FINAL AIR QUALITY TECHNICAL SUPPORT DOCUMENT FOR THE JONAH INFILL DRILLING PROJECT ENVIRONMENTAL IMPACT STATEMENT

(Volume 1 of 2)

Prepared for

Bureau of Land Management
Wyoming State Office
Cheyenne, Wyoming

Pinedale Field Office
Pinedale, Wyoming

and

Jonah Infill Drilling Project Operators

Prepared by

TRC Environmental Corporation
Laramie, Wyoming

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LIST OF ACRONYMS AND ABBREVIATIONS

μeq/l	Microequivalents per liter
$\mu g/m^3$	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
BP	BP America Production Company
BTEX	Benzene, toluene, ethylbenzene, and xylene
BTNF-MA	Bridger-Teton National Forest Management Area
C.F.R.	*Code of Federal Regulations*
CDPHE/APCD	Colorado Department of Public Health and Environment/Air Pollution Control Division
CD/WII	Continental Divide/Wamsutter II
CO	Carbon monoxide
COGCC	Colorado Oil and Gas Conservation Commission
DAT	Deposition analysis thresholds
DEM	Digital elevation model
dv	Deciview
EIS	Environmental impact statement
EnCana	EnCana Oil & Gas (USA) Inc.
EPA	Environmental Protection Agency
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
JIDPA	Jonah Infill Drilling Project Area
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
Operators	EnCana Oil and Gas (USA) Inc., BP America Production Company, and other oil and gas companies
PAPA	Pinedale Anticline Project Area
P-BACT	Presumptive BACT
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
ppm	Parts per million
Project	Jonah Infill Drilling Project
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
RT	Round trip
S	Sulfur
SO_2	Sulfur dioxide
SO_4	Sulfate
SWWYTAF	Southwest Wyoming Technical Air Forum
tpy	Tons per year
TRC	TRC Environmental Corporation
TSP	Total suspended particulates
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
VMT	Vehicle miles traveled
WAAQS	Wyoming Ambient Air Quality Standards
WAQSR	Wyoming Air Quality Standards and Regulations
WDEQ	Wyoming Department of Environmental Quality
WDR	Well development rate
WOGCC	Wyoming Oil and Gas Conservation Commission
WRAP	Western Regional Air Partnership
WYDOT	Wyoming Department of Transportation

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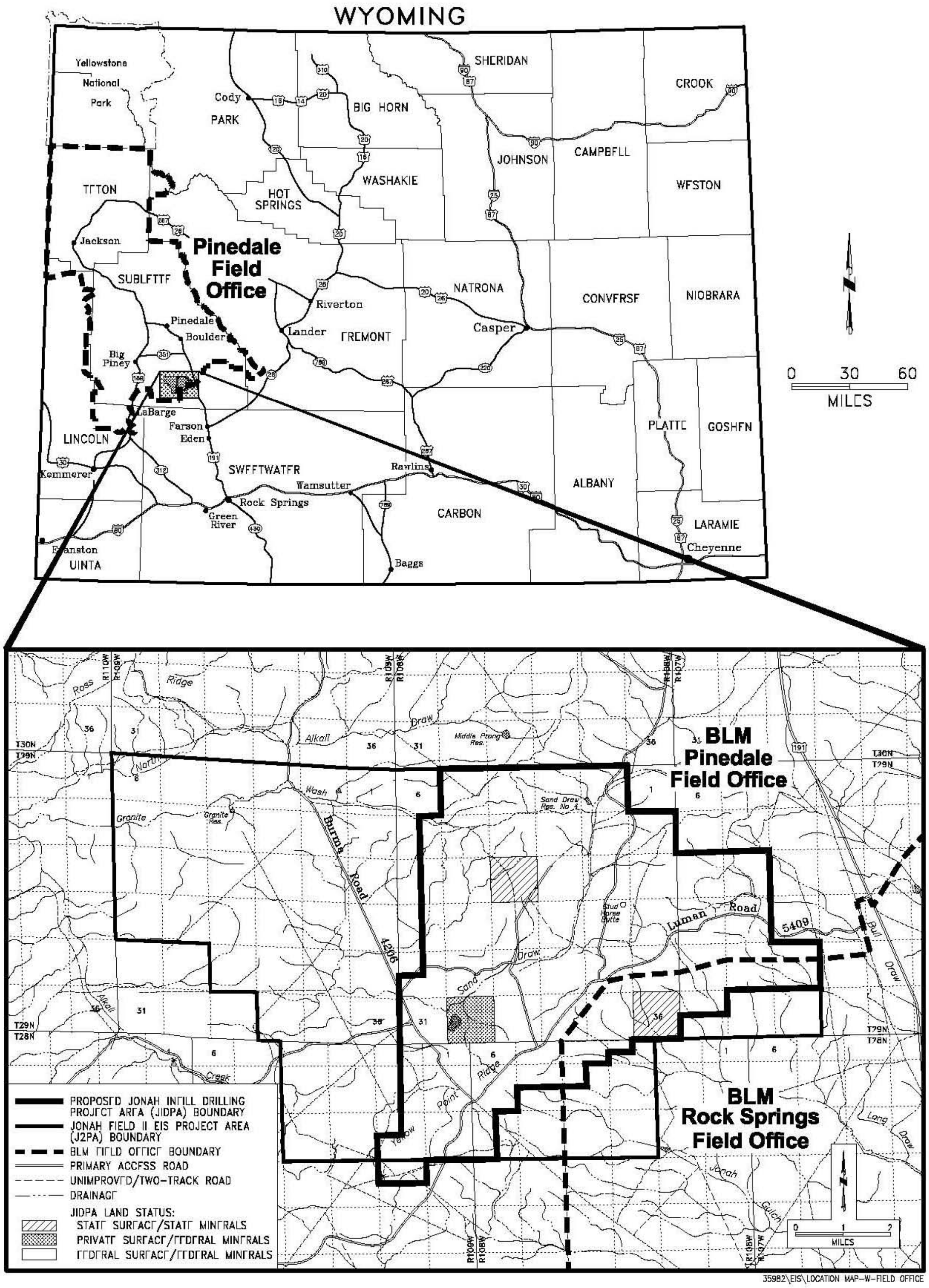
1.0 INTRODUCTION

