pinedale	0.004	0.003	0.003	0.004	20	9	9.00	60	80
		PAPA	0.165	0.173	0.173	0.173	20	9	9.17	60	80
		10km Regional Grid	0.276	0.375	0.375	0.375	20	9	9.37	60	80
		Jonah Monitor	0.127	0.115	0.118	0.127	20	9	9.13	60	80
		Boulder Monitor	0.009	0.008	0.009	0.009	20	9	9.01	60	80
		Daniel Monitor	0.003	0.004	0.003	0.004	20	9	9.00	60	80
SO_2	24-hour	Boulder	0.045	0.040	0.057	0.057	91	43	43.06	260	365
		Cora	0.015	0.031	0.023	0.031	91	43	43.03	260	365
		Pinedale	0.027	0.056	0.035	0.056	91	43	43.06	260	365
		PAPA	1.320	1.040	2.158	2.158	91	43	45.16	260	365
		10km Regional Grid	2.769	3.277	2.621	3.277	91	43	46.28	260	365
		Jonah Monitor	0.557	0.412	0.554	0.557	91	43	43.56	260	365
		Boulder Monitor	0.063	0.063	0.067	0.067	91	43	43.07	260	365
		Daniel Monitor	0.019	0.024	0.018	0.024	91	43	43.02	260	365
SO_2	3-hour	Boulder	0.163	0.152	0.180	0.180	512	132	132.18	1300	1300
		Cora	0.061	0.090	0.084	0.090	512	132	132.09	1300	1300
		Pinedale	0.104	0.166	0.113	0.166	512	132	132.17	1300	1300
		PAPA	6.283	6.345	9.538	9.538	512	132	141.54	1300	1300
		10km Regional Grid	15.901	13.942	10.322	15.901	512	132	147.90	1300	1300
		Jonah Monitor	2.251	1.555	2.038	2.251	512	132	134.25	1300	1300
		Boulder Monitor	0.228	0.248	0.331	0.331	512	132	132.33	1300	1300
		Daniel Monitor	0.077	0.089	0.071	0.089	512	132	132.09	1300	1300

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background SO_2 concentration values of 132 $\mu g/m^3$, 43 $\mu g/m^3$ and 9 $\mu g/m^3$, from Craven Creek used for 3-hour, 24-hour, and annual averaging periods, respectively.

Table E.7.1
Maximum Modeled PM_{10} Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Boulder	0.83	0.56	0.72	0.83	17	9	9.83	50	50
		Cora	0.13	0.17	0.13	0.17	17	9	9.17	50	50
		Pinedale	0.23	0.27	0.22	0.27	17	9	9.27	50	50
		PAPA	16.22	20.86	19.49	20.86	17	9	29.86	50	50
		10km Regional Grid	0.83	1.06	0.96	1.06	17	9	10.06	50	50
		Jonah Monitor	0.45	0.56	0.51	0.56	17	9	9.56	50	50
		Boulder Monitor	1.81	1.07	1.44	1.81	17	9	10.81	50	50
		Daniel Monitor	0.26	0.29	0.22	0.29	17	9	9.29	50	50
PM_{10}	24-hour	Boulder	6.84	4.72	6.66	6.84	30	32	38.84	150	150
		Cora	2.01	5.23	2.63	5.23	30	32	37.23	150	150
		Pinedale	2.62	6.52	4.41	6.52	30	32	38.52	150	150
		PAPA	54.43	76.32	76.31	76.32	30	32	108.32	150	150
		10km Regional Grid	4.49	5.59	6.00	6.00	30	32	38.00	150	150
		Jonah Monitor	2.76	3.87	3.24	3.87	30	32	35.87	150	150
		Boulder Monitor	17.04	7.80	12.04	17.04	30	32	49.04	150	150
		Daniel Monitor	2.80	2.75	2.64	2.80	30	32	34.80	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.7.2
Maximum Modeled PM_{10} Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Boulder	1.11	0.77	0.97	1.11	17	9	10.11	50	50
		Cora	0.22	0.28	0.22	0.28	17	9	9.28	50	50
		Pinedale	0.71	0.61	0.71	0.71	17	9	9.71	50	50
		PAPA	13.94	18.32	16.25	18.32	17	9	27.32	50	50
		10km Regional Grid	1.44	1.78	1.59	1.78	17	9	10.78	50	50
		Jonah Monitor	0.71	0.87	0.76	0.87	17	9	9.87	50	50
		Boulder Monitor	2.28	1.59	1.99	2.28	17	9	11.28	50	50
		Daniel Monitor	0.39	0.45	0.34	0.45	17	9	9.45	50	50
PM_{10}	24-hour	Boulder	8.78	5.72	8.18	8.78	30	32	40.78	150	150
		Cora	2.45	7.51	4.23	7.51	30	32	39.51	150	150
		Pinedale	4.54	8.97	7.62	8.97	30	32	40.97	150	150
		PAPA	41.35	51.36	47.89	51.36	30	32	83.36	150	150
		10km Regional Grid	5.92	9.22	8.02	9.22	30	32	41.22	150	150
		Jonah Monitor	4.32	4.97	4.07	4.97	30	32	36.97	150	150
		Boulder Monitor	16.15	8.37	11.26	16.15	30	32	48.15	150	150
		Daniel Monitor	3.32	3.85	3.48	3.85	30	32	35.85	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.7.3
Maximum Modeled PM_{10} Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Boulder	0.85	0.63	0.76	0.85	17	9	9.85	50	50
		Cora	0.20	0.23	0.20	0.23	17	9	9.23	50	50
		Pinedale	0.52	0.44	0.49	0.52	17	9	9.52	50	50
		PAPA	6.63	8.53	7.41	8.53	17	9	17.53	50	50
		10km Regional Grid	0.91	1.15	0.97	1.15	17	9	10.15	50	50
		Jonah Monitor	0.51	0.62	0.51	0.62	17	9	9.62	50	50
		Boulder Monitor	1.59	1.21	1.45	1.59	17	9	10.59	50	50
		Daniel Monitor	0.33	0.35	0.28	0.35	17	9	9.35	50	50
PM_{10}	24-hour	Boulder	8.23	4.78	7.96	8.23	30	32	40.23	150	150
		Cora	2.62	5.06	4.87	5.06	30	32	37.06	150	150
		Pinedale	4.19	7.37	6.20	7.37	30	32	39.37	150	150
		PAPA	20.69	23.73	24.56	24.56	30	32	56.56	150	150
		10km Regional Grid	6.19	8.51	8.63	8.63	30	32	40.63	150	150
		Jonah Monitor	4.08	4.95	3.96	4.95	30	32	36.95	150	150
		Boulder Monitor	10.04	5.87	7.57	10.04	30	32	42.04	150	150
		Daniel Monitor	3.63	3.19	3.73	3.73	30	32	35.73	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.7.4
Maximum Modeled PM_{10} Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Boulder	0.88	0.62	0.78	0.88	17	9	9.88	50	50
		Cora	0.18	0.21	0.17	0.21	17	9	9.21	50	50
		Pinedale	0.56	0.45	0.53	0.56	17	9	9.56	50	50
		PAPA	8.36	10.83	9.58	10.83	17	9	19.83	50	50
		10km Regional Grid	0.99	1.25	1.07	1.25	17	9	10.25	50	50
		Jonah Monitor	0.50	0.61	0.51	0.61	17	9	9.61	50	50
		Boulder Monitor	1.83	1.34	1.66	1.83	17	9	10.83	50	50
		Daniel Monitor	0.30	0.33	0.26	0.33	17	9	9.33	50	50
PM_{10}	24-hour	Boulder	6.96	4.26	7.17	7.17	30	32	39.17	150	150
		Cora	2.15	4.57	3.91	4.57	30	32	36.57	150	150
		Pinedale	4.10	6.38	5.92	6.38	30	32	38.38	150	150
		PAPA	23.08	28.85	29.93	29.93	30	32	61.93	150	150
		10km Regional Grid	5.63	7.89	7.39	7.89	30	32	39.89	150	150
		Jonah Monitor	3.46	4.00	3.54	4.00	30	32	36.00	150	150
		Boulder Monitor	11.12	6.73	8.35	11.12	30	32	43.12	150	150
		Daniel Monitor	2.71	2.88	2.93	2.93	30	32	34.93	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.7.5
Maximum Modeled PM_{10} Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Boulder	0.68	0.44	0.59	0.68	17	9	9.68	50	50
		Cora	0.11	0.14	0.11	0.14	17	9	9.14	50	50
		Pinedale	0.44	0.34	0.42	0.44	17	9	9.44	50	50
		PAPA	7.75	9.69	9.00	9.69	17	9	18.69	50	50
		10km Regional Grid	0.78	0.99	0.86	0.99	17	9	9.99	50	50
		Jonah Monitor	0.36	0.44	0.38	0.44	17	9	9.44	50	50
		Boulder Monitor	1.53	1.07	1.39	1.53	17	9	10.53	50	50
		Daniel Monitor	0.20	0.23	0.17	0.23	17	9	9.23	50	50
PM_{10}	24-hour	Boulder	5.12	3.06	5.09	5.12	30	32	37.12	150	150
		Cora	1.44	2.95	2.05	2.95	30	32	34.95	150	150
		Pinedale	3.02	3.95	4.07	4.07	30	32	36.07	150	150
		PAPA	22.03	27.01	29.56	29.56	30	32	61.56	150	150
		10km Regional Grid	3.71	5.35	4.41	5.35	30	32	37.35	150	150
		Jonah Monitor	2.26	2.25	2.25	2.26	30	32	34.26	150	150
		Boulder Monitor	9.37	5.81	7.23	9.37	30	32	41.37	150	150
		Daniel Monitor	1.75	1.76	1.62	1.76	30	32	33.76	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.7.6
Maximum Modeled PM_{10} Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Boulder	0.37	0.23	0.33	0.37	17	9	9.37	50	50
		Cora	0.07	0.23	0.07	0.23	17	9	9.23	50	50
		Pinedale	0.23	0.23	0.21	0.23	17	9	9.23	50	50
		PAPA	4.02	0.23	4.62	4.62	17	9	13.62	50	50
		10km Regional Grid	0.39	0.23	0.42	0.42	17	9	9.42	50	50
		Jonah Monitor	0.21	0.26	0.22	0.26	17	9	9.26	50	50
		Boulder Monitor	0.77	0.56	0.70	0.77	17	9	9.77	50	50
		Daniel Monitor	0.12	0.13	0.10	0.13	17	9	9.13	50	50
PM_{10}	24-hour	Boulder	3.28	1.73	3.52	3.52	30	32	35.52	150	150
		Cora	0.92	1.37	1.21	1.37	30	32	33.37	150	150
		Pinedale	1.97	2.80	2.14	2.80	30	32	34.80	150	150
		PAPA	15.75	17.50	15.52	17.50	30	32	49.50	150	150
		10km Regional Grid	2.54	3.49	3.13	3.49	30	32	35.49	150	150
		Jonah Monitor	1.77	1.98	1.76	1.98	30	32	33.98	150	150
		Boulder Monitor	4.63	3.19	4.28	4.63	30	32	36.63	150	150
		Daniel Monitor	1.12	0.98	1.11	1.12	30	32	33.12	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.7.7
Maximum Modeled PM_{10} Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Boulder	1.18	0.83	1.04	1.18	17	9	10.18	50	50
		Cora	0.25	0.31	0.26	0.31	17	9	9.31	50	50
		Pinedale	0.76	0.66	0.75	0.76	17	9	9.76	50	50
		PAPA	14.46	18.85	16.73	18.85	17	9	27.85	50	50
		10km Regional Grid	4.36	5.21	4.83	5.21	17	9	14.21	50	50
		Jonah Monitor	2.57	2.92	2.65	2.92	17	9	11.92	50	50
		Boulder Monitor	2.36	1.67	2.07	2.36	17	9	11.36	50	50
		Daniel Monitor	0.45	0.50	0.39	0.50	17	9	9.50	50	50
PM_{10}	24-hour	Boulder	8.90	6.04	8.31	8.90	30	32	40.90	150	150
		Cora	2.55	7.67	4.79	7.67	30	32	39.67	150	150
		Pinedale	4.78	9.17	8.25	9.17	30	32	41.17	150	150
		PAPA	42.21	51.52	48.92	51.52	30	32	83.52	150	150
		10km Regional Grid	12.05	14.35	14.41	14.41	30	32	46.41	150	150
		Jonah Monitor	9.24	10.51	8.96	10.51	30	32	42.51	150	150
		Boulder Monitor	16.31	8.60	11.41	16.31	30	32	48.31	150	150
		Daniel Monitor	3.62	4.01	3.84	4.01	30	32	36.01	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.7.8
Maximum Modeled PM_{10} Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Boulder	0.92	0.69	0.82	0.92	17	9	9.92	50	50
		Cora	0.24	0.26	0.23	0.26	17	9	9.26	50	50
		Pinedale	0.56	0.48	0.53	0.56	17	9	9.56	50	50
		PAPA	7.16	9.06	7.88	9.06	17	9	18.06	50	50
		10km Regional Grid	4.15	4.88	4.52	4.88	17	9	13.88	50	50
		Jonah Monitor	2.37	2.67	2.40	2.67	17	9	11.67	50	50
		Boulder Monitor	1.67	1.29	1.52	1.67	17	9	10.67	50	50
		Daniel Monitor	0.38	0.41	0.33	0.41	17	9	9.41	50	50
PM_{10}	24-hour	Boulder	8.83	5.00	8.99	8.99	30	32	40.99	150	150
		Cora	2.81	5.22	5.43	5.43	30	32	37.43	150	150
		Pinedale	4.70	8.45	6.44	8.45	30	32	40.45	150	150
		PAPA	22.19	24.98	25.10	25.10	30	32	57.10	150	150
		10km Regional Grid	11.33	13.36	14.42	14.42	30	32	46.42	150	150
		Jonah Monitor	9.01	10.42	8.89	10.42	30	32	42.42	150	150
		Boulder Monitor	10.17	6.15	7.89	10.17	30	32	42.17	150	150
		Daniel Monitor	4.06	3.38	4.37	4.37	30	32	36.37	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.7.9
Maximum Modeled PM_{10} Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Boulder	0.96	0.68	0.85	0.96	17	9	9.96	50	50
		Cora	0.21	0.24	0.20	0.24	17	9	9.24	50	50
		Pinedale	0.60	0.49	0.57	0.60	17	9	9.60	50	50
		PAPA	8.65	11.36	9.79	11.36	17	9	20.36	50	50
		10km Regional Grid	4.14	4.88	4.53	4.88	17	9	13.88	50	50
		Jonah Monitor	2.36	2.66	2.40	2.66	17	9	11.66	50	50
		Boulder Monitor	1.91	1.41	1.74	1.91	17	9	10.91	50	50
		Daniel Monitor	0.36	0.39	0.31	0.39	17	9	9.39	50	50
PM_{10}	24-hour	Boulder	7.55	4.47	8.27	8.27	30	32	40.27	150	150
		Cora	2.36	4.73	4.47	4.73	30	32	36.73	150	150
		Pinedale	4.53	7.47	6.16	7.47	30	32	39.47	150	150
		PAPA	23.46	30.10	30.01	30.10	30	32	62.10	150	150
		10km Regional Grid	10.98	13.36	14.39	14.39	30	32	46.39	150	150
		Jonah Monitor	8.45	9.54	8.44	9.54	30	32	41.54	150	150
		Boulder Monitor	11.36	7.08	8.67	11.36	30	32	43.36	150	150
		Daniel Monitor	3.14	3.07	3.50	3.50	30	32	35.50	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.7.10
Maximum Modeled PM_{10} Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1] 2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	Maximum Direct Modeled Impact ($\mu g/m^3$)	Applicable PSD Increment[2] ($\mu g/m^3$)	Background Concentration[3] ($\mu g/m^3$)	Maximum Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
PM_{10}	Annual	Boulder	0.75	0.51	0.66	0.75	17	9	9.75	50	50
		Cora	0.15	0.17	0.14	0.17	17	9	9.17	50	50
		Pinedale	0.48	0.38	0.46	0.48	17	9	9.48	50	50
		PAPA	7.83	10.22	9.09	10.22	17	9	19.22	50	50
		10km Regional Grid	3.99	4.69	4.36	4.69	17	9	13.69	50	50
		Jonah Monitor	2.22	2.50	2.27	2.50	17	9	11.50	50	50
		Boulder Monitor	1.61	1.15	1.47	1.61	17	9	10.61	50	50
		Daniel Monitor	0.25	0.29	0.22	0.29	17	9	9.29	50	50
PM_{10}	24-hour	Boulder	5.30	3.41	5.62	5.62	30	32	37.62	150	150
		Cora	1.69	3.10	2.61	3.10	30	32	35.10	150	150
		Pinedale	3.38	4.95	4.31	4.95	30	32	36.95	150	150
		PAPA	22.41	27.12	29.65	29.65	30	32	61.65	150	150
		10km Regional Grid	9.92	13.36	14.35	14.35	30	32	46.35	150	150
		Jonah Monitor	7.27	7.57	7.48	7.57	30	32	39.57	150	150
		Boulder Monitor	9.50	6.17	7.32	9.50	30	32	41.50	150	150
		Daniel Monitor	2.03	2.06	2.07	2.07	30	32	34.07	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.7.11
Maximum Modeled PM_{10} Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact[1]			Maximum Direct Modeled Impact	Applicable PSD Increment[2]	Background Concentration[3]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Boulder	0.45	0.32	0.40	0.45	17	9	9.45	50	50
		Cora	0.10	0.11	0.10	0.11	17	9	9.11	50	50
		Pinedale	0.27	0.22	0.25	0.27	17	9	9.27	50	50
		PAPA	4.10	4.94	4.70	4.94	17	9	13.94	50	50
		10km Regional Grid	3.83	4.60	4.36	4.60	17	9	13.60	50	50
		Jonah Monitor	2.07	2.31	2.11	2.31	17	9	11.31	50	50
		Boulder Monitor	0.86	0.64	0.78	0.86	17	9	9.86	50	50
		Daniel Monitor	0.17	0.19	0.15	0.19	17	9	9.19	50	50
PM_{10}	24-hour	Boulder	3.48	2.07	4.29	4.29	30	32	36.29	150	150
		Cora	1.29	2.00	1.77	2.00	30	32	34.00	150	150
		Pinedale	2.35	3.23	2.59	3.23	30	32	35.23	150	150
		PAPA	16.02	17.93	15.82	17.93	30	32	49.93	150	150
		10km Regional Grid	9.66	13.36	14.36	14.36	30	32	46.36	150	150
		Jonah Monitor	6.76	6.89	7.00	7.00	30	32	39.00	150	150
		Boulder Monitor	4.97	3.41	4.60	4.97	30	32	36.97	150	150
		Daniel Monitor	1.40	1.40	1.58	1.58	30	32	33.58	150	150

[1] Background concentrations are not added to modeled concentrations for comparison to the PSD increment.
[2] All NEPA analysis comparisons to the PSD increments are intended to evaluate a threshold of concern and do not represent a regulatory PSD increment consumption analysis.
[3] Background PM_{10} concentration values of 32 $\mu g/m^3$ and 9 $\mu g/m^3$, from Boulder used for 24-hour and annual averaging periods, respectively.