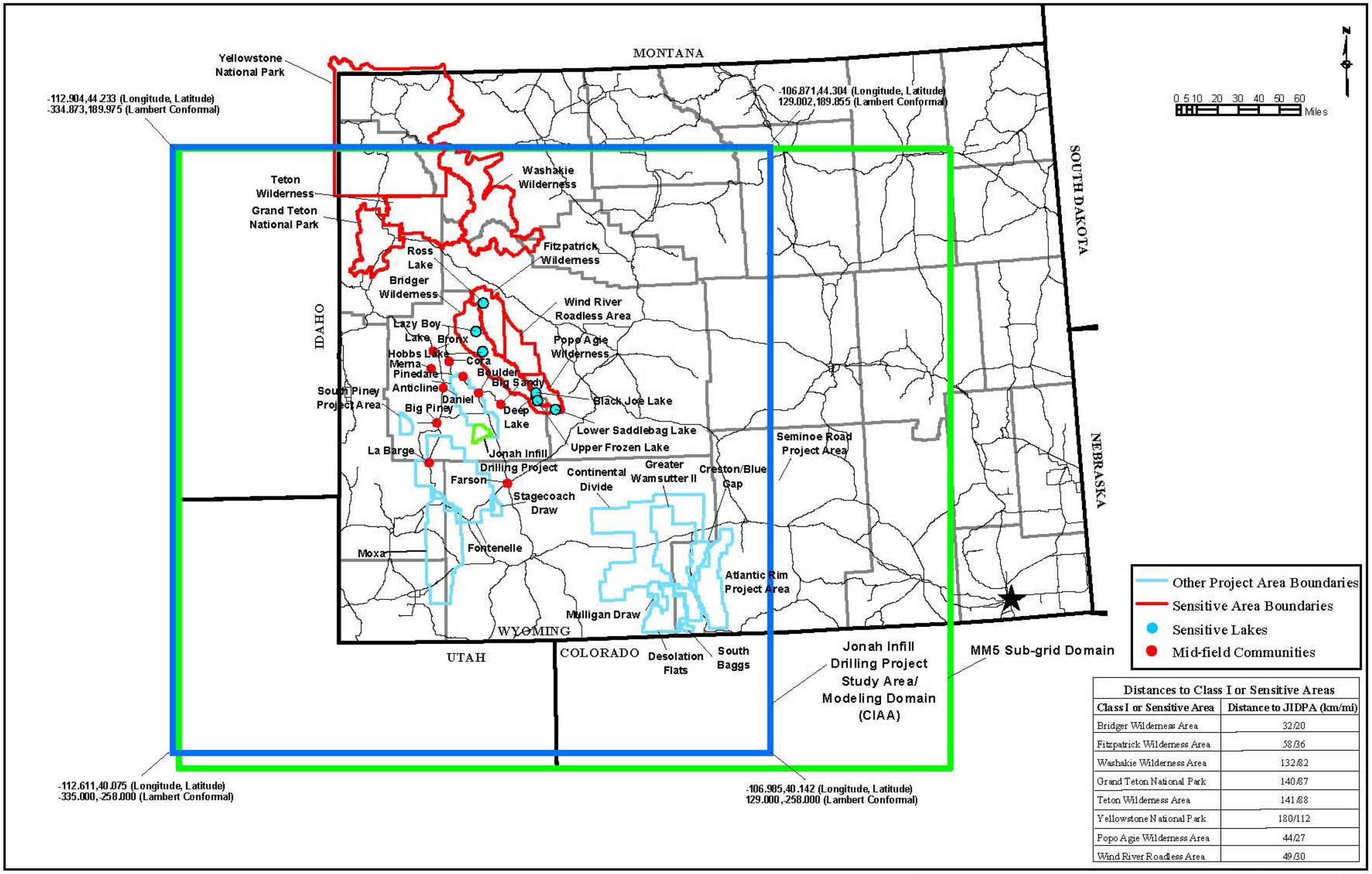
This Air Quality Technical Support Document (AQTSD) was prepared to summarize analyses performed to quantify potential air quality impacts from the proposed Jonah Infill Drilling Project (project) for five project development alternatives selected for inclusion in the project environmental impact statement (EIS). These five development alternatives include the No Action, Proposed Action, Alternative A, Alternative B, and the Preferred Alternative. The air quality analyses for the selected project development alternatives and several other additional development alternatives were performed and presented in the *Draft Environmental Impact Statement, Jonah Infill Drilling Project, Sublette County, Wyoming* (DEIS) (BLM 2005) and summarized in detail in the *Draft Air Quality Technical Support Document for the Jonah Infill Drilling Project Environmental Impact Statement* (AQTSD) (TRC 2004) and the *Jonah Infill Drilling Project Draft Air Quality Technical Support Document Supplement* (TRC 2005). This AQTSD presents a stand-alone document that summarizes the modeling analyses for the selected alternatives and incorporates updates and corrections that were identified in comments received on the two draft technical support documents.

The methodologies utilized in the analysis were originally defined in an air quality impact assessment protocol (Protocol) prepared by TRC Environmental Corporation (TRC) (2003) 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 Forest Service), 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



Map 1.1 Jonah Infill Drilling Project Location, Sublette County, Wyoming.



Distances to Class I or Sensitive Areas

Class I or Sensitive Area	Distance to JIDPA (km/mi)
Bridger Wilderness Area	32/20
Fitzpatrick Wilderness Area	58/36
Washakie Wilderness Area	132/82
Grand Teton National Park	140/87
Teton Wilderness Area	141/88
Yellowstone National Park	180/112
Popo Agie Wilderness Area	44/27
Wind River Roadless Area	49/30

Map 1.2 Air Quality Study Area/Modeling Domain.

analysis area includes the area surrounding the proposed Jonah Infill Drilling project area (JIDPA) and all or a portion of the Bridger, Fitzpatrick, Popo Agie, Teton, and Washakie Wilderness Areas; the Wind River Roadless Area; and Grand Teton and Yellowstone National Parks.

Impacts analyzed include those on air quality and air quality related values (AQRVs) resulting from air emissions from: 1) project sources within the JIDPA, 2) non-project state-permitted and reasonably foreseeable future action (RFFA) sources within the modeling domain, and 3) non-project reasonably foreseeable development (RFD) within the modeling domain. The project source emissions inventory was performed in accordance with the Protocol and following WDEQ-AQD oil and gas inventory guidance (WDEQ-AQD 2001). Portions of the inventory were submitted to WDEQ-AQD for review prior to inventory finalization. Non-project sources were inventoried as part of a cooperative effort between the BLM Wyoming State Office, the project proponents, and the Atlantic Rim Natural Gas Development Project proponents. These data were obtained for use in the Rawlins and Pinedale Resource Management Plan (RMP) revisions, this project EIS air quality analysis, and the Atlantic Rim Natural Gas Development project EIS air quality analysis. Chapter 2.0 specifically presents an overview of the emissions inventories.

The remainder of this AQTSD 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 in-field, mid-field, and far-field direct and cumulative impacts.

1.1 PROJECT DESCRIPTION

EnCana Oil & Gas (USA) Inc. (EnCana), BP America Production Company (BP), and other oil and gas companies (collectively referred to as the Operators) have notified the BLM, Pinedale Field Office (PFO), that they propose to continue development of sweet natural gas resources located within the JIDPA (see Map 1.1). The JIDPA is generally located in Townships 28 and

29 North, Ranges 107 through 109 West, Sublette County, Wyoming. The JIDPA encompasses approximately 30,500 acres, of which 28,580 acres are federal surface/federal mineral estate, 1,280 acres are State of Wyoming surface/mineral estate, and 640 acres are private surface/federal mineral estate.

The Operator Proposed Action for this project would involve the development of up to 3,100 new natural gas wells on up to 16,200 acres of new surface disturbance. However, additional alternatives involving alternate well pad densities and development rates were also analyzed. The maximum number of wells would be 3,100, assuming an approximately 5- to 10-acre down-hole well spacing throughout the JIDPA. Depending upon the authorized rate of development (75 or 250 wells per year), development operations would last from approximately 12.5 to 42 years, with a total life-of-project (LOP) of approximately 76 to 105 years. The JIDPA is currently accessed by existing developed roads.

Approximately 63-87 days would be required to develop each well (four days to construct the well pad and access road, from one to four days for rig-up, generally from 18 to 36 days for drilling, 35 days over a 60-day period for completion and testing, from one to four days for rig-down, and four days for pipeline construction). The estimated size of each single-well drill pad is 3.8 acres, of which approximately 2.9 acres would be reclaimed after the well is completed and the gas gathering pipeline is installed. A reserve pit would be constructed at each drill site location to hold drilling fluids and cuttings. Non-productive and non-economical wells would be reclaimed as soon as practical to appropriate federal, state, or private landowner specifications.