Table E.8.1
Maximum Modeled $PM_{2.5}$ Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Boulder	0.44	0.32	0.39	0.44	6	6.44	15	15
		Cora	0.09	0.11	0.09	0.11	6	6.11	15	15
		Pinedale	0.15	0.17	0.14	0.17	6	6.17	15	15
		PAPA	4.39	5.38	5.07	5.38	6	11.38	15	15
		10km Regional Grid	0.40	0.53	0.45	0.53	6	6.53	15	15
		Jonah Monitor	0.27	0.33	0.28	0.33	6	6.33	15	15
		Boulder Monitor	0.79	0.55	0.66	0.79	6	6.79	15	15
		Daniel Monitor	0.17	0.16	0.14	0.17	6	6.17	15	15
$PM_{2.5}$	24-hour	Boulder	2.68	2.00	2.21	2.68	15	17.68	65(35)[2]	65(35)[2]
		Cora	0.76	0.98	0.84	0.98	15	15.98	65(35)[2]	65(35)[2]
		Pinedale	1.15	1.19	1.22	1.22	15	16.22	65(35)[2]	65(35)[2]
		PAPA	12.60	14.41	15.04	15.04	15	30.04	65(35)[2]	65(35)[2]
		10km Regional Grid	2.29	2.45	2.25	2.45	15	17.45	65(35)[2]	65(35)[2]
		Jonah Monitor	1.99	1.88	1.52	1.99	15	16.99	65(35)[2]	65(35)[2]
		Boulder Monitor	3.94	2.65	3.09	3.94	15	18.94	65(35)[2]	65(35)[2]
		Daniel Monitor	1.29	1.08	1.15	1.29	15	16.29	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.8.2
Maximum Modeled $PM_{2.5}$ Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Boulder	0.55	0.42	0.49	0.55	6	6.55	15	15
		Cora	0.14	0.17	0.15	0.17	6	6.17	15	15
		Pinedale	0.31	0.31	0.31	0.31	6	6.31	15	15
		PAPA	4.40	5.23	4.79	5.23	6	11.23	15	15
		10km Regional Grid	0.68	0.83	0.72	0.83	6	6.83	15	15
		Jonah Monitor	0.40	0.49	0.41	0.49	6	6.49	15	15
		Boulder Monitor	0.93	0.72	0.83	0.93	6	6.93	15	15
		Daniel Monitor	0.24	0.26	0.21	0.26	6	6.26	15	15
$PM_{2.5}$	24-hour	Boulder	3.44	2.41	2.91	3.44	15	18.44	65(35)[2]	65(35)[2]
		Cora	1.23	1.56	1.31	1.56	15	16.56	65(35)[2]	65(35)[2]
		Pinedale	1.66	1.85	2.08	2.08	15	17.08	65(35)[2]	65(35)[2]
		PAPA	13.20	13.74	14.13	14.13	15	29.13	65(35)[2]	65(35)[2]
		10km Regional Grid	2.75	3.16	2.86	3.16	15	18.16	65(35)[2]	65(35)[2]
		Jonah Monitor	2.52	2.40	2.08	2.52	15	17.52	65(35)[2]	65(35)[2]
		Boulder Monitor	4.77	3.13	3.59	4.77	15	19.77	65(35)[2]	65(35)[2]
		Daniel Monitor	1.53	1.39	1.69	1.69	15	16.69	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.8.3
Maximum Modeled $PM_{2.5}$ Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Boulder	0.54	0.43	0.49	0.54	6	6.54	15	15
		Cora	0.16	0.17	0.15	0.17	6	6.17	15	15
		Pinedale	0.31	0.29	0.29	0.31	6	6.31	15	15
		PAPA	3.01	3.42	3.09	3.42	6	9.42	15	15
		10km Regional Grid	0.54	0.68	0.56	0.68	6	6.68	15	15
		Jonah Monitor	0.36	0.43	0.35	0.43	6	6.43	15	15
		Boulder Monitor	0.84	0.70	0.76	0.84	6	6.84	15	15
		Daniel Monitor	0.25	0.25	0.21	0.25	6	6.25	15	15
$PM_{2.5}$	24-hour	Boulder	2.91	2.20	2.64	2.91	15	17.91	65(35)[2]	65(35)[2]
		Cora	1.45	1.47	1.44	1.47	15	16.47	65(35)[2]	65(35)[2]
		Pinedale	2.24	2.05	2.36	2.36	15	17.36	65(35)[2]	65(35)[2]
		PAPA	11.18	9.76	12.11	12.11	15	27.11	65(35)[2]	65(35)[2]
		10km Regional Grid	2.87	3.03	2.95	3.03	15	18.03	65(35)[2]	65(35)[2]
		Jonah Monitor	2.55	2.43	2.12	2.55	15	17.55	65(35)[2]	65(35)[2]
		Boulder Monitor	4.19	3.02	3.31	4.19	15	19.19	65(35)[2]	65(35)[2]
		Daniel Monitor	1.66	1.58	1.33	1.66	15	16.66	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.8.4
Maximum Modeled $PM_{2.5}$ Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Boulder	0.44	0.34	0.40	0.44	6	6.44	15	15
		Cora	0.12	0.13	0.11	0.13	6	6.13	15	15
		Pinedale	0.26	0.23	0.24	0.26	6	6.26	15	15
		PAPA	2.91	3.47	3.10	3.47	6	9.47	15	15
		10km Regional Grid	0.45	0.57	0.48	0.57	6	6.57	15	15
		Jonah Monitor	0.28	0.34	0.28	0.34	6	6.34	15	15
		Boulder Monitor	0.75	0.59	0.68	0.75	6	6.75	15	15
		Daniel Monitor	0.19	0.19	0.16	0.19	6	6.19	15	15
$PM_{2.5}$	24-hour	Boulder	2.29	1.70	2.07	2.29	15	17.29	65(35)[2]	65(35)[2]
		Cora	1.04	1.10	1.01	1.10	15	16.10	65(35)[2]	65(35)[2]
		Pinedale	1.74	1.37	1.80	1.80	15	16.80	65(35)[2]	65(35)[2]
		PAPA	9.52	8.57	9.92	9.92	15	24.92	65(35)[2]	65(35)[2]
		10km Regional Grid	2.07	2.28	2.09	2.28	15	17.28	65(35)[2]	65(35)[2]
		Jonah Monitor	1.86	1.77	1.57	1.86	15	16.86	65(35)[2]	65(35)[2]
		Boulder Monitor	3.67	2.50	2.69	3.67	15	18.67	65(35)[2]	65(35)[2]
		Daniel Monitor	1.19	1.14	1.06	1.19	15	16.19	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.8.5
Maximum Modeled $PM_{2.5}$ Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Boulder	0.23	0.34	0.40	0.40	6	6.40	15	15
		Cora	0.05	0.13	0.11	0.13	6	6.13	15	15
		Pinedale	0.14	0.23	0.24	0.24	6	6.24	15	15
		PAPA	1.77	3.47	3.10	3.47	6	9.47	15	15
		10km Regional Grid	0.25	0.57	0.48	0.57	6	6.57	15	15
		Jonah Monitor	0.14	0.17	0.14	0.17	6	6.17	15	15
		Boulder Monitor	0.45	0.33	0.41	0.45	6	6.45	15	15
		Daniel Monitor	0.08	0.09	0.07	0.09	6	6.09	15	15
$PM_{2.5}$	24-hour	Boulder	1.31	0.84	0.93	1.31	15	16.31	65(35)[2]	65(35)[2]
		Cora	0.43	0.54	0.48	0.54	15	15.54	65(35)[2]	65(35)[2]
		Pinedale	0.77	0.73	0.84	0.84	15	15.84	65(35)[2]	65(35)[2]
		PAPA	4.58	5.74	5.18	5.74	15	20.74	65(35)[2]	65(35)[2]
		10km Regional Grid	0.91	1.12	1.03	1.12	15	16.12	65(35)[2]	65(35)[2]
		Jonah Monitor	0.84	0.83	0.68	0.84	15	15.84	65(35)[2]	65(35)[2]
		Boulder Monitor	1.97	1.32	1.61	1.97	15	16.97	65(35)[2]	65(35)[2]
		Daniel Monitor	0.52	0.48	0.46	0.52	15	15.52	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.8.6
Maximum Modeled $PM_{2.5}$ Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Boulder	0.15	0.12	0.14	0.15	6	6.15	15	15
		Cora	0.04	0.04	0.04	0.04	6	6.04	15	15
		Pinedale	0.09	0.08	0.08	0.09	6	6.09	15	15
		PAPA	0.99	1.23	1.11	1.23	6	7.23	15	15
		10km Regional Grid	0.16	0.21	0.16	0.21	6	6.21	15	15
		Jonah Monitor	0.10	0.13	0.10	0.13	6	6.13	15	15
		Boulder Monitor	0.26	0.21	0.24	0.26	6	6.26	15	15
		Daniel Monitor	0.06	0.06	0.05	0.06	6	6.06	15	15
$PM_{2.5}$	24-hour	Boulder	0.95	0.71	0.89	0.95	15	15.95	65(35)[2]	65(35)[2]
		Cora	0.38	0.35	0.40	0.40	15	15.40	65(35)[2]	65(35)[2]
		Pinedale	0.67	0.55	0.56	0.67	15	15.67	65(35)[2]	65(35)[2]
		PAPA	3.56	4.04	3.73	4.04	15	19.04	65(35)[2]	65(35)[2]
		10km Regional Grid	0.90	1.24	0.90	1.24	15	16.24	65(35)[2]	65(35)[2]
		Jonah Monitor	0.74	0.80	0.68	0.80	15	15.80	65(35)[2]	65(35)[2]
		Boulder Monitor	1.22	1.05	1.23	1.23	15	16.23	65(35)[2]	65(35)[2]
		Daniel Monitor	0.54	0.47	0.36	0.54	15	15.54	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.8.7
Maximum Modeled $PM_{2.5}$ Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Boulder	0.61	0.48	0.55	0.61	6	6.61	15	15
		Cora	0.17	0.20	0.18	0.20	6	6.20	15	15
		Pinedale	0.35	0.35	0.35	0.35	6	6.35	15	15
		PAPA	4.62	5.45	4.98	5.45	6	11.45	15	15
		10km Regional Grid	3.45	4.60	4.37	4.60	6	10.60	15	15
		Jonah Monitor	1.18	1.27	1.17	1.27	6	7.27	15	15
		Boulder Monitor	1.00	0.79	0.89	1.00	6	7.00	15	15
		Daniel Monitor	0.29	0.31	0.25	0.31	6	6.31	15	15
$PM_{2.5}$	24-hour	Boulder	3.55	2.74	3.16	3.55	15	18.55	65(35)[2]	65(35)[2]
		Cora	1.36	1.73	1.45	1.73	15	16.73	65(35)[2]	65(35)[2]
		Pinedale	1.88	1.94	2.32	2.32	15	17.32	65(35)[2]	65(35)[2]
		PAPA	13.50	14.24	14.49	14.49	15	29.49	65(35)[2]	65(35)[2]
		10km Regional Grid	7.45	10.08	11.05	11.05	15	26.05	65(35)[2]	65(35)[2]
		Jonah Monitor	4.87	4.05	4.15	4.87	15	19.87	65(35)[2]	65(35)[2]
		Boulder Monitor	4.93	3.32	3.83	4.93	15	19.93	65(35)[2]	65(35)[2]
		Daniel Monitor	1.69	1.73	1.83	1.83	15	16.83	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.8.8
Maximum Modeled $PM_{2.5}$ Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Boulder	0.60	0.49	0.55	0.60	6	6.60	15	15
		Cora	0.19	0.20	0.18	0.20	6	6.20	15	15
		Pinedale	0.35	0.32	0.33	0.35	6	6.35	15	15
		PAPA	3.23	3.63	3.28	3.63	6	9.63	15	15
		10km Regional Grid	3.46	4.60	4.37	4.60	6	10.60	15	15
		Jonah Monitor	1.13	1.21	1.10	1.21	6	7.21	15	15
		Boulder Monitor	0.91	0.77	0.83	0.91	6	6.91	15	15
		Daniel Monitor	0.30	0.30	0.25	0.30	6	6.30	15	15
$PM_{2.5}$	24-hour	Boulder	3.01	2.40	2.93	3.01	15	18.01	65(35)[2]	65(35)[2]
		Cora	1.67	1.58	1.61	1.67	15	16.67	65(35)[2]	65(35)[2]
		Pinedale	2.44	2.13	2.65	2.65	15	17.65	65(35)[2]	65(35)[2]
		PAPA	12.19	10.44	12.16	12.19	15	27.19	65(35)[2]	65(35)[2]
		10km Regional Grid	7.45	10.08	11.06	11.06	15	26.06	65(35)[2]	65(35)[2]
		Jonah Monitor	4.83	4.20	4.30	4.83	15	19.83	65(35)[2]	65(35)[2]
		Boulder Monitor	4.32	3.29	3.65	4.32	15	19.32	65(35)[2]	65(35)[2]
		Daniel Monitor	1.87	1.96	1.55	1.96	15	16.96	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.8.9
Maximum Modeled $PM_{2.5}$ Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Boulder	0.50	0.39	0.46	0.50	6	6.50	15	15
		Cora	0.15	0.16	0.14	0.16	6	6.16	15	15
		Pinedale	0.30	0.27	0.28	0.30	6	6.30	15	15
		PAPA	3.13	3.69	3.29	3.69	6	9.69	15	15
		10km Regional Grid	3.45	4.60	4.36	4.60	6	10.60	15	15
		Jonah Monitor	1.05	1.12	1.03	1.12	6	7.12	15	15
		Boulder Monitor	0.82	0.66	0.75	0.82	6	6.82	15	15
		Daniel Monitor	0.23	0.24	0.20	0.24	6	6.24	15	15
$PM_{2.5}$	24-hour	Boulder	2.52	1.97	2.24	2.52	15	17.52	65(35)[2]	65(35)[2]
		Cora	1.23	1.22	1.16	1.23	15	16.23	65(35)[2]	65(35)[2]
		Pinedale	1.90	1.58	2.01	2.01	15	17.01	65(35)[2]	65(35)[2]
		PAPA	9.89	9.17	9.98	9.98	15	24.98	65(35)[2]	65(35)[2]
		10km Regional Grid	7.45	10.08	11.04	11.04	15	26.04	65(35)[2]	65(35)[2]
		Jonah Monitor	4.16	3.80	3.70	4.16	15	19.16	65(35)[2]	65(35)[2]
		Boulder Monitor	3.94	2.66	2.99	3.94	15	18.94	65(35)[2]	65(35)[2]
		Daniel Monitor	1.40	1.47	1.21	1.47	15	16.47	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.8.10
Maximum Modeled $PM_{2.5}$ Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Boulder	0.29	0.22	0.27	0.29	6	6.29	15	15
		Cora	0.08	0.09	0.08	0.09	6	6.09	15	15
		Pinedale	0.18	0.16	0.17	0.18	6	6.18	15	15
		PAPA	1.95	2.55	2.18	2.55	6	8.55	15	15
		10km Regional Grid	3.44	4.59	4.36	4.59	6	10.59	15	15
		Jonah Monitor	0.91	0.95	0.89	0.95	6	6.95	15	15
		Boulder Monitor	0.52	0.40	0.47	0.52	6	6.52	15	15
		Daniel Monitor	0.13	0.14	0.12	0.14	6	6.14	15	15
$PM_{2.5}$	24-hour	Boulder	1.41	1.04	1.22	1.41	15	16.41	65(35)[2]	65(35)[2]
		Cora	0.57	0.64	0.66	0.66	15	15.66	65(35)[2]	65(35)[2]
		Pinedale	0.96	0.96	1.13	1.13	15	16.13	65(35)[2]	65(35)[2]
		PAPA	4.92	6.20	5.46	6.20	15	21.20	65(35)[2]	65(35)[2]
		10km Regional Grid	7.45	10.08	11.01	11.01	15	26.01	65(35)[2]	65(35)[2]
		Jonah Monitor	3.13	2.66	2.91	3.13	15	18.13	65(35)[2]	65(35)[2]
		Boulder Monitor	2.40	1.52	1.86	2.40	15	17.40	65(35)[2]	65(35)[2]
		Daniel Monitor	0.78	0.76	0.68	0.78	15	15.78	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.8.11
Maximum Modeled $PM_{2.5}$ Concentration Impacts at Mid-Field and In-Field Locations from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact			Maximum Direct Modeled Impact	Background Concentration[1]	Maximum Total Concentration	WAAQS	NAAQS
			2001 ($\mu g/m^3$)	2002 ($\mu g/m^3$)	2003 ($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
$PM_{2.5}$	Annual	Boulder	0.22	0.17	0.20	0.22	6	6.22	15	15
		Cora	0.07	0.07	0.06	0.07	6	6.07	15	15
		Pinedale	0.13	0.11	0.12	0.13	6	6.13	15	15
		PAPA	1.12	1.32	1.21	1.32	6	7.32	15	15
		10km Regional Grid	3.44	4.59	4.36	4.59	6	10.59	15	15
		Jonah Monitor	0.88	0.91	0.85	0.91	6	6.91	15	15
		Boulder Monitor	0.33	0.28	0.31	0.33	6	6.33	15	15
		Daniel Monitor	0.11	0.11	0.09	0.11	6	6.11	15	15
$PM_{2.5}$	24-hour	Boulder	1.17	0.94	1.09	1.17	15	16.17	65(35)[2]	65(35)[2]
		Cora	0.53	0.54	0.53	0.54	15	15.54	65(35)[2]	65(35)[2]
		Pinedale	0.83	0.74	0.88	0.88	15	15.88	65(35)[2]	65(35)[2]
		PAPA	3.92	4.40	4.20	4.40	15	19.40	65(35)[2]	65(35)[2]
		10km Regional Grid	7.45	10.08	11.02	11.02	15	26.02	65(35)[2]	65(35)[2]
		Jonah Monitor	3.08	2.66	2.95	3.08	15	18.08	65(35)[2]	65(35)[2]
		Boulder Monitor	1.53	1.37	1.41	1.53	15	16.53	65(35)[2]	65(35)[2]
		Daniel Monitor	0.82	0.73	0.58	0.82	15	15.82	65(35)[2]	65(35)[2]

[1] Background $PM_{2.5}$ concentration values of 15 $\mu g/m^3$ and 6 $\mu g/m^3$, from Pinedale used for 24-hour and annual averaging periods, respectively.
[2] Revised NAAQS effective December 16, 2006.

Table E.9.1
Maximum Modeled Nitrogen (N) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Deposition Analysis Threshold (DAT)[1]	Background Deposition Value[2]	Total Impact	Level of Concern for Total[3]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	5.8E-02	4.1E-02	5.2E-02	5.8E-02	0.005	1.42	1.48	3.0
Fitzpatrick WA	7.3E-03	6.3E-03	6.4E-03	7.3E-03	0.005	1.42	1.43	3.0
Grand Teton NP	2.9E-03	3.7E-03	3.5E-03	3.7E-03	0.005	1.29	1.29	3.0
Gros Ventre WA	7.9E-03	7.8E-03	6.9E-03	7.9E-03	0.005	1.42	1.43	3.0
North Absaroka WA	1.3E-03	2.7E-03	1.5E-03	2.7E-03	0.005	1.29	1.29	3.0
Popo Agie WA	2.0E-02	2.0E-02	1.9E-02	2.0E-02	0.005	1.42	1.44	3.0
Teton WA	2.8E-03	2.8E-03	3.1E-03	3.1E-03	0.005	1.29	1.29	3.0
Washakie WA	2.6E-03	3.1E-03	2.7E-03	3.1E-03	0.005	1.29	1.29	3.0
Wind River RA	1.2E-02	1.2E-02	1.2E-02	1.2E-02	0.005	1.42	1.43	3.0
Yellowstone NP	1.6E-03	2.2E-03	1.7E-03	2.2E-03	0.005	1.29	1.29	3.0

[1] National Park Service (2001).

[2] Background value of 1.42 collected at the CASTNET/NADP site near Pinedale for the year 2004.

Background value of 1.29 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.
Fox et al. (1989)

Table E.9.2
Maximum Modeled Nitrogen (N) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Deposition Analysis Threshold (DAT)[1]	Background Deposition Value[2]	Total Impact	Level of Concern for Total[3]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	9.7E-02	7.0E-02	8.5E-02	9.7E-02	0.005	1.42	1.52	3.0
Fitzpatrick WA	1.2E-02	1.1E-02	1.2E-02	1.2E-02	0.005	1.42	1.43	3.0
Grand Teton NP	4.7E-03	6.8E-03	6.0E-03	6.8E-03	0.005	1.29	1.30	3.0
Gros Ventre WA	1.3E-02	1.4E-02	1.2E-02	1.4E-02	0.005	1.42	1.43	3.0
North Absaroka WA	2.2E-03	4.4E-03	2.4E-03	4.4E-03	0.005	1.29	1.29	3.0
Popo Agie WA	3.5E-02	3.6E-02	3.4E-02	3.6E-02	0.005	1.42	1.46	3.0
Teton WA	4.5E-03	4.7E-03	5.1E-03	5.1E-03	0.005	1.29	1.30	3.0
Washakie WA	4.4E-03	5.3E-03	4.5E-03	5.3E-03	0.005	1.29	1.30	3.0
Wind River RA	2.1E-02	2.2E-02	2.0E-02	2.2E-02	0.005	1.42	1.44	3.0
Yellowstone NP	2.5E-03	3.8E-03	2.9E-03	3.8E-03	0.005	1.29	1.29	3.0

[1] National Park Service (2001).

[2] Background value of 1.42 collected at the CASTNET/NADP site near Pinedale for the year 2004.

Background value of 1.29 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.
Fox et al. (1989)

Table E.9.3
Maximum Modeled Nitrogen (N) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Deposition Analysis Threshold (DAT)[1]	Background Deposition Value[2]	Total Impact	Level of Concern for Total[3]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	8.9E-02	6.7E-02	8.1E-02	8.9E-02	0.005	1.42	1.51	3.0
Fitzpatrick WA	1.2E-02	1.0E-02	1.1E-02	1.2E-02	0.005	1.42	1.43	3.0
Grand Teton NP	4.7E-03	6.0E-03	5.5E-03	6.0E-03	0.005	1.29	1.30	3.0
Gros Ventre WA	1.3E-02	1.3E-02	1.1E-02	1.3E-02	0.005	1.42	1.43	3.0
North Absaroka WA	2.0E-03	4.1E-03	2.4E-03	4.1E-03	0.005	1.29	1.29	3.0
Popo Agie WA	3.0E-02	3.2E-02	3.0E-02	3.2E-02	0.005	1.42	1.45	3.0
Teton WA	4.5E-03	4.4E-03	4.7E-03	4.7E-03	0.005	1.29	1.29	3.0
Washakie WA	4.2E-03	4.8E-03	4.2E-03	4.8E-03	0.005	1.29	1.29	3.0
Wind River RA	1.9E-02	2.0E-02	1.8E-02	2.0E-02	0.005	1.42	1.44	3.0
Yellowstone NP	2.5E-03	3.7E-03	2.8E-03	3.7E-03	0.005	1.29	1.29	3.0

[1] National Park Service (2001).

[2] Background value of 1.42 collected at the CASTNET/NADP site near Pinedale for the year 2004.

Background value of 1.29 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.
Fox et al. (1989)

Table E.9.4
Maximum Modeled Nitrogen (N) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Deposition Analysis Threshold (DAT)[1]	Background Deposition Value[2]	Total Impact	Level of Concern for Total[3]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	5.6E-02	4.2E-02	5.1E-02	5.6E-02	0.005	1.42	1.48	3.0
Fitzpatrick WA	7.5E-03	6.5E-03	6.8E-03	7.5E-03	0.005	1.42	1.43	3.0
Grand Teton NP	3.0E-03	3.8E-03	3.6E-03	3.8E-03	0.005	1.29	1.29	3.0
Gros Ventre WA	8.2E-03	8.3E-03	7.1E-03	8.3E-03	0.005	1.42	1.43	3.0
North Absaroka WA	1.3E-03	2.7E-03	1.6E-03	2.7E-03	0.005	1.29	1.29	3.0
Popo Agie WA	1.9E-02	2.0E-02	1.9E-02	2.0E-02	0.005	1.42	1.44	3.0
Teton WA	2.9E-03	2.9E-03	3.1E-03	3.1E-03	0.005	1.29	1.29	3.0
Washakie WA	2.7E-03	3.1E-03	2.7E-03	3.1E-03	0.005	1.29	1.29	3.0
Wind River RA	1.2E-02	1.3E-02	1.2E-02	1.3E-02	0.005	1.42	1.43	3.0
Yellowstone NP	1.6E-03	2.4E-03	1.8E-03	2.4E-03	0.005	1.29	1.29	3.0

[1] National Park Service (2001).

[2] Background value of 1.42 collected at the CASTNET/NADP site near Pinedale for the year 2004.

Background value of 1.29 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.
Fox et al. (1989)

Table E.9.5
Maximum Modeled Nitrogen (N) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Deposition Analysis Threshold (DAT)[1]	Background Deposition Value[2]	Total Impact	Level of Concern for Total[3]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	2.1E-02	1.5E-02	1.9E-02	2.1E-02	0.005	1.42	1.44	3.0
Fitzpatrick WA	2.8E-03	2.5E-03	2.5E-03	2.8E-03	0.005	1.42	1.42	3.0
Grand Teton NP	1.1E-03	1.5E-03	1.4E-03	1.5E-03	0.005	1.29	1.29	3.0
Gros Ventre WA	3.1E-03	3.2E-03	2.7E-03	3.2E-03	0.005	1.42	1.42	3.0
North Absaroka WA	5.2E-04	1.1E-03	6.1E-04	1.1E-03	0.005	1.29	1.29	3.0
Popo Agie WA	7.7E-03	8.0E-03	7.5E-03	8.0E-03	0.005	1.42	1.43	3.0
Teton WA	1.1E-03	1.1E-03	1.2E-03	1.2E-03	0.005	1.29	1.29	3.0
Washakie WA	1.0E-03	1.2E-03	1.0E-03	1.2E-03	0.005	1.29	1.29	3.0
Wind River RA	4.6E-03	4.8E-03	4.4E-03	4.8E-03	0.005	1.42	1.42	3.0
Yellowstone NP	6.3E-04	9.1E-04	7.0E-04	9.1E-04	0.005	1.29	1.29	3.0

[1] National Park Service (2001).

[2] Background value of 1.42 collected at the CASTNET/NADP site near Pinedale for the year 2004.

Background value of 1.29 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.

Fox et al. (1989)

Table E.9.6
Maximum Modeled Nitrogen (N) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Deposition Analysis Threshold (DAT)[1]	Background Deposition Value[2]	Total Impact	Level of Concern for Total[3]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	3.1E-02	2.0E-02	2.7E-02	3.1E-02	0.005	1.42	1.45	3.0
Fitzpatrick WA	4.2E-03	3.5E-03	3.3E-03	4.2E-03	0.005	1.42	1.42	3.0
Grand Teton NP	1.6E-03	2.0E-03	2.0E-03	2.0E-03	0.005	1.29	1.29	3.0
Gros Ventre WA	4.4E-03	4.3E-03	3.9E-03	4.4E-03	0.005	1.42	1.42	3.0
North Absaroka WA	7.1E-04	1.5E-03	8.5E-04	1.5E-03	0.005	1.29	1.29	3.0
Popo Agie WA	1.1E-02	1.1E-02	1.0E-02	1.1E-02	0.005	1.42	1.43	3.0
Teton WA	1.6E-03	1.6E-03	1.7E-03	1.7E-03	0.005	1.29	1.29	3.0
Washakie WA	1.6E-03	1.8E-03	1.4E-03	1.8E-03	0.005	1.29	1.29	3.0
Wind River RA	6.3E-03	6.7E-03	6.4E-03	6.7E-03	0.005	1.42	1.43	3.0
Yellowstone NP	8.8E-04	1.2E-03	9.5E-04	1.2E-03	0.005	1.29	1.29	3.0

[1] National Park Service (2001).

[2] Background value of 1.42 collected at the CASTNET/NADP site near Pinedale for the year 2004.

Background value of 1.29 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.

Fox et al. (1989)

Table E.9.7
Maximum Modeled Nitrogen (N) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Background Deposition Value[1]	Total Impact	Level of Concern for Total[2]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	1.1E-01	7.9E-02	9.4E-02	1.1E-01	1.42	1.53	3.0
Fitzpatrick WA	1.5E-02	1.4E-02	1.4E-02	1.5E-02	1.42	1.43	3.0
Grand Teton NP	2.4E-02	3.1E-02	2.9E-02	3.1E-02	1.29	1.32	3.0
Gros Ventre WA	1.7E-02	2.0E-02	1.6E-02	2.0E-02	1.42	1.44	3.0
North Absaroka WA	3.1E-03	6.3E-03	3.2E-03	6.3E-03	1.29	1.30	3.0
Popo Agie WA	4.2E-02	4.4E-02	4.2E-02	4.4E-02	1.42	1.46	3.0
Teton WA	6.0E-03	6.8E-03	6.2E-03	6.8E-03	1.29	1.30	3.0
Washakie WA	5.8E-03	7.3E-03	5.7E-03	7.3E-03	1.29	1.30	3.0
Wind River RA	2.6E-02	2.8E-02	2.4E-02	2.8E-02	1.42	1.45	3.0
Yellowstone NP	3.6E-03	5.4E-03	4.0E-03	5.4E-03	1.29	1.30	3.0

[1] Background value of 1.42 collected at the CASTNET/NADP site near Pinedale for the year 2004.

[2] Background value of 1.29 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.
Fox et al. (1989)

Table E.9.8
Maximum Modeled Nitrogen (N) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Background Deposition Value[1]	Total Impact	Level of Concern for Total[2]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	1.0E-01	7.6E-02	9.1E-02	1.0E-01	1.42	1.52	3.0
Fitzpatrick WA	1.4E-02	1.4E-02	1.3E-02	1.4E-02	1.42	1.43	3.0
Grand Teton NP	2.4E-02	3.0E-02	2.9E-02	3.0E-02	1.29	1.32	3.0
Gros Ventre WA	1.7E-02	1.8E-02	1.5E-02	1.8E-02	1.42	1.44	3.0
North Absaroka WA	2.9E-03	6.0E-03	3.2E-03	6.0E-03	1.29	1.30	3.0
Popo Agie WA	3.7E-02	3.9E-02	3.8E-02	3.9E-02	1.42	1.46	3.0
Teton WA	6.0E-03	6.4E-03	5.8E-03	6.4E-03	1.29	1.30	3.0
Washakie WA	5.6E-03	6.9E-03	5.4E-03	6.9E-03	1.29	1.30	3.0
Wind River RA	2.3E-02	2.6E-02	2.2E-02	2.6E-02	1.42	1.45	3.0
Yellowstone NP	3.5E-03	5.3E-03	3.8E-03	5.3E-03	1.29	1.30	3.0

[1] Background value of 1.42 collected at the CASTNET/NADP site near Pinedale for the year 2004.

[2] Background value of 1.29 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.
Fox et al. (1989)

Table E.9.9
Maximum Modeled Nitrogen (N) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Background Deposition Value[1]	Total Impact	Level of Concern for Total[2]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	6.8E-02	5.1E-02	6.1E-02	6.8E-02	1.42	1.49	3.0
Fitzpatrick WA	1.0E-02	1.0E-02	9.2E-03	1.0E-02	1.42	1.43	3.0
Grand Teton NP	2.3E-02	2.9E-02	2.7E-02	2.9E-02	1.29	1.32	3.0
Gros Ventre WA	1.2E-02	1.3E-02	1.1E-02	1.3E-02	1.42	1.43	3.0
North Absaroka WA	2.2E-03	4.6E-03	2.4E-03	4.6E-03	1.29	1.29	3.0
Popo Agie WA	2.6E-02	2.8E-02	2.7E-02	2.8E-02	1.42	1.45	3.0
Teton WA	4.4E-03	4.9E-03	4.2E-03	4.9E-03	1.29	1.29	3.0
Washakie WA	4.1E-03	5.2E-03	3.9E-03	5.2E-03	1.29	1.30	3.0
Wind River RA	1.6E-02	1.9E-02	1.5E-02	1.9E-02	1.42	1.44	3.0
Yellowstone NP	2.7E-03	4.0E-03	2.9E-03	4.0E-03	1.29	1.29	3.0

[1] Background value of 1.42 collected at the CASTNET/NADP site near Pinedale for the year 2004.

Background value of 1.29 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.
Fox et al. (1989)

Table E.9.10
Maximum Modeled Nitrogen (N) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Background Deposition Value[1]	Total Impact	Level of Concern for Total[2]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	3.3E-02	2.4E-02	2.8E-02	3.3E-02	1.42	1.45	3.0
Fitzpatrick WA	5.4E-03	6.1E-03	5.0E-03	6.1E-03	1.42	1.43	3.0
Grand Teton NP	2.2E-02	2.7E-02	2.6E-02	2.7E-02	1.29	1.32	3.0
Gros Ventre WA	7.3E-03	8.3E-03	7.0E-03	8.3E-03	1.42	1.43	3.0
North Absaroka WA	1.4E-03	3.0E-03	1.5E-03	3.0E-03	1.29	1.29	3.0
Popo Agie WA	1.4E-02	1.6E-02	1.5E-02	1.6E-02	1.42	1.44	3.0
Teton WA	2.7E-03	3.2E-03	2.3E-03	3.2E-03	1.29	1.29	3.0
Washakie WA	2.4E-03	3.3E-03	2.2E-03	3.3E-03	1.29	1.29	3.0
Wind River RA	9.1E-03	1.1E-02	8.3E-03	1.1E-02	1.42	1.43	3.0
Yellowstone NP	1.7E-03	2.5E-03	1.8E-03	2.5E-03	1.29	1.29	3.0

[1] Background value of 1.42 collected at the CASTNET/NADP site near Pinedale for the year 2004.

Background value of 1.29 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.
Fox et al. (1989)

Table E.9.11
Maximum Modeled Nitrogen (N) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Background Deposition Value[1]	Total Impact	Level of Concern for Total[2]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	4.2E-02	2.9E-02	3.6E-02	4.2E-02	1.42	1.46	3.0
Fitzpatrick WA	6.8E-03	7.1E-03	5.7E-03	7.1E-03	1.42	1.43	3.0
Grand Teton NP	2.2E-02	2.7E-02	2.6E-02	2.7E-02	1.29	1.32	3.0
Gros Ventre WA	8.6E-03	9.4E-03	8.1E-03	9.4E-03	1.42	1.43	3.0
North Absaroka WA	1.6E-03	3.4E-03	1.7E-03	3.4E-03	1.29	1.29	3.0
Popo Agie WA	1.7E-02	1.9E-02	1.8E-02	1.9E-02	1.42	1.44	3.0
Teton WA	3.1E-03	3.6E-03	2.8E-03	3.6E-03	1.29	1.29	3.0
Washakie WA	3.0E-03	3.9E-03	2.7E-03	3.9E-03	1.29	1.29	3.0
Wind River RA	1.1E-02	1.3E-02	1.0E-02	1.3E-02	1.42	1.43	3.0
Yellowstone NP	1.9E-03	2.8E-03	2.0E-03	2.8E-03	1.29	1.29	3.0

[1] Background value of 1.42 collected at the CASTNET/NADP site near Pinedale for the year 2004.