The gas produced within the JIDPA would be transported by existing pipelines from the field. To facilitate a complete cumulative impact assessment and since gas compression needs for the project cannot reasonably be separated from those necessary for the adjacent Pinedale Anticline Project Area (PAPA), future compression requirements for the PAPA are also considered in this air quality analysis. Projections of future compression requirements supporting both the JIDPA and the PAPA were obtained from pipeline companies currently transporting gas from these areas. This total regional compression estimate was analyzed as part of both the Proposed Action and alternatives.

1.2 PROJECT ALTERNATIVES

Five project alternatives were analyzed in the *National Environmental Policy Act* (NEPA) EIS for this project. These alternatives are summarized below:

- the No Action Alternative - no further development; LOP is approximately 63 years;
- the Proposed Action - up to 3,100 new wells, a well development rate (WDR) of 250 wells/year (WDR250), and LOP of 76 years;
- Alternative A - up to 3,100 new wells, WDR250, and LOP 76 years;
- Alternative B - up to 3,100 new wells, WDR75, and LOP 105 years;
- Preferred Alternative - up to 3,100 new wells, WDR250, and LOP 76 years.

Each of these alternatives was analyzed as part of the Jonah Infill Drilling Project DEIS. Modeling analyses for the No Action and Proposed Action alternative and Alternatives A and B were summarized in the *Draft Air Quality Technical Support Document for the Jonah Infill Drilling Project Environmental Impact Statement* (AQTSD) (TRC 2004). Modeling analyses for several configurations of the Preferred Alternative were summarized in the *Jonah Infill Drilling Project Draft Air Quality Technical Support Document Supplement*, (TRC 2005), which is included as Appendix G in Volume II of this AQTSD. The BLM selected modeling analysis for the Preferred Alternative for the EIS is defined as the modeling scenario that includes project emissions levels equivalent to an 80 percent emission reduction from the Jonah Infill Drilling Project high emissions configuration assuming a 250WDR. This scenario was analyzed as a Preferred Alternative mitigation scenario in the AQTSD supplement.

1.3 STUDY TASKS

The following eight tasks were performed for air quality and AQRVs impact assessment:

1. **Project Air Emissions Inventory.** Development of an air pollutant emissions inventory for the project.

2. **Regional Air Emissions Inventory.** Development of an air pollutant emissions inventory for other regional sources not represented by background air quality measurements, including state-permitted sources, RFFA, and RFD.

3. **Project Near-Field Analysis.** Assessment of near-field air quality concentration impacts resulting from activities proposed within the JIDPA.

4. **Regional Near-Field Analysis.** Assessment of near-field air quality concentration impacts resulting from activities proposed within the JIDPA in combination with other existing and proposed regional compressor stations.

5. **In-Field Cumulative Analysis.** Assessment of concentration impacts within the JIDPA resulting from the project and other regional sources inventoried under item 2 above.

6. **Mid-Field Cumulative Analysis.** Assessment of mid-field visibility impacts to regional communities resulting from the project and other regional sources.

7. **Far-Field Direct Project Impact Analysis.** Assessment of far-field air quality concentration and AQRV impacts resulting from proposed project activities.

8. **Far-Field Cumulative Impact Analysis.** Assessment of far-field air quality concentration and AQRV impacts resulting from activities proposed within the JIDPA combined with other regional sources inventoried under item 2 above.