Background value of 1.29 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.

[2] Fox et al. (1989)

Table E.10.1
Maximum Modeled Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Deposition Analysis Threshold (DAT)[1]	Background Deposition Value[2]	Total Impact	Level of Concern for Total[3]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	9.8E-03	6.9E-03	9.3E-03	9.8E-03	0.005	0.74	0.75	5.0
Fitzpatrick WA	1.5E-03	1.2E-03	1.3E-03	1.5E-03	0.005	0.74	0.74	5.0
Grand Teton NP	4.1E-04	6.1E-04	5.0E-04	6.1E-04	0.005	0.68	0.68	5.0
Gros Ventre WA	1.2E-03	1.3E-03	1.0E-03	1.3E-03	0.005	0.74	0.74	5.0
North Absaroka WA	2.6E-04	4.4E-04	2.6E-04	4.4E-04	0.005	0.68	0.68	5.0
Popo Agie WA	4.0E-03	4.2E-03	4.1E-03	4.2E-03	0.005	0.74	0.74	5.0
Teton WA	4.6E-04	5.0E-04	4.8E-04	5.0E-04	0.005	0.68	0.68	5.0
Washakie WA	5.7E-04	5.7E-04	4.8E-04	5.7E-04	0.005	0.68	0.68	5.0
Wind River RA	2.5E-03	2.6E-03	2.6E-03	2.6E-03	0.005	0.74	0.74	5.0
Yellowstone NP	2.6E-04	3.7E-04	2.6E-04	3.7E-04	0.005	0.68	0.68	5.0

[1] National Park Service (2001).

[2] Background value of 0.74 collected at the CASTNET/NADP site near Pinedale for the year 2004.

[3] Fox et al. (1989)

Background value of 0.68 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.

Table E.10.2
Maximum Modeled Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Deposition Analysis Threshold (DAT)[1]	Background Deposition Value[2]	Total Impact	Level of Concern for Total[3]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	3.0E-03	2.1E-03	2.7E-03	3.0E-03	0.005	0.74	0.74	5.0
Fitzpatrick WA	4.5E-04	3.8E-04	4.1E-04	4.5E-04	0.005	0.74	0.74	5.0
Grand Teton NP	1.2E-04	2.0E-04	1.6E-04	2.0E-04	0.005	0.68	0.68	5.0
Gros Ventre WA	3.5E-04	4.2E-04	3.2E-04	4.2E-04	0.005	0.74	0.74	5.0
North Absaroka WA	8.6E-05	1.4E-04	7.6E-05	1.4E-04	0.005	0.68	0.68	5.0
Popo Agie WA	1.3E-03	1.4E-03	1.3E-03	1.4E-03	0.005	0.74	0.74	5.0
Teton WA	1.4E-04	1.6E-04	1.4E-04	1.6E-04	0.005	0.68	0.68	5.0
Washakie WA	1.9E-04	1.8E-04	1.5E-04	1.9E-04	0.005	0.68	0.68	5.0
Wind River RA	8.1E-04	8.4E-04	8.0E-04	8.4E-04	0.005	0.74	0.74	5.0
Yellowstone NP	7.7E-05	1.2E-04	7.9E-05	1.2E-04	0.005	0.68	0.68	5.0

[1] National Park Service (2001).

[2] Background value of 0.74 collected at the CASTNET/NADP site near Pinedale for the year 2004.

[3] Fox et al. (1989)

Background value of 0.68 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.

Table E.10.3
Maximum Modeled Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Deposition Analysis Threshold (DAT)[1]	Background Deposition Value[2]	Total Impact	Level of Concern for Total[3]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	3.2E-03	2.3E-03	2.9E-03	3.2E-03	0.005	0.74	0.74	5.0
Fitzpatrick WA	5.0E-04	4.1E-04	4.3E-04	5.0E-04	0.005	0.74	0.74	5.0
Grand Teton NP	1.4E-04	2.1E-04	1.7E-04	2.1E-04	0.005	0.68	0.68	5.0
Gros Ventre WA	3.9E-04	4.3E-04	3.4E-04	4.3E-04	0.005	0.74	0.74	5.0
North Absaroka WA	8.9E-05	1.5E-04	8.8E-05	1.5E-04	0.005	0.68	0.68	5.0
Popo Agie WA	1.4E-03	1.4E-03	1.4E-03	1.4E-03	0.005	0.74	0.74	5.0
Teton WA	1.6E-04	1.7E-04	1.5E-04	1.7E-04	0.005	0.68	0.68	5.0
Washakie WA	2.0E-04	1.9E-04	1.6E-04	2.0E-04	0.005	0.68	0.68	5.0
Wind River RA	8.5E-04	8.8E-04	8.4E-04	8.8E-04	0.005	0.74	0.74	5.0
Yellowstone NP	8.6E-05	1.2E-04	8.6E-05	1.2E-04	0.005	0.68	0.68	5.0

[1] National Park Service (2001).

[2] Background value of 0.74 collected at the CASTNET/NADP site near Pinedale for the year 2004.

[3] Fox et al. (1989)

Background value of 0.68 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.

Table E.10.4
Maximum Modeled Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Deposition Analysis Threshold (DAT)[1]	Background Deposition Value[2]	Total Impact	Level of Concern for Total[3]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	9.3E-03	6.7E-03	8.6E-03	9.3E-03	0.005	0.74	0.75	5.0
Fitzpatrick WA	1.5E-03	1.2E-03	1.3E-03	1.5E-03	0.005	0.74	0.74	5.0
Grand Teton NP	4.0E-04	6.1E-04	5.0E-04	6.1E-04	0.005	0.68	0.68	5.0
Gros Ventre WA	1.2E-03	1.3E-03	1.0E-03	1.3E-03	0.005	0.74	0.74	5.0
North Absaroka WA	2.6E-04	4.4E-04	2.6E-04	4.4E-04	0.005	0.68	0.68	5.0
Popo Agie WA	4.0E-03	4.3E-03	4.1E-03	4.3E-03	0.005	0.74	0.74	5.0
Teton WA	4.6E-04	4.9E-04	4.6E-04	4.9E-04	0.005	0.68	0.68	5.0
Washakie WA	5.8E-04	5.5E-04	4.7E-04	5.8E-04	0.005	0.68	0.68	5.0
Wind River RA	2.5E-03	2.6E-03	2.5E-03	2.6E-03	0.005	0.74	0.74	5.0
Yellowstone NP	2.5E-04	3.7E-04	2.5E-04	3.7E-04	0.005	0.68	0.68	5.0

[1] National Park Service (2001).

[2] Background value of 0.74 collected at the CASTNET/NADP site near Pinedale for the year 2004.

[3] Fox et al. (1989)

Background value of 0.68 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.

Table E.10.5
Maximum Modeled Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - 80% Mitigation - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Deposition Analysis Threshold (DAT)[1]	Background Deposition Value[2]	Total Impact	Level of Concern for Total[3]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	2.2E-03	1.6E-03	2.1E-03	2.2E-03	0.005	0.74	0.74	5.0
Fitzpatrick WA	3.5E-04	2.8E-04	3.0E-04	3.5E-04	0.005	0.74	0.74	5.0
Grand Teton NP	9.5E-05	1.5E-04	1.2E-04	1.5E-04	0.005	0.68	0.68	5.0
Gros Ventre WA	2.8E-04	3.0E-04	2.4E-04	3.0E-04	0.005	0.74	0.74	5.0
North Absaroka WA	6.2E-05	1.0E-04	6.1E-05	1.0E-04	0.005	0.68	0.68	5.0
Popo Agie WA	9.5E-04	1.0E-03	9.6E-04	1.0E-03	0.005	0.74	0.74	5.0
Teton WA	1.1E-04	1.2E-04	1.1E-04	1.2E-04	0.005	0.68	0.68	5.0
Washakie WA	1.4E-04	1.3E-04	1.1E-04	1.4E-04	0.005	0.68	0.68	5.0
Wind River RA	5.9E-04	6.2E-04	5.8E-04	6.2E-04	0.005	0.74	0.74	5.0
Yellowstone NP	6.0E-05	8.7E-05	6.0E-05	8.7E-05	0.005	0.68	0.68	5.0

[1] National Park Service (2001).

[2] Background value of 0.74 collected at the CASTNET/NADP site near Pinedale for the year 2004.

[3] Fox et al. (1989)

Background value of 0.68 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.

Table E.10.6
Maximum Modeled Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Deposition Analysis Threshold (DAT)[1]	Background Deposition Value[2]	Total Impact	Level of Concern for Total[3]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	8.5E-05	6.3E-05	8.2E-05	8.5E-05	0.005	0.74	0.74	5.0
Fitzpatrick WA	1.5E-05	1.1E-05	1.1E-05	1.5E-05	0.005	0.74	0.74	5.0
Grand Teton NP	4.2E-06	4.5E-06	4.3E-06	4.5E-06	0.005	0.68	0.68	5.0
Gros Ventre WA	1.3E-05	1.1E-05	9.3E-06	1.3E-05	0.005	0.74	0.74	5.0
North Absaroka WA	2.1E-06	3.8E-06	2.8E-06	3.8E-06	0.005	0.68	0.68	5.0
Popo Agie WA	3.3E-05	3.5E-05	3.4E-05	3.5E-05	0.005	0.74	0.74	5.0
Teton WA	4.9E-06	4.0E-06	4.5E-06	4.9E-06	0.005	0.68	0.68	5.0
Washakie WA	5.0E-06	4.4E-06	4.2E-06	5.0E-06	0.005	0.68	0.68	5.0
Wind River RA	2.1E-05	2.0E-05	2.1E-05	2.1E-05	0.005	0.74	0.74	5.0
Yellowstone NP	2.6E-06	3.2E-06	2.7E-06	3.2E-06	0.005	0.68	0.68	5.0

[1] National Park Service (2001).

[2] Background value of 0.74 collected at the CASTNET/NADP site near Pinedale for the year 2004.

[3] Fox et al. (1989)

Background value of 0.68 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.

Table E.10.7
Maximum Modeled Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Background Deposition Value[1]	Total Impact	Level of Concern for Total[2]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	3.7E-03	2.8E-03	3.4E-03	3.7E-03	0.74	0.74	5.0
Fitzpatrick WA	7.1E-04	6.4E-04	6.9E-04	7.1E-04	0.74	0.74	5.0
Grand Teton NP	2.7E-04	4.4E-04	4.0E-04	4.4E-04	0.68	0.68	5.0
Gros Ventre WA	5.9E-04	7.8E-04	6.0E-04	7.8E-04	0.74	0.74	5.0
North Absaroka WA	2.3E-04	3.3E-04	2.1E-04	3.3E-04	0.68	0.68	5.0
Popo Agie WA	2.0E-03	2.1E-03	2.0E-03	2.1E-03	0.74	0.74	5.0
Teton WA	3.0E-04	3.7E-04	3.3E-04	3.7E-04	0.68	0.68	5.0
Washakie WA	3.9E-04	3.7E-04	4.0E-04	4.0E-04	0.68	0.68	5.0
Wind River RA	1.3E-03	1.3E-03	1.2E-03	1.3E-03	0.74	0.74	5.0
Yellowstone NP	2.0E-04	2.9E-04	2.2E-04	2.9E-04	0.68	0.68	5.0

[1] Background value of 0.74 collected at the CASTNET/NADP site near Pinedale for the year 2004.

[2] Fox et al. (1989) Background value of 0.68 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.

Table E.10.8
Maximum Modeled Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Background Deposition Value[1]	Total Impact	Level of Concern for Total[2]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	3.9E-03	2.9E-03	3.6E-03	3.9E-03	0.74	0.74	5.0
Fitzpatrick WA	7.5E-04	6.7E-04	7.1E-04	7.5E-04	0.74	0.74	5.0
Grand Teton NP	2.9E-04	4.5E-04	4.1E-04	4.5E-04	0.68	0.68	5.0
Gros Ventre WA	6.3E-04	7.9E-04	6.3E-04	7.9E-04	0.74	0.74	5.0
North Absaroka WA	2.3E-04	3.4E-04	2.2E-04	3.4E-04	0.68	0.68	5.0
Popo Agie WA	2.1E-03	2.2E-03	2.1E-03	2.2E-03	0.74	0.74	5.0
Teton WA	3.2E-04	3.8E-04	3.4E-04	3.8E-04	0.68	0.68	5.0
Washakie WA	4.0E-04	3.8E-04	4.1E-04	4.1E-04	0.68	0.68	5.0
Wind River RA	1.3E-03	1.3E-03	1.3E-03	1.3E-03	0.74	0.74	5.0
Yellowstone NP	2.1E-04	2.9E-04	2.2E-04	2.9E-04	0.68	0.68	5.0

[1] Background value of 0.74 collected at the CASTNET/NADP site near Pinedale for the year 2004.

[2] Fox et al. (1989) Background value of 0.68 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.

Table D.10.9
Maximum Modeled Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Background Deposition Value[1]	Total Impact	Level of Concern for Total[2]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	1.0E-02	7.4E-03	9.3E-03	1.0E-02	0.74	0.75	5.0
Fitzpatrick WA	1.7E-03	1.5E-03	1.5E-03	1.7E-03	0.74	0.74	5.0
Grand Teton NP	5.5E-04	8.4E-04	7.4E-04	8.4E-04	0.68	0.68	5.0
Gros Ventre WA	1.4E-03	1.6E-03	1.3E-03	1.6E-03	0.74	0.74	5.0
North Absaroka WA	4.1E-04	6.3E-04	4.0E-04	6.3E-04	0.68	0.68	5.0
Popo Agie WA	4.7E-03	5.0E-03	4.8E-03	5.0E-03	0.74	0.75	5.0
Teton WA	6.2E-04	7.0E-04	6.4E-04	7.0E-04	0.68	0.68	5.0
Washakie WA	7.8E-04	7.4E-04	7.1E-04	7.8E-04	0.68	0.68	5.0
Wind River RA	2.9E-03	3.0E-03	2.9E-03	3.0E-03	0.74	0.74	5.0
Yellowstone NP	3.8E-04	5.3E-04	3.9E-04	5.3E-04	0.68	0.68	5.0

[1] Background value of 0.74 collected at the CASTNET/NADP site near Pinedale for the year 2004.

[2] Background value of 0.68 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.
Fox et al. (1989)

Table E.10.10
Maximum Modeled Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Background Deposition Value[1]	Total Impact	Level of Concern for Total[2]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	3.0E-03	2.3E-03	2.7E-03	3.0E-03	0.74	0.74	5.0
Fitzpatrick WA	6.0E-04	5.5E-04	5.8E-04	6.0E-04	0.74	0.74	5.0
Grand Teton NP	2.5E-04	3.8E-04	3.6E-04	3.8E-04	0.68	0.68	5.0
Gros Ventre WA	5.1E-04	6.6E-04	5.3E-04	6.6E-04	0.74	0.74	5.0
North Absaroka WA	2.1E-04	3.0E-04	1.9E-04	3.0E-04	0.68	0.68	5.0
Popo Agie WA	1.7E-03	1.8E-03	1.7E-03	1.8E-03	0.74	0.74	5.0
Teton WA	2.8E-04	3.3E-04	2.9E-04	3.3E-04	0.68	0.68	5.0
Washakie WA	3.4E-04	3.2E-04	3.6E-04	3.6E-04	0.68	0.68	5.0
Wind River RA	1.0E-03	1.1E-03	1.0E-03	1.1E-03	0.74	0.74	5.0
Yellowstone NP	1.8E-04	2.6E-04	2.0E-04	2.6E-04	0.68	0.68	5.0

[1] Background value of 0.74 collected at the CASTNET/NADP site near Pinedale for the year 2004.

[2] Background value of 0.68 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.
Fox et al. (1989)

Table E.10.11
Maximum Modeled Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions-Using Meteorology Data for Years 2001 - 2003

Receptor Area	Direct Project Impact			Maximum Direct Project Impact	Background Deposition Value[1]	Total Impact	Level of Concern for Total[2]
	2001 (kg/ha-yr)	2002 (kg/ha-yr)	2003 (kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)	(kg/ha-yr)
Bridger WA	9.8E-04	9.0E-04	9.5E-04	9.8E-04	0.74	0.74	5.0
Fitzpatrick WA	2.8E-04	2.8E-04	2.9E-04	2.9E-04	0.74	0.74	5.0
Grand Teton NP	1.7E-04	2.4E-04	2.5E-04	2.5E-04	0.68	0.68	5.0
Gros Ventre WA	2.5E-04	3.7E-04	3.1E-04	3.7E-04	0.74	0.74	5.0
North Absaroka WA	1.5E-04	2.0E-04	1.4E-04	2.0E-04	0.68	0.68	5.0
Popo Agie WA	7.4E-04	8.1E-04	7.8E-04	8.1E-04	0.74	0.74	5.0
Teton WA	1.8E-04	2.2E-04	1.9E-04	2.2E-04	0.68	0.68	5.0
Washakie WA	2.1E-04	2.1E-04	2.6E-04	2.6E-04	0.68	0.68	5.0
Wind River RA	4.7E-04	4.8E-04	4.5E-04	4.8E-04	0.74	0.74	5.0
Yellowstone NP	1.3E-04	1.7E-04	1.5E-04	1.7E-04	0.68	0.68	5.0

[1] Background value of 0.74 collected at the CASTNET/NADP site near Pinedale for the year 2004.

Background value of 0.68 collected at the CASTNET/NADP site in Yellowstone National Park for the year 2005.

[2] Fox et al. (1989)

Table E.11.1
Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change			Maximum ANC Change	Maximum Percent ANC Change
				2001	2002	2003		
		(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(%)
Black Joe	Bridger	67.1	6.7	0.183	0.166	0.171	0.183	0.27%
Deep	Bridger	59.7	6.0	0.204	0.182	0.186	0.204	0.34%
Hobbs	Bridger	69.9	7.0	0.104	0.084	0.085	0.104	0.15%
Lazy Boy	Bridger	10.8	1.0	0.040	0.059	0.038	0.059	0.55%
Lower Saddlebag	Popo Agie	55.2	5.5	0.184	0.195	0.179	0.195	0.35%
Ross	Fitzpatrick	53.7	5.4	0.034	0.052	0.033	0.052	0.10%
Upper Frozen	Bridger	6.0	1.0	0.223	0.203	0.199	0.223	3.71%

[1] USFS Level of Acceptable Change; 10% change in ANC for lakes with ANC background values greater than 25μeq/L
μeq/L for lakes with ANC values less than or equal to 25μeq/L.
1

Table E.11.2
Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change[2]			Maximum ANC Change	Maximum Percent ANC Change
				2001	2002	2003		
		(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(%)
Black Joe	Bridger	67.1	6.7	0.281	0.256	0.259	0.281	0.42%
Deep	Bridger	59.7	6.0	0.310	0.280	0.282	0.310	0.52%
Hobbs	Bridger	69.9	7.0	0.150	0.131	0.136	0.150	0.21%
Lazy Boy	Bridger	10.8	1.0	0.059	0.087	0.061	0.087	0.80%
Lower Saddlebag	Popo Agie	55.2	5.5	0.286	0.301	0.274	0.301	0.55%
Ross	Fitzpatrick	53.7	5.4	0.049	0.076	0.052	0.076	0.14%
Upper Frozen	Bridger	6.0	1.0	0.339	0.313	0.307	0.339	5.65%

[1] USFS Level of Acceptable Change; 10% change in ANC for lakes with ANC background values greater than 25μeq/L
μeq/L for lakes with ANC values less than or equal to 25μeq/L.
1

Table E.11.3
Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change			Maximum ANC Change	Maximum Percent ANC Change
				2001	2002	2003		
		(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(%)
Black Joe	Bridger	67.1	6.7	0.250	0.233	0.234	0.250	0.37%
Deep	Bridger	59.7	6.0	0.275	0.255	0.254	0.275	0.46%
Hobbs	Bridger	69.9	7.0	0.146	0.122	0.129	0.146	0.21%
Lazy Boy	Bridger	10.8	1.0	0.057	0.083	0.055	0.083	0.77%
Lower Saddlebag	Popo Agie	55.2	5.5	0.251	0.264	0.245	0.264	0.48%
Ross	Fitzpatrick	53.7	5.4	0.048	0.072	0.047	0.072	0.13%
Upper Frozen	Bridger	6.0	1.0	0.300	0.281	0.275	0.300	5.00%

[1] USFS Level of Acceptable Change; 10% change in ANC for lakes with ANC background values greater than 25μeq/L
μeq/L for lakes with ANC values less than or equal to 25μeq/L.
1

Table E.11.4
Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change			Maximum ANC Change	Maximum Percent ANC Change
				2001	2002	2003		
		(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(%)
Black Joe	Bridger	67.1	6.7	0.179	0.167	0.170	0.179	0.27%
Deep	Bridger	59.7	6.0	0.198	0.183	0.184	0.198	0.33%
Hobbs	Bridger	69.9	7.0	0.104	0.087	0.092	0.104	0.15%
Lazy Boy	Bridger	10.8	1.0	0.041	0.059	0.040	0.059	0.55%
Lower Saddlebag	Popo Agie	55.2	5.5	0.182	0.193	0.178	0.193	0.35%
Ross	Fitzpatrick	53.7	5.4	0.035	0.052	0.034	0.052	0.10%
Upper Frozen	Bridger	6.0	1.0	0.216	0.202	0.199	0.216	3.59%

[1] USFS Level of Acceptable Change; 10% change in ANC for lakes with ANC background values greater than 25μeq/L
μeq/L for lakes with ANC values less than or equal to 25μeq/L.
1

Table E.11.5
Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Pinedale Anticline Project Sources - Alternative C - 80% Emissions Reduction - Using Meteorology Data for Years 2001 - 2003

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change			Maximum ANC Change	Maximum Percent ANC Change
				2001	2002	2003		
		(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(%)
Black Joe	Bridger	67.1	6.7	0.065	0.059	0.061	0.065	0.10%
Deep	Bridger	59.7	6.0	0.072	0.065	0.067	0.072	0.12%
Hobbs	Bridger	69.9	7.0	0.037	0.031	0.032	0.037	0.05%
Lazy Boy	Bridger	10.8	1.0	0.015	0.022	0.014	0.022	0.20%
Lower Saddlebag	Popo Agie	55.2	5.5	0.068	0.071	0.065	0.071	0.13%
Ross	Fitzpatrick	53.7	5.4	0.013	0.019	0.012	0.019	0.03%
Upper Frozen	Bridger	6.0	1.0	0.079	0.072	0.073	0.079	1.32%

[1] USFS Level of Acceptable Change; 10% change in ANC for lakes with ANC background values greater than 25μeq/L
1 μeq/L for lakes with ANC values less than or equal to 25μeq/L.

Table E.11.6
Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change			Maximum ANC Change	Maximum Percent ANC Change
				2001	2002	2003		
		(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(%)
Black Joe	Bridger	67.1	6.7	0.082	0.074	0.079	0.082	0.12%
Deep	Bridger	59.7	6.0	0.092	0.081	0.086	0.092	0.15%
Hobbs	Bridger	69.9	7.0	0.048	0.038	0.036	0.048	0.07%
Lazy Boy	Bridger	10.8	1.0	0.020	0.029	0.017	0.029	0.27%
Lower Saddlebag	Popo Agie	55.2	5.5	0.086	0.091	0.081	0.091	0.17%
Ross	Fitzpatrick	53.7	5.4	0.018	0.026	0.015	0.026	0.05%
Upper Frozen	Bridger	6.0	1.0	0.104	0.091	0.094	0.104	1.73%

[1] USFS Level of Acceptable Change; 10% change in ANC for lakes with ANC background values greater than 25μeq/L
1 μeq/L for lakes with ANC values less than or equal to 25μeq/L.

Table E.11.7
Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change			Maximum ANC Change	Maximum Percent ANC Change
				2001	2002	2003		
		(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(%)
Black Joe	Bridger	67.1	6.7	0.335	0.312	0.311	0.335	0.50%
Deep	Bridger	59.7	6.0	0.369	0.340	0.339	0.369	0.62%
Hobbs	Bridger	69.9	7.0	0.177	0.166	0.164	0.177	0.25%
Lazy Boy	Bridger	10.8	1.0	0.074	0.115	0.081	0.115	1.06%
Lower Saddlebag	Popo Agie	55.2	5.5	0.345	0.370	0.341	0.370	0.67%
Ross	Fitzpatrick	53.7	5.4	0.063	0.101	0.070	0.101	0.19%
Upper Frozen	Bridger	6.0	1.0	0.404	0.379	0.370	0.404	6.74%

[1] USFS Level of Acceptable Change; 10% change in ANC for lakes with ANC background values greater than 25μeq/L
μeq/L for lakes with ANC values less than or equal to 25μeq/L.

1

Table E.11.8
Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change			Maximum ANC Change	Maximum Percent ANC Change
				2001	2002	2003		
		(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(%)
Black Joe	Bridger	67.1	6.7	0.304	0.289	0.286	0.304	0.45%
Deep	Bridger	59.7	6.0	0.334	0.314	0.310	0.334	0.56%
Hobbs	Bridger	69.9	7.0	0.173	0.157	0.157	0.173	0.25%
Lazy Boy	Bridger	10.8	1.0	0.073	0.111	0.076	0.111	1.03%
Lower Saddlebag	Popo Agie	55.2	5.5	0.310	0.333	0.311	0.333	0.60%
Ross	Fitzpatrick	53.7	5.4	0.062	0.097	0.065	0.097	0.18%
Upper Frozen	Bridger	6.0	1.0	0.365	0.347	0.338	0.365	6.09%

[1] USFS Level of Acceptable Change; 10% change in ANC for lakes with ANC background values greater than 25μeq/L
μeq/L for lakes with ANC values less than or equal to 25μeq/L.

1

Table E.11.9
Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change			Maximum ANC Change	Maximum Percent ANC Change
				2001	2002	2003		
		(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(%)
Black Joe	Bridger	67.1	6.7	0.233	0.224	0.286	0.286	0.43%
Deep	Bridger	59.7	6.0	0.256	0.243	0.310	0.310	0.52%
Hobbs	Bridger	69.9	7.0	0.132	0.123	0.157	0.157	0.22%
Lazy Boy	Bridger	10.8	1.0	0.056	0.087	0.076	0.087	0.80%
Lower Saddlebag	Popo Agie	55.2	5.5	0.241	0.262	0.311	0.311	0.56%
Ross	Fitzpatrick	53.7	5.4	0.048	0.077	0.065	0.077	0.14%
Upper Frozen	Bridger	6.0	1.0	0.281	0.268	0.338	0.338	5.63%

[1] USFS Level of Acceptable Change; 10% change in ANC for lakes with ANC background values greater than 25μeq/L
μeq/L for lakes with ANC values less than or equal to 25μeq/L.
1

Table E.11.10
Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change			Maximum ANC Change	Maximum Percent ANC Change
				2001	2002	2003		
		(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(%)
Black Joe	Bridger	67.1	6.7	0.119	0.116	0.113	0.119	0.18%
Deep	Bridger	59.7	6.0	0.131	0.125	0.123	0.131	0.22%
Hobbs	Bridger	69.9	7.0	0.064	0.067	0.060	0.067	0.10%
Lazy Boy	Bridger	10.8	1.0	0.030	0.050	0.035	0.050	0.46%
Lower Saddlebag	Popo Agie	55.2	5.5	0.126	0.140	0.132	0.140	0.25%
Ross	Fitzpatrick	53.7	5.4	0.026	0.044	0.030	0.044	0.08%
Upper Frozen	Bridger	6.0	1.0	0.144	0.138	0.136	0.144	2.41%

[1] USFS Level of Acceptable Change; 10% change in ANC for lakes with ANC background values greater than 25μeq/L
μeq/L for lakes with ANC values less than or equal to 25μeq/L.
1

Table E.11.11
Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change			Maximum ANC Change	Maximum Percent ANC Change
				2001	2002	2003		
		(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(μeq/L)	(%)
Black Joe	Bridger	67.1	6.7	0.136	0.131	0.131	0.136	0.20%
Deep	Bridger	59.7	6.0	0.151	0.141	0.143	0.151	0.25%
Hobbs	Bridger	69.9	7.0	0.075	0.073	0.064	0.075	0.11%
Lazy Boy	Bridger	10.8	1.0	0.035	0.057	0.037	0.057	0.53%
Lower Saddlebag	Popo Agie	55.2	5.5	0.145	0.160	0.148	0.160	0.29%
Ross	Fitzpatrick	53.7	5.4	0.031	0.051	0.033	0.051	0.09%
Upper Frozen	Bridger	6.0	1.0	0.169	0.157	0.158	0.169	2.82%

[1] USFS Level of Acceptable Change; 10% change in ANC for lakes with ANC background values greater than 25μeq/L
μeq/L for lakes with ANC values less than or equal to 25μeq/L.

Table E.12.1
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	87	45	4.73	79	29	6.13	71	40	4.88	87	45	6.13
Fitzpatrick WA	15	5	2.14	15	3	3.91	15	5	1.63	15	5	3.91
Grand Teton NP	2	1	1.15	4	0	0.88	1	0	0.54	4	1	1.15
Gros Ventre WA	8	1	2.80	11	2	1.45	12	2	2.00	12	2	2.80
North Absaroka WA	0	0	0.32	0	0	0.50	0	0	0.29	0	0	0.50
Popo Agie WA	23	5	1.22	25	6	1.58	26	5	2.25	26	6	2.25
Teton WA	1	0	0.81	2	0	0.57	0	0	0.46	2	0	0.81
Washakie WA	2	0	0.89	1	0	0.52	1	0	0.53	2	0	0.89
Wind River RA	23	3	1.08	15	3	2.92	17	6	1.16	23	6	2.92
Yellowstone NP	0	0	0.44	1	0	0.52	0	0	0.38	1	0	0.52

Note: Δdv = change in deciview.

Table E.12.2
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	106	62	5.54	108	54	7.41	93	58	6.52	108	62	7.41
Fitzpatrick WA	22	6	2.68	18	8	4.80	19	7	2.67	22	8	4.80
Grand Teton NP	4	1	1.49	10	2	1.63	3	1	1.00	10	2	1.63
Gros Ventre WA	21	3	3.58	20	6	2.49	17	5	3.52	21	6	3.58
North Absaroka WA	0	0	0.41	3	0	0.86	0	0	0.36	3	0	0.86
Popo Agie WA	39	9	1.59	45	12	2.37	33	10	2.79	45	12	2.79
Teton WA	2	1	1.06	6	1	1.09	2	0	0.65	6	1	1.09
Washakie WA	3	2	1.15	7	0	0.95	2	0	0.76	7	2	1.15
Wind River RA	26	7	1.38	22	9	3.73	23	9	1.97	26	9	3.73
Yellowstone NP	1	0	0.58	4	0	0.83	1	0	0.72	4	0	0.83

Note: Δdv = change in deciview.

Table E.12.3
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	110	67	6.39	114	59	8.55	95	53	7.09	114	67	8.55
Fitzpatrick WA	31	10	3.10	22	8	5.59	20	9	2.34	31	10	5.59
Grand Teton NP	7	1	1.72	9	3	1.32	3	0	0.79	9	3	1.72
Gros Ventre WA	26	7	4.14	20	7	2.06	25	8	2.87	26	8	4.14
North Absaroka WA	0	0	0.50	3	0	0.75	0	0	0.43	3	0	0.75
Popo Agie WA	41	9	1.86	43	14	2.56	36	14	3.19	43	14	3.19
Teton WA	4	1	1.22	7	0	0.86	2	0	0.69	7	1	1.22
Washakie WA	3	2	1.33	7	0	0.75	3	0	0.80	7	2	1.33
Wind River RA	34	7	1.61	24	8	4.21	27	10	1.70	34	10	4.21
Yellowstone NP	1	0	0.70	6	0	0.79	1	0	0.56	6	0	0.79

Note: Δdv = change in deciview.

Table E.12.4
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	85	40	4.53	81	28	6.27	72	39	5.11	85	40	6.27
Fitzpatrick WA	17	4	2.14	15	3	3.95	14	5	1.57	17	5	3.95
Grand Teton NP	2	1	1.16	4	0	0.88	1	0	0.53	4	1	1.16
Gros Ventre WA	9	2	2.87	10	2	1.40	12	2	1.94	12	2	2.87
North Absaroka WA	0	0	0.33	1	0	0.50	0	0	0.28	1	0	0.50
Popo Agie WA	20	4	1.23	24	6	1.78	25	4	2.20	25	6	2.20
Teton WA	1	0	0.82	2	0	0.57	0	0	0.46	2	0	0.82
Washakie WA	3	0	0.90	1	0	0.50	1	0	0.53	3	0	0.90
Wind River RA	17	1	1.08	15	3	2.97	15	5	1.14	17	5	2.97
Yellowstone NP	0	0	0.46	1	0	0.55	0	0	0.38	1	0	0.55

Note: Δdv = change in deciview.

Table E.12.5
Maximum Modeled Visibility Impacts from at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	18	3	2.62	27	10	2.11	18	3	1.80	27	10	2.62
Fitzpatrick WA	3	1	1.52	2	0	0.57	1	0	0.57	3	1	1.52
Grand Teton NP	0	0	0.35	0	0	0.22	0	0	0.22	0	0	0.35
Gros Ventre WA	2	0	0.57	1	0	0.74	1	0	0.57	2	0	0.74
North Absaroka WA	0	0	0.20	0	0	0.10	0	0	0.10	0	0	0.20
Popo Agie WA	3	0	0.76	3	0	0.87	0	0	0.46	3	0	0.87
Teton WA	0	0	0.23	0	0	0.17	0	0	0.17	0	0	0.23
Washakie WA	0	0	0.20	0	0	0.20	0	0	0.20	0	0	0.20
Wind River RA	2	1	1.25	0	0	0.50	0	0	0.42	2	1	1.25
Yellowstone NP	0	0	0.23	0	0	0.16	0	0	0.16	0	0	0.23

Note: Δdv = change in deciview.

Table E.12.6
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	47	9	1.82	34	6	3.33	38	16	2.08	47	16	3.33
Fitzpatrick WA	4	1	1.29	3	3	2.08	3	0	0.95	4	3	2.08
Grand Teton NP	1	0	0.75	0	0	0.43	0	0	0.25	1	0	0.75
Gros Ventre WA	1	1	1.83	4	0	0.66	1	0	0.52	4	1	1.83
North Absaroka WA	0	0	0.20	0	0	0.32	0	0	0.17	0	0	0.32
Popo Agie WA	5	0	0.60	7	1	1.08	7	1	1.46	7	1	1.46
Teton WA	1	0	0.50	0	0	0.32	0	0	0.24	1	0	0.50
Washakie WA	1	0	0.55	0	0	0.31	0	0	0.30	1	0	0.55
Wind River RA	4	0	0.71	4	2	1.84	4	0	0.68	4	2	1.84
Yellowstone NP	0	0	0.28	0	0	0.31	0	0	0.21	0	0	0.31

Note: Δdv = change in deciview.

Table E.12.7
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	119	75	6.56	124	66	8.64	110	59	7.33	124	75	8.64
Fitzpatrick WA	34	11	3.60	29	10	5.98	24	13	2.95	34	13	5.98
Grand Teton NP	13	3	2.24	21	4	1.97	9	2	1.36	21	4	2.24
Gros Ventre WA	33	9	4.64	27	12	2.81	31	11	3.83	33	12	4.64
North Absaroka WA	1	0	0.64	7	1	1.05	1	0	0.54	7	1	1.05
Popo Agie WA	52	19	2.32	59	21	3.91	50	18	3.71	59	21	3.91
Teton WA	7	1	1.46	9	2	1.21	5	0	0.83	9	2	1.46
Washakie WA	6	2	1.66	11	2	1.14	5	0	0.94	11	2	1.66
Wind River RA	42	12	2.01	32	12	5.32	35	12	2.26	42	12	5.32
Yellowstone NP	2	0	0.88	8	1	1.16	2	0	0.99	8	1	1.16

Note: Δdv = change in deciview.