2.0 EMISSIONS INVENTORY

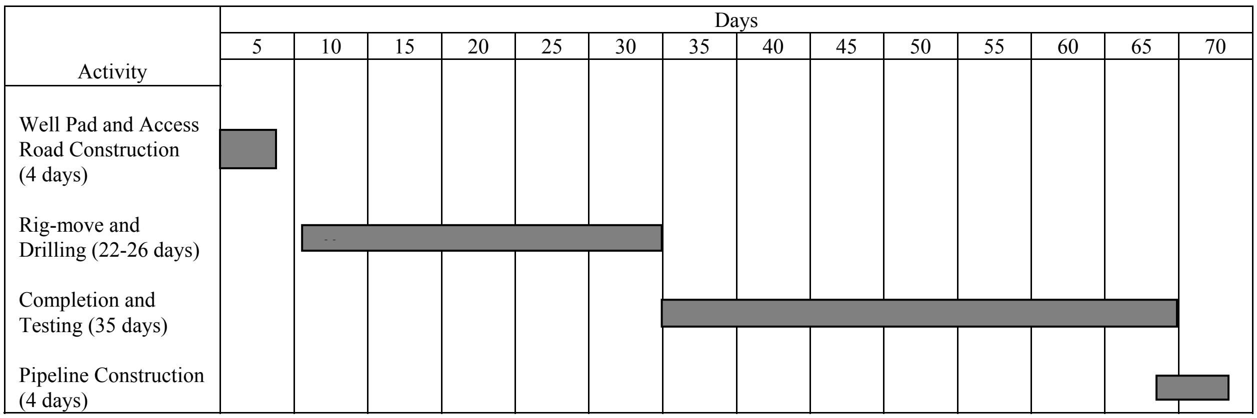
2.1 PROJECT EMISSIONS

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 consisted 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) in effect at the time the inventory was conducted, stack test data, EPA's AP-42, or other accepted engineering methods (see Appendix A, Protocol). Additions to WDEQ-AQD *Oil and Gas Production Facility Emission Control and Permitting Requirements for the Jonah and Pinedale Anticline Gas Fields* were approved by the Air Quality Advisory Board on July 28, 2004. The additional guidance became effective upon approval and applies to all wells reported to WOGCC after the approval date of July 28, 2004. The additional guidance revised emission control requirements and permitting process currently utilized under WDEQ-AQD Notice of Intent (NOI)/Presumptive Best Available Control Technology (P-BACT) permitting processes. Because the project air emissions inventory and dispersion modeling analysis was complete prior to the adoption of the guidance referenced above, the revised guidance is not reflected in this analysis. Since new emission sources would have to comply with this and any other future promulgated emission control guidance, the emission levels and associated impacts presented herein are likely overstated.

2.1.1 Construction Emissions

Construction activities are a source of primarily criteria pollutants. Emissions would occur from well pad and resource road construction and traffic, rig-move/drilling and associated traffic, completion/testing and associated traffic, pipeline installation and associated traffic, and wind erosion during construction activities. A timeline illustrating the duration of construction activities for a single well is provided in Figure 2.1. Up to 3,100 natural gas wells may be developed. Two separate WDRs were examined in this emissions inventory: 75 and 250 wells developed per year. The Proposed Action, Alternative A and the Preferred Alternative assume 250 well per year development rates and Alternative B assumes a WDR of 75 wells per year. The 75 WDR provides for a slower pace of development and results in lower annual emission rates during the construction phase of the project.

Figure 2.1 Approximate Single-Well Development Timeline.



Well pad and resource road emissions would include fugitive PM_{10} and $PM_{2.5}$ emissions from 1) construction activities and 2) traffic to and from the construction site. Other criteria pollutant emissions would occur from diesel combustion in haul trucks and heavy construction equipment. On resource roads, water would be used for fugitive dust control, effecting a control efficiency of 50%. On collector roads (e.g., Luman Road) magnesium chloride would be used for dust control, effecting a control efficiency of 85%.

After the pad is prepared, rig-move/drilling would begin. Emissions would include fugitives from unpaved road travel to and from the drilling site and emissions from diesel drilling engines (three total engines). At directionally drilled wells the amount of traffic would increase by 20%, and one additional drilling engine (a total of four engines) would be utilized. Emissions from well completion and testing would include fugitive PM_{10} and $PM_{2.5}$ emissions from traffic and emissions from diesel haul truck tailpipes. During the completion phase, gas and condensate are both vented to the atmosphere and combusted (flared). Emissions from the venting of natural gas include HAPs and VOCs. Flaring emissions from the combustion of natural gas and condensate include NO_x, CO, VOCs, and HAPs.

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

Fugitive dust (PM_{10} and $PM_{2.5}$) would occur during well pad, road, and pipeline construction due to wind erosion on disturbed areas.

A summary of single-well construction emissions for both straight and directionally drilled wells are shown in Table 2.1. Construction emission calculations are provided in detail, showing all emission factors, input parameters, and assumptions, in Appendix B (Project Emissions Inventory).

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

Table 2.1 Single-well Construction Emissions Summary for Both Straight and Directionally Drilled Wells.

	Well Pad and Access Road Construction[1]		Rig Move[1] and Drilling		Completion and Testing		Pipeline Construction[1]		Totals
Pollutant	(lb/hr)	(tons/well)	(lb/hr)	(tons/well)	(lb/hr)	(tons/well)	(lb/hr)	(tons/well)	(tons/well)
Emissions for one straight well (19 days of drilling									
NO_x	12.23[2]	0.23	10.87[3]	2.49	0.35	0.10	7.81[4]	0.067	2.89
CO	3.76[2]	0.07	3.76[3]	1.47	0.45	0.13	3.03[4]	0.024	1.69
SO_2	1.46[2]	0.03	0.31[3]	0.07	0.01	0.00	0.74[4]	0.007	0.11
PM_{10}	10.76[2]	0.21	3.11[3]	0.80	6.56	1.95	4.88[4]	0.073	3.03
$PM_{2.5}$	3.52[2]	0.07	0.93[3]	0.23	1.00	0.30	1.52[4]	0.019	0.61
VOC	0.90[2]	0.02	1.22[3]	0.28	0.17	57.62	0.76[4]	0.007	57.92
Emissions for one directional well (23 days of drilling)									
NO_x	12.23[5]	0.23	16.27[6]	3.73	0.35[7]	0.10	7.81[7]	0.067	4.12
CO	3.76[5]	0.07	7.89[6]	2.19	0.45[7]	0.13	3.03[7]	0.024	2.41
SO_2	1.46[5]	0.03	0.38[6]	0.11	0.01[7]	0.00	0.74[7]	0.007	0.15
PM_{10}	10.76[5]	0.21	3.28[6]	1.00	6.56[7]	1.95	4.88[7]	0.073	3.23
$PM_{2.5}$	3.52[5]	0.07	1.07[6]	0.31	1.00[7]	0.30	1.52[7]	0.019	0.69
VOC	0.90[5]	0.02	2.43[6]	0.42	0.17[7]	57.62	0.76[7]	0.007	58.06

1 Emission rates persist for less than 24-hours per day.
2 Sum of well pad construction, road construction, well pad and road construction traffic, and construction heavy equipment tailpipe emissions, and these activities are conservatively assumed to occur simultaneously over the operating period.
3 Sum of straight drilling traffic, straight drilling engines, and straight drilling heavy equipment tailpipe emissions, and these activities are conservatively assumed to occur simultaneously over the operating period.
4 Sum of pipeline construction, pipeline construction traffic, and pipeline heavy equipment tailpipe emissions, and these activities are conservatively assumed to occur simultaneously over the operating period.
5 Well pad and access road construction emissions for one directionally drilled well are equal to emissions for one straight drilled well.
6 Sum of directional drilling traffic, directional drilling engines, and directional drilling heavy equipment tailpipe emissions, and these activities are conservatively assumed to occur simultaneously over the operating period.
7 Completion and testing emissions and pipeline construction emissions are the same for straight and directional wells.

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 each well site include an indirect heater, a dehydrator reboiler heater, and a separator heater. Stack testing was performed for oxides of nitrogen (NO_x) and CO on these heaters, by Operators in 2003, to obtain an accurate estimate of these emissions from these sources. These stack test emissions were used throughout this air quality analysis. Heater emissions for all other pollutants were calculated using AP-42.

HAPs and VOC 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. HAP and VOC emissions would decrease over the life of an individual well due to declines in condensate production. Emissions from these sources were provided by Operators.

Total production emissions of criteria pollutants and HAPs occurring from a single well are presented in Table 2.2. Production emission calculations are provided in detail, in Appendix B, showing all emission factors, input parameters, and assumptions.

Table 2.2 Single-Well Production Emissions Summary.

Pollutant	Traffic Emissions[1] (tpy)	Production Emissions[2] (tpy)	Total Emissions (tpy)
NO_x	0.008	0.045	0.053
CO	0.011	0.43	0.44
SO_2	0.0002	0.00	0.0002
PM_{10}	0.30	0.009	0.31
$PM_{2.5}$	0.045	0.009	0.053
VOC	0.004	10.13	10.13
Benzene	--	1.20	1.20
Toluene	--	2.47	2.47
Ethylbenzene	--	0.11	0.11
Xylene	--	1.31	1.31
n-hexane	--	0.13	0.13

[1] Includes emissions from all traffic associated with full-field production. PM_{10} and $PM_{2.5}$ emissions calculations assume 20 wells can be visited per day. Light trucks/pickups emissions on primary access roads (see Table B.2.1) are adjusted to assume 20 wells can be visited per day.

[2] Includes emissions from indirect heater, separator heater, dehydrator heater, and dehydrator flashing, and fugitive HAP/VOC. Assumes 25% of the dehydrators have BTEX control, the remaining 75% of the dehydrators have a pump limit (limits the amount of glycol that is re-circulated in the dehydration unit), and that 50% of condensate storage tanks have VOC controls.

2.1.3 Total Field Emissions

Conservative estimates of maximum potential annual emissions in the JIDPA under the Proposed Action and each alternative are shown in Table 2.3. Table 2.4 presents the EPA nonroad engine emissions regulations and their implementation dates. These regulations are structured as a tiered progression phase in (Tier standards), by horsepower rating, over several years and apply to new engines, including drilling engines, built during these years. The Tier 1 standards were phased in from 1996 to 2000. Tier 2 standards take effect from 2001 to 2006, Tier 3 standards (for smaller engines only) apply from 2006 to 2008, and Tier 4 standards will be phased in from 2008 to 2015. Table 2.4 presents the emissions standards for Tiers 1 through 3, which would be most representative of the drill rig engines used for the project. Maximum potential annual emissions assume construction and production occurring simultaneously in the field and include one year of maximum construction emissions plus one year of production at maximum emission rates. These emissions are assumed to occur along during the last full year of project development (i.e., project-year 12 to 13 of the Proposed Action, Alternative A, and the Preferred Alternative [approximately 2017] or project-year 41 to 42 of Alternative B). The Tier emissions standards assumed for the drilling rig engines used in estimating potential emissions for the Proposed Action and each alternative are provided in Table 2.3. Production VOC and HAP emissions from wells incorporate production declines over time based on annual field production estimates from typical wells in the JIDPA, as provided by Operators. These field production decline estimates are provided in Appendix B, Table 2.23.