Table E.12.8
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	120	77	7.34	128	68	9.65	112	62	7.94	128	77	9.65
Fitzpatrick WA	41	15	3.99	28	12	6.65	26	14	2.60	41	15	6.65
Grand Teton NP	17	3	2.46	20	5	1.92	12	1	1.15	20	5	2.46
Gros Ventre WA	38	12	5.12	28	9	2.39	29	12	3.21	38	12	5.12
North Absaroka WA	1	0	0.73	6	1	1.03	1	0	0.60	6	1	1.03
Popo Agie WA	57	21	2.54	60	24	4.07	49	25	4.05	60	25	4.07
Teton WA	8	2	1.61	10	2	1.28	5	0	0.92	10	2	1.61
Washakie WA	6	3	1.84	13	2	1.02	7	1	1.04	13	3	1.84
Wind River RA	48	19	2.22	35	13	5.72	34	15	2.15	48	19	5.72
Yellowstone NP	3	0	0.98	8	1	1.25	2	0	0.84	8	1	1.25

Note: Δdv = change in deciview.

Table E.12.9
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	101	56	5.66	95	51	7.65	87	49	6.13	101	56	7.65
Fitzpatrick WA	29	7	3.11	22	6	5.19	20	7	1.85	29	7	5.19
Grand Teton NP	12	2	1.94	16	2	1.61	7	0	0.90	16	2	1.94
Gros Ventre WA	24	8	4.01	18	6	1.75	20	7	2.31	24	8	4.01
North Absaroka WA	1	0	0.57	4	0	0.79	0	0	0.46	4	0	0.79
Popo Agie WA	46	11	1.97	45	13	3.40	39	14	3.16	46	14	3.40
Teton WA	4	1	1.23	8	1	1.03	3	0	0.69	8	1	1.23
Washakie WA	4	2	1.42	7	0	0.81	2	0	0.78	7	2	1.42
Wind River RA	29	8	1.73	25	9	4.67	28	10	1.63	29	10	4.67
Yellowstone NP	1	0	0.76	4	1	1.01	1	0	0.65	4	1	1.01

Note: Δdv = change in deciview.

Table E.12.10
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	67	23	3.26	54	16	4.54	51	25	3.47	67	25	4.54
Fitzpatrick WA	12	2	1.95	7	4	3.12	9	0	0.92	12	4	3.12
Grand Teton NP	6	1	1.29	9	1	1.23	6	0	0.69	9	1	1.29
Gros Ventre WA	13	1	2.55	8	0	0.96	8	2	1.15	13	2	2.55
North Absaroka WA	0	0	0.36	1	0	0.51	0	0	0.29	1	0	0.51
Popo Agie WA	24	2	1.28	19	6	2.54	20	3	1.98	24	6	2.54
Teton WA	2	0	0.75	1	0	0.71	1	0	0.61	2	0	0.75
Washakie WA	3	0	0.90	2	0	0.54	0	0	0.48	3	0	0.90
Wind River RA	15	2	1.14	12	6	3.25	14	0	0.98	15	6	3.25
Yellowstone NP	0	0	0.49	1	0	0.71	0	0	0.44	1	0	0.71

Note: Δdv = change in deciview.

Table E.12.11
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=6

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	76	31	3.31	68	19	5.13	58	31	3.44	76	31	5.13
Fitzpatrick WA	14	2	2.34	10	4	3.60	11	2	1.26	14	4	3.60
Grand Teton NP	7	1	1.57	9	1	1.34	6	0	0.71	9	1	1.57
Gros Ventre WA	15	3	3.05	8	2	1.11	10	2	1.09	15	3	3.05
North Absaroka WA	0	0	0.43	2	0	0.62	0	0	0.35	2	0	0.62
Popo Agie WA	30	3	1.35	24	9	2.81	26	5	2.52	30	9	2.81
Teton WA	2	0	0.93	3	0	0.80	1	0	0.62	3	0	0.93
Washakie WA	3	1	1.09	5	0	0.63	1	0	0.60	5	1	1.09
Wind River RA	20	2	1.32	14	8	3.74	16	2	1.10	20	8	3.74
Yellowstone NP	1	0	0.58	3	0	0.79	0	0	0.49	3	0	0.79

Note: Δdv = change in deciview.

Table E.13.1
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	94	59	5.58	90	50	7.15	77	48	5.75	94	59	7.15
Fitzpatrick WA	22	6	2.55	18	5	4.65	15	7	1.95	22	7	4.65
Grand Teton NP	2	1	1.28	5	1	1.04	2	0	0.64	5	1	1.28
Gros Ventre WA	17	3	3.32	14	4	1.78	13	3	1.91	17	4	3.32
North Absaroka WA	0	0	0.38	3	0	0.59	0	0	0.34	3	0	0.59
Popo Agie WA	34	8	1.49	35	7	1.89	32	9	2.69	35	9	2.69
Teton WA	2	0	0.91	4	0	0.69	1	0	0.52	4	0	0.91
Washakie WA	3	1	1.06	6	0	0.65	1	0	0.63	6	1	1.06
Wind River RA	24	7	1.30	20	5	3.46	20	9	1.40	24	9	3.46
Yellowstone NP	0	0	0.50	3	0	0.62	0	0	0.46	3	0	0.62

Note: Δdv = change in deciview.

Table E.13.2
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	110	70	6.49	109	64	8.57	99	56	7.49	110	70	8.57
Fitzpatrick WA	31	11	3.19	23	11	5.66	21	9	2.55	31	11	5.66
Grand Teton NP	6	1	1.66	11	3	1.93	3	1	1.20	11	3	1.93
Gros Ventre WA	25	5	4.22	20	9	3.02	22	8	3.37	25	9	4.22
North Absaroka WA	0	0	0.49	5	1	1.07	0	0	0.43	5	1	1.07
Popo Agie WA	44	9	1.94	48	17	2.82	39	14	3.31	48	17	3.31
Teton WA	3	1	1.18	9	1	1.30	2	0	0.78	9	1	1.30
Washakie WA	3	2	1.35	9	2	1.17	3	0	0.81	9	2	1.35
Wind River RA	31	9	1.66	26	9	4.37	27	12	1.91	31	12	4.37
Yellowstone NP	1	0	0.65	7	0	1.00	1	0	0.87	7	0	1.00

Note: Δdv = change in deciview.

Table E.13.3
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	117	75	7.45	120	70	9.81	109	61	8.23	120	75	9.81
Fitzpatrick WA	35	13	3.68	24	11	6.55	25	13	2.79	35	13	6.55
Grand Teton NP	7	1	1.92	11	4	1.57	3	0	0.94	11	4	1.92
Gros Ventre WA	29	9	4.86	21	9	2.51	26	7	2.75	29	9	4.86
North Absaroka WA	1	0	0.59	5	0	0.88	1	0	0.51	5	0	0.88
Popo Agie WA	44	15	2.25	52	18	3.03	41	21	3.78	52	21	3.78
Teton WA	7	1	1.36	8	1	1.03	3	0	0.78	8	1	1.36
Washakie WA	7	2	1.57	10	0	0.93	3	0	0.95	10	2	1.57
Wind River RA	44	13	1.93	31	9	4.92	31	13	2.04	44	13	4.92
Yellowstone NP	2	0	0.78	6	0	0.94	1	0	0.67	6	0	0.94

Note: Δdv = change in deciview.

Table E.13.4
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	93	51	5.35	88	44	7.31	74	47	6.01	93	51	7.31
Fitzpatrick WA	21	6	2.55	19	5	4.69	17	7	1.88	21	7	4.69
Grand Teton NP	4	1	1.30	6	1	1.05	2	0	0.63	6	1	1.30
Gros Ventre WA	15	3	3.41	13	5	1.71	14	3	1.86	15	5	3.41
North Absaroka WA	0	0	0.40	2	0	0.59	0	0	0.34	2	0	0.59
Popo Agie WA	31	8	1.49	34	7	2.13	31	8	2.62	34	8	2.62
Teton WA	2	0	0.92	3	0	0.68	1	0	0.51	3	0	0.92
Washakie WA	3	1	1.06	4	0	0.63	1	0	0.62	4	1	1.06
Wind River RA	22	7	1.31	20	3	3.50	22	6	1.39	22	7	3.50
Yellowstone NP	1	0	0.52	3	0	0.65	0	0	0.45	3	0	0.65

Note: Δdv = change in deciview.

Table E.13.5
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	38	9	2.19	23	7	3.15	36	13	2.55	38	13	3.15
Fitzpatrick WA	3	1	1.03	3	1	1.85	3	0	0.69	3	1	1.85
Grand Teton NP	1	0	0.50	0	0	0.42	0	0	0.26	1	0	0.50
Gros Ventre WA	1	1	1.41	2	0	0.71	2	0	0.70	2	1	1.41
North Absaroka WA	0	0	0.15	0	0	0.24	0	0	0.12	0	0	0.24
Popo Agie WA	2	0	0.57	5	0	0.92	4	1	1.05	5	1	1.05
Teton WA	0	0	0.36	0	0	0.27	0	0	0.19	0	0	0.36
Washakie WA	0	0	0.41	0	0	0.25	0	0	0.24	0	0	0.41
Wind River RA	1	0	0.51	2	2	1.50	1	0	0.57	2	2	1.50
Yellowstone NP	0	0	0.20	0	0	0.27	0	0	0.19	0	0	0.27

Note: Δdv = change in deciview.

Table E.13.6
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	58	15	2.18	46	12	3.97	46	21	2.48	58	21	3.97
Fitzpatrick WA	7	1	1.56	6	3	2.51	3	1	1.15	7	3	2.51
Grand Teton NP	1	0	0.84	2	0	0.51	0	0	0.30	2	0	0.84
Gros Ventre WA	4	1	2.19	5	0	0.81	2	0	0.63	5	1	2.19
North Absaroka WA	0	0	0.24	0	0	0.38	0	0	0.20	0	0	0.38
Popo Agie WA	7	0	0.73	10	2	1.30	10	3	1.75	10	3	1.75
Teton WA	1	0	0.57	0	0	0.38	0	0	0.28	1	0	0.57
Washakie WA	2	0	0.65	0	0	0.36	0	0	0.36	2	0	0.65
Wind River RA	6	0	0.86	6	2	2.20	7	0	0.82	7	2	2.20
Yellowstone NP	0	0	0.32	0	0	0.37	0	0	0.25	0	0	0.37

Note: Δdv = change in deciview.

Table E.13.7
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	123	84	7.64	136	72	9.92	119	67	8.49	136	84	9.92
Fitzpatrick WA	44	16	4.25	33	14	6.98	29	17	2.82	44	17	6.98
Grand Teton NP	15	4	2.49	23	9	2.33	13	2	1.62	23	9	2.49
Gros Ventre WA	41	13	5.43	30	13	3.39	30	12	3.67	41	13	5.43
North Absaroka WA	1	0	0.76	7	3	1.29	1	0	0.64	7	3	1.29
Popo Agie WA	60	29	2.79	63	27	4.58	55	27	4.37	63	29	4.58
Teton WA	8	2	1.63	11	3	1.43	7	0	0.99	11	3	1.63
Washakie WA	6	3	1.95	11	5	1.40	8	1	1.11	11	5	1.95
Wind River RA	52	20	2.40	36	18	6.17	38	17	2.38	52	20	6.17
Yellowstone NP	3	0	0.98	8	2	1.37	2	1	1.18	8	2	1.37

Note: Δdv = change in deciview.

Table E.13.8
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	125	85	8.49	141	79	11.01	123	68	9.16	141	85	11.01
Fitzpatrick WA	48	21	4.69	33	17	7.73	32	16	3.09	48	21	7.73
Grand Teton NP	18	5	2.73	24	6	2.25	14	2	1.37	24	6	2.73
Gros Ventre WA	45	14	5.97	27	13	2.90	34	13	3.07	45	14	5.97
North Absaroka WA	1	0	0.86	7	3	1.22	1	0	0.72	7	3	1.22
Popo Agie WA	64	30	3.05	67	33	4.76	56	28	4.76	67	33	4.76
Teton WA	9	2	1.80	10	3	1.52	7	1	1.03	10	3	1.80
Washakie WA	7	3	2.15	13	5	1.25	7	1	1.23	13	5	2.15
Wind River RA	57	23	2.65	40	21	6.61	36	21	2.59	57	23	6.61
Yellowstone NP	4	1	1.10	8	2	1.47	3	0	1.00	8	2	1.47

Note: Δdv = change in deciview.

Table E.13.9
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	108	68	6.62	108	61	8.83	91	51	7.17	108	68	8.83
Fitzpatrick WA	36	11	3.68	25	8	6.10	25	10	2.22	36	11	6.10
Grand Teton NP	14	4	2.16	22	4	1.90	9	1	1.07	22	4	2.16
Gros Ventre WA	28	10	4.72	21	8	2.14	23	6	2.21	28	10	4.72
North Absaroka WA	1	0	0.67	6	0	0.94	1	0	0.55	6	0	0.94
Popo Agie WA	51	19	2.38	54	20	4.01	47	18	3.74	54	20	4.01
Teton WA	6	1	1.37	9	1	1.22	3	0	0.77	9	1	1.37
Washakie WA	5	3	1.68	10	0	0.99	5	0	0.92	10	3	1.68
Wind River RA	42	12	2.07	29	10	5.44	31	13	1.98	42	13	5.44
Yellowstone NP	2	0	0.85	7	1	1.20	2	0	0.78	7	1	1.20

Note: Δdv = change in deciview.

Table E.13.10
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	76	35	3.90	64	17	5.37	57	30	4.15	76	35	5.37
Fitzpatrick WA	15	2	2.33	11	4	3.73	12	3	1.13	15	4	3.73
Grand Teton NP	8	3	1.43	14	3	1.45	6	0	0.72	14	3	1.45
Gros Ventre WA	17	4	3.04	10	4	1.19	11	3	1.30	17	4	3.04
North Absaroka WA	0	0	0.43	2	0	0.60	0	0	0.34	2	0	0.60
Popo Agie WA	33	5	1.56	24	9	3.02	32	5	2.36	33	9	3.02
Teton WA	2	0	0.84	2	0	0.84	1	0	0.60	2	0	0.84
Washakie WA	3	1	1.07	5	0	0.67	1	0	0.57	5	1	1.07
Wind River RA	20	3	1.37	14	6	3.83	20	2	1.20	20	6	3.83
Yellowstone NP	1	0	0.55	1	0	0.84	1	0	0.53	1	0	0.84

Note: Δdv = change in deciview.

Table E.13.11
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and IMPROVE Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	81	43	3.91	74	26	6.03	66	37	4.06	81	43	6.03
Fitzpatrick WA	23	4	2.79	15	5	4.28	14	4	1.51	23	5	4.28
Grand Teton NP	9	3	1.75	15	3	1.58	7	0	0.77	15	3	1.75
Gros Ventre WA	19	5	3.61	11	5	1.34	13	3	1.34	19	5	3.61
North Absaroka WA	1	0	0.51	3	0	0.73	0	0	0.42	3	0	0.73
Popo Agie WA	39	8	1.64	38	10	3.33	37	9	3.00	39	10	3.33
Teton WA	2	1	1.04	6	0	0.95	2	0	0.61	6	1	1.04
Washakie WA	4	2	1.29	7	0	0.76	2	0	0.71	7	2	1.29
Wind River RA	26	7	1.59	21	8	4.39	25	5	1.33	26	8	4.39
Yellowstone NP	1	0	0.65	3	0	0.94	1	0	0.58	3	0	0.94

Note: Δdv = change in deciview.

Table E.14.1
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	97	61	8.71	92	49	10.24	94	63	13.49	97	63	13.49
Fitzpatrick WA	24	10	4.87	23	11	6.87	24	10	6.36	24	11	6.87
Grand Teton NP	7	3	1.57	9	3	1.45	1	0	0.56	9	3	1.57
Gros Ventre WA	21	6	2.82	16	8	2.14	16	4	2.24	21	8	2.82
North Absaroka WA	1	1	1.48	4	0	0.76	0	0	0.45	4	1	1.48
Popo Agie WA	28	11	4.04	35	15	3.27	33	13	4.28	35	15	4.28
Teton WA	5	2	1.27	6	1	1.23	2	0	0.72	6	2	1.27
Washakie WA	7	2	2.31	10	1	1.19	6	4	2.58	10	4	2.58
Wind River RA	28	11	4.12	27	10	5.56	26	15	4.38	28	15	5.56
Yellowstone NP	1	0	0.65	6	1	1.19	3	0	0.56	6	1	1.19

Note: Δdv = change in deciview.

Table E.14.2
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	112	76	9.82	103	64	13.80	107	75	19.05	112	76	19.05
Fitzpatrick WA	36	17	5.65	28	18	8.23	29	17	10.10	36	18	10.10
Grand Teton NP	13	3	1.85	12	7	2.23	4	1	1.05	13	7	2.23
Gros Ventre WA	34	11	3.62	22	13	3.62	24	9	3.91	34	13	3.91
North Absaroka WA	1	1	1.86	7	1	1.24	1	0	0.60	7	1	1.86
Popo Agie WA	41	15	4.74	43	20	4.64	50	22	5.61	50	22	5.61
Teton WA	10	2	1.62	10	5	1.57	5	0	0.92	10	5	1.62
Washakie WA	10	3	3.00	15	6	1.63	7	4	3.26	15	6	3.26
Wind River RA	37	12	4.99	34	16	6.87	32	20	7.09	37	20	7.09
Yellowstone NP	4	0	0.85	11	3	1.56	5	0	0.99	11	3	1.56

Note: Δdv = change in deciview.