Construction emissions were based on well construction, drilling, drilling traffic, completion traffic, and completion flaring. Well construction emissions were based on the number of wells constructed per year and the type of well constructed. Drilling, drilling traffic, completion traffic, and completion flaring were based on the number of wells developed per year. Completion flaring operations were assumed to occur at 20% of the wells under construction. For alternatives with both directional and straight wells, a proportional split between straight and directional wells was used to determine the number of straight and directional drilling rigs.

Table 2.3 Estimated Jonah Infill Drilling Project Maximum Annual In-field Emissions Summary - Construction and Production.

Alternative	Annual Development Rate	Pollutant	Annual Construction Emissions[1] (tpy)	Total Proposed Wells	Total Producing Wells	Annual Production Emissions[2] (tpy)	Total Annual Emissions (tpy)
Alternative A/Proposed Action (100% straight)[3]	250	NO_x	701.8	3,100	2,850	580.2	1,282.0
		CO	396.5			3,604.7	4,001.2
		SO_2	26.3			0.0	26.3
		PM_{10}	368.3			871.1	1,239.4
		$PM_{2.5}$	93.3			153.6	246.9
		VOC	2,955.7			11,121.8	14,077.5
		HAPs	232.9			3,376.7	3,609.6
Alternative B	75	NO_x	285.9	3,100	3,025	615.9	901.8
(100% directional)[4]		CO	167.6			3,826.0	3,993.6
		SO_2	8.8			0.0	8.8
		PM_{10}	109.4			924.5	1,033.9
		$PM_{2.5}$	28.8			163.0	191.8
		VOC	895.9			4,482.6	5,378.5
		HAPs	69.9			1,390.8	1,460.7
Preferred Alternative	250	NO_x	580.6	3,100	2,850	116.1	696.7
(50% straight, 50%		CO	432.5			3,604.7	4,037.2
Directional)[5]		SO_2	34.1			0.0	34.1
		PM_{10}	107.1			174.2	281.3
		$PM_{2.5}$	97.4			30.7	128.1
		VOC	2,962.7			11,121.8	14,084.5
		HAPs	232.9			3,376.7	3609.6

1 Includes emissions from well pad and access road construction and associated traffic (see Tables B.1.1, B.1.2, B.1.3, and B.1.4), rig moving and drilling and associated traffic (see Tables B.1.10, B.1.11, and B.1.12).

2 Includes emissions from indirect heater (see Table B.2.3), separator heater (see Table B.2.4), dehydrator heater (see Table B.2.4), dehydrator flashing (see table B.2.6), fugitive HAP/VOC (see Table B.2.7), and traffic associated with full-field production (see Tables B.2.1 and B.2.2). Assumes 50% of condensate storage tanks are controlled and 50% are uncontrolled, and 25% of the dehydrators have BTEX control, and the remaining 75% have a pump limit (limits the amount of glycol that is re-circulated in the dehydration unit).

3 Assumes emissions include 250 drilling operations occurring during the year including 125 rigs with Tier 1 emission levels (see Table B.1.8) and 125 rigs with Tier 2 emission levels (see Table B.1.9). Emissions also include 50 completion flares (see Table B.1.12) operating during the year.

4 Assumes emissions include 75 drilling operations occurring during the year including 37 rigs with Tier 1 emission levels (see Table B.1.8) and 37 rigs with Tier 2 emission levels (see Table B.1.9). Emissions also include 15 completion flares (see Table B.1.12) operating during the year.

5 Assumes 20% of NO_x, SO_2, PM_{10} and $PM_{2.5}$ emissions from 250 drilling operations (50% straight, 50% directional) occurring during the year including 200 rigs with AP-42 (Tier 0) emission levels (see Tables B.1.7 and B.1.22) and 50 rigs with Tier 1 emission levels (see Tables B.1.8 and B.1.23), 50 completion flares (see Table B.1.12) operating during the year and from associated annual production (see Appendix G).

Table 2.4 EPA Tier 1-3 Nonroad Diesel Engine Emissions Standards (g/hp-hr)[1].

Engine Power	Tier	Year	CO	HC[2]	NMHC[3]+NOx	NO_x	PM[4]
175 <= hp < 300	Tier 1	1996	8.5	1.0	--	6.9	0.4
	Tier 2	2003	2.6	--	4.9	--	0.15
	Tier 3	2006	2.6	--	3.0	--	*
300 <= hp < 600	Tier 1	1996	8.5	1.0	--	6.9	0.4
	Tier 2	2001	2.6	--	4.8	--	0.15
	Tier 3	2006	2.6	--	3.0	--	*
600 <= hp < 750	Tier 1	1996	8.5	1.0	--	6.9	0.4
	Tier 2	2002	2.6	--	4.8	--	0.15
	Tier 3	2006	2.6	--	3.0	--	*
hp >= 750	Tier 1	2000	8.5	1.0	--	6.9	0.4
	Tier 2	2006	2.6	--	6.4	--	0.15
* - Not adopted, engines must meet Tier 2 PM standard.							