Table E.14.3
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	115	75	11.49	109	66	13.48	114	82	17.64	115	82	17.64
Fitzpatrick WA	40	20	6.65	32	18	9.38	32	22	8.65	40	22	9.38
Grand Teton NP	16	3	2.32	15	6	2.15	7	0	0.82	16	6	2.32
Gros Ventre WA	38	16	4.19	25	13	3.04	26	10	3.21	38	16	4.19
North Absaroka WA	1	1	2.22	8	3	1.09	2	0	0.68	8	3	2.22
Popo Agie WA	41	21	5.53	45	25	5.00	50	24	6.26	50	25	6.26
Teton WA	13	4	1.94	12	3	1.80	7	1	1.08	13	4	1.94
Washakie WA	11	4	3.40	15	7	1.84	9	4	3.71	15	7	3.71
Wind River RA	43	18	5.75	35	18	7.71	37	22	6.15	43	22	7.71
Yellowstone NP	6	1	1.01	10	2	1.77	6	0	0.88	10	2	1.77

Note: Δdv = change in deciview.

Table E.14.4
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	92	59	8.62	88	47	10.40	94	63	14.03	94	63	14.03
Fitzpatrick WA	27	10	4.74	23	10	6.93	24	10	6.29	27	10	6.93
Grand Teton NP	7	3	1.53	8	3	1.49	1	0	0.55	8	3	1.53
Gros Ventre WA	22	6	2.91	15	7	2.07	16	4	2.18	22	7	2.91
North Absaroka WA	1	1	1.52	4	0	0.73	0	0	0.47	4	1	1.52
Popo Agie WA	30	10	3.92	35	14	3.59	34	13	4.50	35	14	4.50
Teton WA	6	2	1.30	6	1	1.25	2	0	0.72	6	2	1.30
Washakie WA	6	2	2.42	10	1	1.24	5	4	2.53	10	4	2.53
Wind River RA	28	11	4.06	28	11	5.67	26	13	4.40	28	13	5.67
Yellowstone NP	1	0	0.68	5	1	1.23	3	0	0.57	5	1	1.23

Note: Δdv = change in deciview.

Table E.14.5
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	46	29	3.54	34	18	4.84	55	26	7.39	55	29	7.39
Fitzpatrick WA	7	3	1.77	7	5	2.98	9	7	2.70	9	7	2.98
Grand Teton NP	1	0	0.55	1	0	0.62	0	0	0.23	1	0	0.62
Gros Ventre WA	5	1	1.19	4	0	0.86	2	0	0.82	5	1	1.19
North Absaroka WA	1	0	0.60	0	0	0.28	0	0	0.19	1	0	0.60
Popo Agie WA	7	1	1.47	11	5	1.61	10	4	1.97	11	5	1.97
Teton WA	1	0	0.51	1	0	0.51	0	0	0.27	1	0	0.51
Washakie WA	2	1	1.01	0	0	0.48	2	0	1.00	2	1	1.01
Wind River RA	7	2	1.64	9	5	2.54	11	2	1.92	11	5	2.54
Yellowstone NP	0	0	0.26	1	0	0.52	0	0	0.22	1	0	0.52

Note: Δdv = change in deciview.

Table E.14.6
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data -

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	60	36	4.74	55	25	6.05	63	38	6.27	63	38	6.27
Fitzpatrick WA	13	6	2.86	10	6	4.69	13	8	2.20	13	8	4.69
Grand Teton NP	3	0	0.80	4	0	0.88	0	0	0.26	4	0	0.88
Gros Ventre WA	11	1	1.86	5	2	1.15	3	0	0.81	11	2	1.86
North Absaroka WA	1	0	0.94	0	0	0.45	0	0	0.28	1	0	0.94
Popo Agie WA	12	4	1.68	15	7	2.28	17	7	2.60	17	7	2.60
Teton WA	2	0	0.81	2	0	0.72	0	0	0.43	2	0	0.81
Washakie WA	4	2	1.50	2	0	0.96	4	1	1.54	4	2	1.54
Wind River RA	14	5	2.74	12	6	3.65	16	5	1.93	16	6	3.65
Yellowstone NP	0	0	0.41	1	0	0.71	0	0	0.39	1	0	0.71

Note: Δdv = change in deciview.

Table E.14.7
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	124	85	10.31	112	76	14.20	124	87	19.69	124	87	19.69
Fitzpatrick WA	43	19	6.14	36	22	9.87	37	23	10.75	43	23	10.75
Grand Teton NP	22	6	2.42	25	9	3.12	12	2	1.42	25	9	3.12
Gros Ventre WA	44	19	4.64	33	17	4.08	34	13	4.23	44	19	4.64
North Absaroka WA	4	1	2.77	10	5	1.51	2	0	0.63	10	5	2.77
Popo Agie WA	64	26	5.24	56	31	7.04	59	33	6.92	64	33	7.04
Teton WA	13	3	2.38	15	5	2.48	10	2	1.39	15	5	2.48
Washakie WA	20	6	4.22	21	10	2.84	13	4	4.23	21	10	4.23
Wind River RA	56	27	5.72	46	24	9.19	46	28	7.85	56	28	9.19
Yellowstone NP	7	1	1.27	14	4	2.51	8	3	1.33	14	4	2.51

Note: Δdv = change in deciview.

Table E.14.8
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	125	88	11.91	121	79	14.89	127	87	18.70	127	88	18.70
Fitzpatrick WA	47	28	7.10	41	23	10.85	37	23	9.40	47	28	10.85
Grand Teton NP	26	10	2.86	24	8	3.36	14	3	1.20	26	10	3.36
Gros Ventre WA	49	20	5.16	34	16	3.52	30	16	3.55	49	20	5.16
North Absaroka WA	4	1	3.10	8	6	1.52	6	0	0.72	8	6	3.10
Popo Agie WA	66	33	6.00	62	33	7.33	67	34	7.49	67	34	7.49
Teton WA	15	6	2.67	15	6	2.69	11	3	1.54	15	6	2.69
Washakie WA	20	9	4.57	20	11	2.54	14	5	4.63	20	11	4.63
Wind River RA	55	32	6.18	49	25	9.81	49	29	7.42	55	32	9.81
Yellowstone NP	8	1	1.42	13	5	2.69	9	3	1.25	13	5	2.69

Note: Δdv = change in deciview.

Table E.14.9
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	107	71	9.17	99	61	12.27	105	74	15.59	107	74	15.59
Fitzpatrick WA	39	17	5.28	31	16	8.77	33	17	7.24	39	17	8.77
Grand Teton NP	19	5	2.11	23	4	2.79	12	0	0.95	23	5	2.79
Gros Ventre WA	36	16	4.00	26	11	2.61	26	10	2.55	36	16	4.00
North Absaroka WA	2	1	2.47	8	3	1.21	1	0	0.51	8	3	2.47
Popo Agie WA	50	22	4.46	46	26	6.22	49	26	5.95	50	26	6.22
Teton WA	13	3	2.08	12	2	2.18	6	1	1.20	13	3	2.18
Washakie WA	14	4	3.70	14	7	2.17	9	4	3.57	14	7	3.70
Wind River RA	44	17	4.69	38	17	8.22	40	23	5.89	44	23	8.22
Yellowstone NP	6	1	1.10	9	2	2.21	5	0	0.99	9	2	2.21

Note: Δdv = change in deciview.

Table E.14.10
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	84	47	4.43	69	30	7.95	71	53	10.20	84	53	10.20
Fitzpatrick WA	19	10	2.68	18	7	5.60	19	11	4.03	19	11	5.60
Grand Teton NP	11	3	1.37	12	3	2.05	7	0	0.82	12	3	2.05
Gros Ventre WA	21	10	2.48	16	6	1.75	12	4	1.40	21	10	2.48
North Absaroka WA	1	1	1.64	6	0	0.80	0	0	0.34	6	1	1.64
Popo Agie WA	34	11	2.17	30	13	4.74	34	17	3.80	34	17	4.74
Teton WA	4	1	1.35	4	1	1.51	4	0	0.77	4	1	1.51
Washakie WA	8	3	2.48	11	3	1.73	4	3	2.19	11	3	2.48
Wind River RA	30	11	2.73	25	11	5.95	30	12	3.79	30	12	5.95
Yellowstone NP	1	0	0.70	3	1	1.56	3	0	0.66	3	1	1.56

Note: Δdv = change in deciview.

Table E.14.11
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and FLAG Background Data - MVISBK=2

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum Δdv
Bridger WA	88	57	5.77	73	40	8.84	83	58	9.66	88	58	9.66
Fitzpatrick WA	24	13	3.72	26	7	6.39	19	12	3.98	26	13	6.39
Grand Teton NP	13	3	1.67	14	3	2.27	9	0	0.87	14	3	2.27
Gros Ventre WA	21	12	3.07	20	5	1.98	15	5	1.54	21	12	3.07
North Absaroka WA	1	1	1.94	6	0	0.91	0	0	0.35	6	1	1.94
Popo Agie WA	38	13	2.36	36	14	5.23	38	20	4.29	38	20	5.23
Teton WA	10	1	1.59	9	1	1.70	4	0	0.92	10	1	1.70
Washakie WA	9	4	2.90	12	5	1.80	5	3	2.68	12	5	2.90
Wind River RA	34	14	3.62	28	10	6.75	30	16	3.79	34	16	6.75
Yellowstone NP	2	0	0.85	6	1	1.74	4	0	0.79	6	1	1.74

Note: Δdv = change in deciview.

Table E.15.1
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	92	53	3.01	98	48	3.01	74	44	4.00	98	53	4.00
Fitzpatrick WA	20	0	1.00	13	0	0.97	10	1	1.01	20	1	1.01
Grand Teton NP	0	0	0.40	0	0	0.50	0	0	0.27	0	0	0.50
Gros Ventre WA	11	0	0.79	10	0	0.72	10	0	0.77	11	0	0.79
North Absaroka WA	0	0	0.12	0	0	0.27	0	0	0.13	0	0	0.27
Popo Agie WA	31	2	1.09	31	3	1.07	27	4	1.19	31	4	1.19
Teton WA	0	0	0.37	0	0	0.40	0	0	0.24	0	0	0.40
Washakie WA	0	0	0.34	0	0	0.46	0	0	0.27	0	0	0.46
Wind River RA	21	0	0.90	15	0	0.92	16	2	1.20	21	2	1.20
Yellowstone NP	0	0	0.20	0	0	0.29	0	0	0.15	0	0	0.29

Note: Δdv = change in deciview.

Table E.15.2
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	118	70	3.51	123	64	3.60	106	53	4.48	123	70	4.48
Fitzpatrick WA	26	4	1.24	20	5	1.28	16	5	1.22	26	5	1.28
Grand Teton NP	1	0	0.51	6	0	0.79	0	0	0.40	6	0	0.79
Gros Ventre WA	26	1	1.02	20	3	1.18	24	3	1.16	26	3	1.18
North Absaroka WA	0	0	0.17	0	0	0.32	0	0	0.24	0	0	0.32
Popo Agie WA	40	5	1.40	45	15	1.53	40	10	1.56	45	15	1.56
Teton WA	0	0	0.47	2	0	0.61	0	0	0.30	2	0	0.61
Washakie WA	0	0	0.39	2	0	0.59	0	0	0.38	2	0	0.59
Wind River RA	30	4	1.20	24	5	1.36	27	5	1.44	30	5	1.44
Yellowstone NP	0	0	0.28	1	0	0.52	0	0	0.23	1	0	0.52

Note: Δdv = change in deciview.

Table E.15.3
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	116	75	4.27	128	71	3.73	115	61	5.15	128	75	5.15
Fitzpatrick WA	33	9	1.46	23	7	1.35	19	7	1.46	33	9	1.46
Grand Teton NP	4	0	0.61	6	0	0.76	0	0	0.45	6	0	0.76
Gros Ventre WA	31	2	1.22	19	3	1.10	22	4	1.29	31	4	1.29
North Absaroka WA	0	0	0.20	0	0	0.39	0	0	0.21	0	0	0.39
Popo Agie WA	43	11	1.66	56	15	1.56	40	16	1.59	56	16	1.66
Teton WA	2	0	0.57	2	0	0.59	0	0	0.35	2	0	0.59
Washakie WA	0	0	0.49	3	0	0.65	0	0	0.37	3	0	0.65
Wind River RA	42	9	1.27	29	7	1.29	26	7	1.58	42	9	1.58
Yellowstone NP	0	0	0.33	0	0	0.43	0	0	0.25	0	0	0.43

Note: Δdv = change in deciview.

Table E.15.4
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	91	54	2.98	93	47	2.75	76	44	3.62	93	54	3.62
Fitzpatrick WA	21	0	0.98	14	0	0.90	13	0	0.96	21	0	0.98
Grand Teton NP	0	0	0.40	1	0	0.51	0	0	0.29	1	0	0.51
Gros Ventre WA	13	0	0.80	10	0	0.73	10	0	0.85	13	0	0.85
North Absaroka WA	0	0	0.13	0	0	0.26	0	0	0.14	0	0	0.26
Popo Agie WA	27	2	1.10	30	3	1.06	25	3	1.07	30	3	1.10
Teton WA	0	0	0.38	0	0	0.39	0	0	0.23	0	0	0.39
Washakie WA	0	0	0.32	0	0	0.44	0	0	0.26	0	0	0.44
Wind River RA	19	0	0.84	16	0	0.86	16	2	1.05	19	2	1.05
Yellowstone NP	0	0	0.21	0	0	0.29	0	0	0.17	0	0	0.29

Note: Δdv = change in deciview.

Table E.15.5
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources -
Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	35	3	1.15	19	1	1.17	32	8	1.47	35	8	1.47
Fitzpatrick WA	0	0	0.37	0	0	0.33	0	0	0.36	0	0	0.37
Grand Teton NP	0	0	0.15	0	0	0.20	0	0	0.11	0	0	0.20
Gros Ventre WA	0	0	0.30	0	0	0.30	0	0	0.30	0	0	0.30
North Absaroka WA	0	0	0.05	0	0	0.10	0	0	0.06	0	0	0.10
Popo Agie WA	0	0	0.41	0	0	0.41	0	0	0.44	0	0	0.44
Teton WA	0	0	0.14	0	0	0.15	0	0	0.09	0	0	0.15
Washakie WA	0	0	0.12	0	0	0.17	0	0	0.10	0	0	0.17
Wind River RA	0	0	0.33	0	0	0.31	0	0	0.39	0	0	0.39
Yellowstone NP	0	0	0.08	0	0	0.12	0	0	0.06	0	0	0.12

Note: Δdv = change in deciview.

Table E.15.6
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources -
Year 2026 Proposed Action Maximum Field Production Emissions -
Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	55	13	1.45	43	7	1.24	42	18	1.69	55	18	1.69
Fitzpatrick WA	5	0	0.52	0	0	0.45	0	0	0.40	5	0	0.52
Grand Teton NP	0	0	0.21	0	0	0.25	0	0	0.18	0	0	0.25
Gros Ventre WA	0	0	0.39	0	0	0.47	0	0	0.38	0	0	0.47
North Absaroka WA	0	0	0.08	0	0	0.12	0	0	0.07	0	0	0.12
Popo Agie WA	3	0	0.53	4	0	0.58	3	0	0.63	4	0	0.63
Teton WA	0	0	0.21	0	0	0.20	0	0	0.14	0	0	0.21
Washakie WA	0	0	0.19	0	0	0.26	0	0	0.15	0	0	0.26
Wind River RA	1	0	0.51	0	0	0.47	3	0	0.53	3	0	0.53
Yellowstone NP	0	0	0.12	0	0	0.14	0	0	0.11	0	0	0.14

Note: Δdv = change in deciview.

Table E.15.7
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	130	83	4.22	148	72	3.75	122	69	5.34	148	83	5.34
Fitzpatrick WA	42	11	1.52	32	8	1.55	26	10	1.47	42	11	1.55
Grand Teton NP	15	0	0.85	21	3	1.13	10	0	0.69	21	3	1.13
Gros Ventre WA	39	8	1.56	24	6	1.45	30	7	1.45	39	8	1.56
North Absaroka WA	0	0	0.26	0	0	0.45	0	0	0.36	0	0	0.45
Popo Agie WA	61	27	1.94	64	27	2.23	53	21	1.97	64	27	2.23
Teton WA	1	0	0.59	6	0	0.82	2	0	0.53	6	0	0.82
Washakie WA	0	0	0.45	7	0	0.72	1	0	0.60	7	0	0.72
Wind River RA	50	18	1.66	37	14	1.83	35	13	1.95	50	18	1.95
Yellowstone NP	0	0	0.35	2	0	0.65	0	0	0.34	2	0	0.65

Note: Δdv = change in deciview.

Table E.15.8
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	128	87	4.86	146	83	4.12	128	71	4.12	146	87	4.86
Fitzpatrick WA	43	17	1.79	34	11	1.43	30	11	1.43	43	17	1.79
Grand Teton NP	17	0	0.91	23	0	0.99	12	0	0.72	23	0	0.99
Gros Ventre WA	44	10	1.73	24	8	1.57	24	8	1.52	44	10	1.73
North Absaroka WA	0	0	0.28	1	0	0.51	0	0	0.28	1	0	0.51
Popo Agie WA	60	29	2.11	65	29	2.59	55	24	1.94	65	29	2.59
Teton WA	5	0	0.71	5	0	0.94	3	0	0.58	5	0	0.94
Washakie WA	1	0	0.53	6	0	0.86	1	0	0.53	6	0	0.86
Wind River RA	50	19	1.76	38	16	1.97	37	16	1.76	50	19	1.97
Yellowstone NP	0	0	0.41	2	0	0.67	0	0	0.33	2	0	0.67

Note: Δdv = change in deciview.

Table E.15.9
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	107	67	3.62	114	57	3.24	98	50	4.43	114	67	4.43
Fitzpatrick WA	31	8	1.28	20	3	1.09	21	4	1.22	31	8	1.28
Grand Teton NP	12	0	0.78	19	0	0.80	7	0	0.62	19	0	0.80
Gros Ventre WA	29	5	1.28	19	2	1.22	21	4	1.18	29	5	1.28
North Absaroka WA	0	0	0.22	0	0	0.39	0	0	0.24	0	0	0.39
Popo Agie WA	47	13	1.59	52	16	1.91	43	17	1.46	52	17	1.91
Teton WA	1	0	0.52	2	0	0.74	0	0	0.46	2	0	0.74
Washakie WA	0	0	0.41	5	0	0.62	0	0	0.49	5	0	0.62
Wind River RA	43	8	1.40	28	6	1.60	27	8	1.44	43	8	1.60
Yellowstone NP	0	0	0.33	1	0	0.53	0	0	0.27	1	0	0.53

Note: Δdv = change in deciview.

Table E.15.10
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	73	29	1.98	64	14	1.75	59	24	2.43	73	29	2.43
Fitzpatrick WA	11	0	0.72	6	0	0.62	7	0	0.66	11	0	0.72
Grand Teton NP	7	0	0.60	11	0	0.69	0	0	0.45	11	0	0.69
Gros Ventre WA	12	0	0.78	5	0	0.67	7	0	0.78	12	0	0.78
North Absaroka WA	0	0	0.14	0	0	0.24	0	0	0.16	0	0	0.24
Popo Agie WA	29	0	1.00	23	4	1.14	28	0	0.93	29	4	1.14
Teton WA	0	0	0.40	0	0	0.47	0	0	0.32	0	0	0.47
Washakie WA	0	0	0.28	0	0	0.45	0	0	0.30	0	0	0.45
Wind River RA	15	0	0.86	13	1	1.17	15	0	0.86	15	1	1.17
Yellowstone NP	0	0	0.22	0	0	0.31	0	0	0.19	0	0	0.31

Note: Δdv = change in deciview.

Table E.15.11
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Best Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	80	41	2.22	78	26	1.97	68	33	2.65	80	41	2.65
Fitzpatrick WA	18	0	0.86	11	0	0.69	9	0	0.75	18	0	0.86
Grand Teton NP	7	0	0.62	12	0	0.69	0	0	0.47	12	0	0.69
Gros Ventre WA	14	0	0.85	8	0	0.76	9	0	0.76	14	0	0.85
North Absaroka WA	0	0	0.17	0	0	0.28	0	0	0.18	0	0	0.28
Popo Agie WA	37	3	1.09	34	4	1.41	33	3	1.12	37	4	1.41
Teton WA	0	0	0.44	2	0	0.52	0	0	0.33	2	0	0.52
Washakie WA	0	0	0.28	1	0	0.51	0	0	0.33	1	0	0.51
Wind River RA	21	1	1.09	21	1	1.30	18	0	0.97	21	1	1.30
Yellowstone NP	0	0	0.24	0	0	0.35	0	0	0.22	0	0	0.35

Note: Δdv = change in deciview.

Table E.16.1
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	80	41	2.40	73	25	2.40	65	34	3.23	80	41	3.23
Fitzpatrick WA	8	0	0.78	8	0	0.76	8	0	0.79	8	0	0.79
Grand Teton NP	0	0	0.31	0	0	0.39	0	0	0.21	0	0	0.39
Gros Ventre WA	1	0	0.62	4	0	0.56	5	0	0.60	5	0	0.62
North Absaroka WA	0	0	0.09	0	0	0.21	0	0	0.10	0	0	0.21
Popo Agie WA	16	0	0.86	18	0	0.83	20	0	0.94	20	0	0.94
Teton WA	0	0	0.29	0	0	0.31	0	0	0.19	0	0	0.31
Washakie WA	0	0	0.26	0	0	0.36	0	0	0.21	0	0	0.36
Wind River RA	16	0	0.70	8	0	0.72	10	0	0.94	16	0	0.94
Yellowstone NP	0	0	0.16	0	0	0.23	0	0	0.12	0	0	0.23

Note: Δdv = change in deciview.

Table E.16.2
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	100	55	2.82	102	48	2.89	87	51	3.63	102	55	3.63
Fitzpatrick WA	15	0	0.98	11	1	1.01	12	0	0.96	15	1	1.01
Grand Teton NP	0	0	0.40	3	0	0.62	0	0	0.31	3	0	0.62
Gros Ventre WA	14	0	0.80	14	0	0.92	10	0	0.91	14	0	0.92
North Absaroka WA	0	0	0.13	0	0	0.25	0	0	0.19	0	0	0.25
Popo Agie WA	34	2	1.10	38	5	1.21	25	4	1.23	38	5	1.23
Teton WA	0	0	0.36	0	0	0.47	0	0	0.23	0	0	0.47
Washakie WA	0	0	0.30	0	0	0.46	0	0	0.30	0	0	0.46
Wind River RA	20	0	0.94	15	2	1.07	16	2	1.13	20	2	1.13
Yellowstone NP	0	0	0.22	0	0	0.41	0	0	0.18	0	0	0.41

Note: Δdv = change in deciview.

Table E.16.3
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	104	60	3.45	108	54	3.15	88	46	4.19	108	60	4.19
Fitzpatrick WA	24	4	1.15	15	1	1.06	13	2	1.15	24	4	1.15
Grand Teton NP	0	0	0.48	2	0	0.59	0	0	0.35	2	0	0.59
Gros Ventre WA	19	0	0.96	13	0	0.86	18	1	1.01	19	1	1.01
North Absaroka WA	0	0	0.15	0	0	0.30	0	0	0.16	0	0	0.30
Popo Agie WA	35	2	1.31	38	8	1.23	31	7	1.25	38	8	1.31
Teton WA	0	0	0.45	0	0	0.46	0	0	0.27	0	0	0.46
Washakie WA	0	0	0.38	1	0	0.50	0	0	0.29	1	0	0.50
Wind River RA	27	0	0.99	17	1	1.01	20	3	1.24	27	3	1.24
Yellowstone NP	0	0	0.26	0	0	0.34	0	0	0.20	0	0	0.34

Note: Δdv = change in deciview.

Table E.16.4
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	77	33	2.38	74	21	2.19	68	32	2.91	77	33	2.91
Fitzpatrick WA	10	0	0.76	8	0	0.70	7	0	0.75	10	0	0.76
Grand Teton NP	0	0	0.31	0	0	0.40	0	0	0.23	0	0	0.40
Gros Ventre WA	2	0	0.63	3	0	0.57	5	0	0.67	5	0	0.67
North Absaroka WA	0	0	0.10	0	0	0.21	0	0	0.11	0	0	0.21
Popo Agie WA	15	0	0.86	17	0	0.83	19	0	0.84	19	0	0.86
Teton WA	0	0	0.29	0	0	0.31	0	0	0.18	0	0	0.31
Washakie WA	0	0	0.25	0	0	0.34	0	0	0.20	0	0	0.34
Wind River RA	11	0	0.66	8	0	0.67	8	0	0.82	11	0	0.82
Yellowstone NP	0	0	0.17	0	0	0.22	0	0	0.13	0	0	0.22

Note: Δdv = change in deciview.

Table E.16.5
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	23	0	0.91	12	0	0.92	20	3	1.16	23	3	1.16
Fitzpatrick WA	0	0	0.29	0	0	0.26	0	0	0.28	0	0	0.29
Grand Teton NP	0	0	0.12	0	0	0.16	0	0	0.08	0	0	0.16
Gros Ventre WA	0	0	0.23	0	0	0.23	0	0	0.24	0	0	0.24
North Absaroka WA	0	0	0.04	0	0	0.08	0	0	0.05	0	0	0.08
Popo Agie WA	0	0	0.32	0	0	0.32	0	0	0.34	0	0	0.34
Teton WA	0	0	0.11	0	0	0.12	0	0	0.07	0	0	0.12
Washakie WA	0	0	0.09	0	0	0.13	0	0	0.08	0	0	0.13
Wind River RA	0	0	0.26	0	0	0.24	0	0	0.30	0	0	0.30
Yellowstone NP	0	0	0.06	0	0	0.10	0	0	0.05	0	0	0.10

Note: Δdv = change in deciview.

Table E.16.6
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	41	2	1.14	29	0	0.97	31	9	1.33	41	9	1.33
Fitzpatrick WA	0	0	0.40	0	0	0.35	0	0	0.31	0	0	0.40
Grand Teton NP	0	0	0.16	0	0	0.20	0	0	0.14	0	0	0.20
Gros Ventre WA	0	0	0.30	0	0	0.37	0	0	0.29	0	0	0.37
North Absaroka WA	0	0	0.06	0	0	0.09	0	0	0.06	0	0	0.09
Popo Agie WA	0	0	0.41	0	0	0.45	0	0	0.49	0	0	0.49
Teton WA	0	0	0.16	0	0	0.16	0	0	0.11	0	0	0.16
Washakie WA	0	0	0.14	0	0	0.20	0	0	0.12	0	0	0.20
Wind River RA	0	0	0.40	0	0	0.37	0	0	0.41	0	0	0.41
Yellowstone NP	0	0	0.10	0	0	0.11	0	0	0.09	0	0	0.11

Note: Δdv = change in deciview.

Table E.16.7
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	112	68	3.41	117	59	3.47	103	54	4.36	117	68	4.36
Fitzpatrick WA	27	4	1.20	22	3	1.22	17	6	1.16	27	6	1.22
Grand Teton NP	6	0	0.67	15	0	0.88	2	0	0.54	15	0	0.88
Gros Ventre WA	26	2	1.23	20	5	1.14	24	4	1.14	26	5	1.23
North Absaroka WA	0	0	0.20	0	0	0.35	0	0	0.28	0	0	0.35
Popo Agie WA	46	12	1.53	53	14	1.77	43	12	1.56	53	14	1.77
Teton WA	0	0	0.46	2	0	0.64	0	0	0.41	2	0	0.64
Washakie WA	0	0	0.35	4	0	0.56	0	0	0.47	4	0	0.56
Wind River RA	35	5	1.31	26	5	1.44	27	5	1.54	35	5	1.54
Yellowstone NP	0	0	0.27	1	0	0.51	0	0	0.27	1	0	0.51

Note: Δdv = change in deciview.

Table E.16.8
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	112	70	3.95	123	61	3.40	105	55	4.67	123	70	4.67
Fitzpatrick WA	34	8	1.42	21	5	1.12	21	7	1.34	34	8	1.42
Grand Teton NP	10	0	0.71	14	0	0.78	5	0	0.56	14	0	0.78
Gros Ventre WA	31	5	1.37	21	2	1.24	23	4	1.20	31	5	1.37
North Absaroka WA	0	0	0.22	0	0	0.40	0	0	0.24	0	0	0.40
Popo Agie WA	50	15	1.67	53	17	2.06	43	18	1.53	53	18	2.06
Teton WA	1	0	0.55	3	0	0.73	0	0	0.45	3	0	0.73
Washakie WA	0	0	0.41	6	0	0.67	0	0	0.47	6	0	0.67
Wind River RA	41	13	1.39	29	6	1.56	28	8	1.53	41	13	1.56
Yellowstone NP	0	0	0.32	1	0	0.53	0	0	0.26	1	0	0.53

Note: Δdv = change in deciview.

Table E.16.9
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	94	53	2.91	91	45	2.59	80	42	3.59	94	53	3.59
Fitzpatrick WA	23	1	1.01	16	0	0.86	13	0	0.96	23	1	1.01
Grand Teton NP	6	0	0.61	11	0	0.62	0	0	0.49	11	0	0.62
Gros Ventre WA	17	1	1.01	11	0	0.96	14	0	0.92	17	1	1.01
North Absaroka WA	0	0	0.17	0	0	0.30	0	0	0.18	0	0	0.30
Popo Agie WA	39	4	1.25	39	6	1.51	32	8	1.15	39	8	1.51
Teton WA	0	0	0.40	1	0	0.58	0	0	0.36	1	0	0.58
Washakie WA	0	0	0.32	0	0	0.48	0	0	0.38	0	0	0.48
Wind River RA	24	2	1.10	19	2	1.26	21	4	1.13	24	4	1.26
Yellowstone NP	0	0	0.25	0	0	0.41	0	0	0.21	0	0	0.41

Note: Δdv = change in deciview.

Table E.16.10
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	61	17	1.57	48	9	1.38	44	18	1.93	61	18	1.93
Fitzpatrick WA	6	0	0.56	0	0	0.48	3	0	0.51	6	0	0.56
Grand Teton NP	0	0	0.47	3	0	0.54	0	0	0.35	3	0	0.54
Gros Ventre WA	7	0	0.61	1	0	0.53	1	0	0.61	7	0	0.61
North Absaroka WA	0	0	0.11	0	0	0.19	0	0	0.12	0	0	0.19
Popo Agie WA	17	0	0.78	13	0	0.90	13	0	0.73	17	0	0.90
Teton WA	0	0	0.31	0	0	0.37	0	0	0.25	0	0	0.37
Washakie WA	0	0	0.22	0	0	0.35	0	0	0.23	0	0	0.35
Wind River RA	8	0	0.67	5	0	0.92	8	0	0.67	8	0	0.92
Yellowstone NP	0	0	0.17	0	0	0.24	0	0	0.15	0	0	0.24

Note: Δdv = change in deciview.

Table E.16.11
Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and Regional Haze Rule - Average Days - Background Data

	2001			2002			2003			Maximum Modeled Impacts		
	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	8th Highest Δdv	# Days > 0.5 Δdv	# Days > 1.0 Δdv	Maximum 8th Highest Δdv
Bridger WA	69	24	1.76	63	12	1.56	51	24	2.11	69	24	2.11
Fitzpatrick WA	7	0	0.67	3	0	0.54	4	0	0.58	7	0	0.67
Grand Teton NP	0	0	0.48	3	0	0.54	0	0	0.37	3	0	0.54
Gros Ventre WA	8	0	0.66	1	0	0.59	3	0	0.59	8	0	0.66
North Absaroka WA	0	0	0.13	0	0	0.22	0	0	0.14	0	0	0.22
Popo Agie WA	23	0	0.85	17	2	1.11	21	0	0.88	23	2	1.11
Teton WA	0	0	0.34	0	0	0.40	0	0	0.26	0	0	0.40
Washakie WA	0	0	0.22	0	0	0.40	0	0	0.26	0	0	0.40
Wind River RA	13	0	0.85	8	1	1.02	10	0	0.76	13	1	1.02
Yellowstone NP	0	0	0.19	0	0	0.27	0	0	0.17	0	0	0.27

Note: Δdv = change in deciview.

Table E.17.1
Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project Sources - Year 2005 Case - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

	2001		2002		2003		Maximum Modeled Impacts	
	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv
Boulder	108	11.46	100	9.22	91	12.16	108	12.16
Cora	36	5.99	32	7.33	29	8.52	36	8.52
Pinedale	55	5.51	47	10.29	41	9.10	55	10.29

Note: Δdv = change in deciview.

Table E.17.2
Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

	2001		2002		2003		Maximum Modeled Impacts	
	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv
Boulder	126	11.65	121	10.70	119	13.13	126	13.13
Cora	58	6.93	49	11.25	46	10.20	58	11.25
Pinedale	89	6.14	79	12.50	74	10.58	89	12.50

Note: Δdv = change in deciview.

Table E.17.3
Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

	2001		2002		2003		Maximum Modeled Impacts	
	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv
Boulder	128	13.76	138	11.82	127	15.32	138	15.32
Cora	62	8.10	55	10.12	47	12.50	62	12.50
Pinedale	91	7.43	83	12.14	76	12.29	91	12.29

Note: Δdv = change in deciview.

Table E.17.4
Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

	2001		2002		2003		Maximum Modeled Impacts	
	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv
Boulder	107	10.70	101	9.03	96	12.22	107	12.22
Cora	47	5.88	38	7.67	35	9.51	47	9.51
Pinedale	70	5.42	59	9.36	54	9.38	70	9.38

Note: Δdv = change in deciview.

Table E.17.5
Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

	2001		2002		2003		Maximum Modeled Impacts	
	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv
Boulder	45	5.14	35	4.14	39	6.60	45	6.60
Cora	11	2.29	12	3.63	10	4.03	12	4.03
Pinedale	25	2.44	15	4.42	17	4.08	25	4.42

Note: Δdv = change in deciview.

Table E.17.6
Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

	2001		2002		2003		Maximum Modeled Impacts	
	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv
Boulder	54	5.29	45	3.39	42	6.76	54	6.76
Cora	12	1.97	10	3.29	10	2.78	12	3.29
Pinedale	23	2.94	18	5.25	19	3.47	23	5.25

Note: Δdv = change in deciview.

Table E.17.7
Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project and Regional Sources - Year 2007 No Action Case - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

	2001		2002		2003		Maximum Modeled Impacts	
	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv
Boulder	133	12.34	141	11.23	128	13.69	141	13.69
Cora	65	7.26	54	11.55	48	10.86	65	11.55
Pinedale	94	6.95	84	12.77	80	11.45	94	12.77

Note: Δdv = change in deciview.

Table E.17.8
Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project and Regional Sources - Year 2009 Proposed Action Case - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

	2001		2002		2003		Maximum Modeled Impacts	
	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv
Boulder	134	14.32	153	12.29	144	15.77	153	15.77
Cora	68	8.40	59	10.45	51	13.02	68	13.02
Pinedale	96	7.88	85	13.23	81	12.99	96	13.23

Note: Δdv = change in deciview.

Table E.17.9
Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project and Regional Sources - Alternative C - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

	2001		2002		2003		Maximum Modeled Impacts	
	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv
Boulder	113	11.45	118	9.65	110	12.83	118	12.83
Cora	60	6.25	50	8.10	41	10.21	60	10.21
Pinedale	79	6.18	72	10.77	66	10.35	79	10.77

Note: Δdv = change in deciview.

Table E.17.10
Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project and Regional Sources - Alternative C - 80% Drill Rig Mitigation - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

	2001		2002		2003		Maximum Modeled Impacts	
	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv
Boulder	69	6.41	58	5.13	54	7.64	69	7.64
Cora	25	3.00	21	5.11	23	5.22	25	5.22
Pinedale	45	3.60	31	6.67	34	5.70	45	6.67

Note: Δdv = change in deciview.

Table E.17.11
Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Pinedale Anticline Project and Regional Sources - Year 2026 Proposed Action Maximum Field Production Emissions - Using Meteorology Data for Years 2001 - 2003, and Boulder Background Data

	2001		2002		2003		Maximum Modeled Impacts	
	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv	# Days > 1.0 Δdv	Maximum Δdv
Boulder	74	6.55	59	4.48	54	7.79	74	7.79
Cora	25	3.28	27	5.59	22	4.12	27	5.59
Pinedale	43	4.05	34	7.30	33	4.70	43	7.30

Note: Δdv = change in deciview.