1 Data taken from www.diselnet.com/standards/us/offroad.html (9-15-2005), EPA emissions standards for nonroad diesel engines are published in 40 C.F.R. Part 89.
2 Total hydrocarbons
3 Non-methane hydrocarbons
4 Total particulate matter

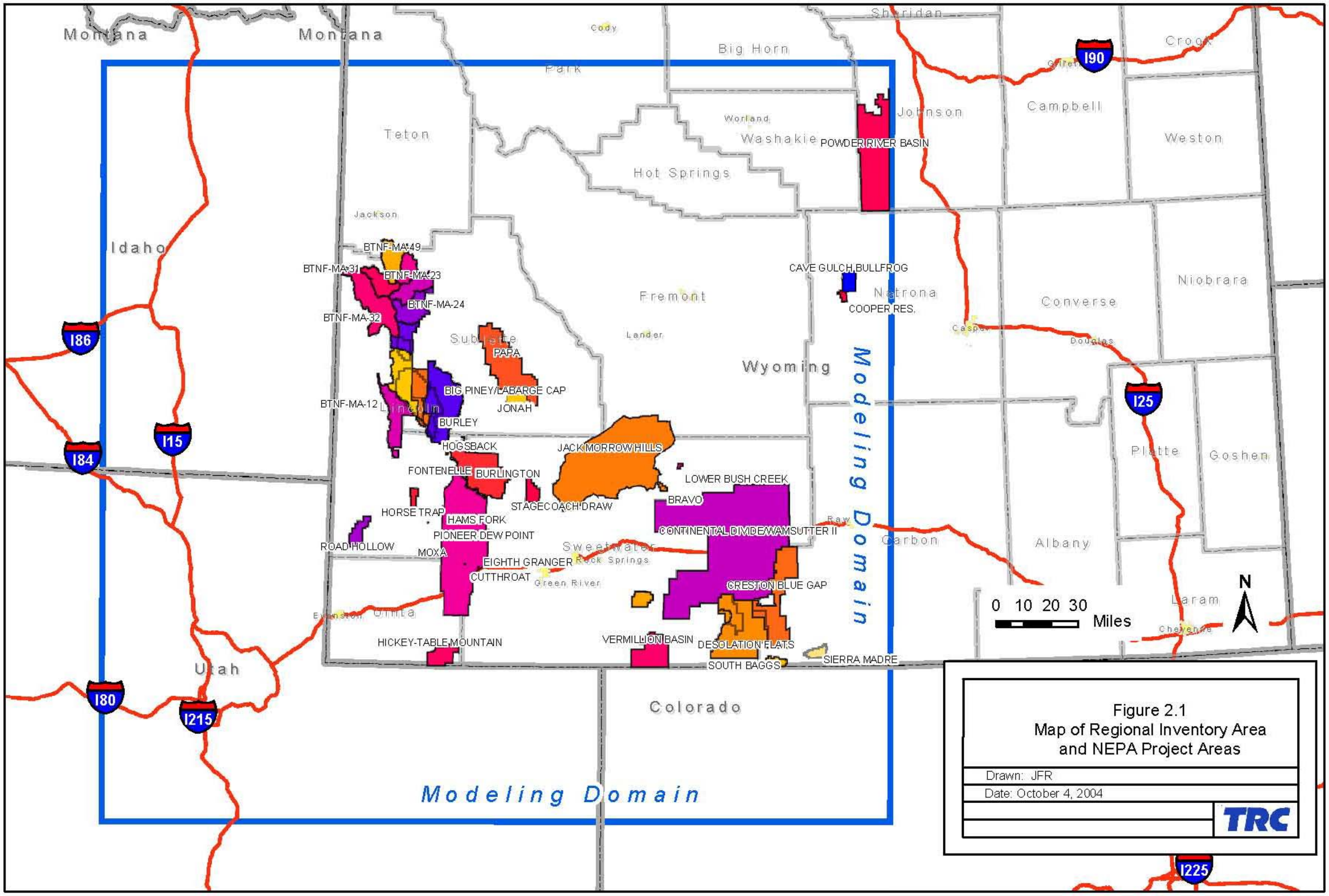
Production emissions were calculated based on the total number of producing wells in the field. Total producing wells were equal to the difference in number of wells proposed and the number of wells constructed per year. Annual emissions estimates for each project alternative for each year of field development are provided in Appendix B, Tables B.2.24 – B.2.26.

2.2 REGIONAL EMISSIONS INVENTORY

An emissions inventory of industrial sources within the JIDPA 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, 2001 through June 30, 2003) through state air quality regulatory agencies and state oil and gas permitting agencies were first 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 Forest Service 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.

Map 2.1 shows the regional inventory area with NEPA project areas, and a summary of the regional inventory is shown in Table 2.5. Values presented in Table 2.5 represent the change in emissions between the inventory start-date (January 1, 2001) and the inventory end-date (June 30, 2003).

The regional inventory, including methodologies used to compile the regional source emissions, are provided in Appendix C 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.



Map 2.1 Regional Inventory Area and Included NEPA Project Areas.

Table 2.5 Regional Inventory Summary of Emissions Changes from January 1, 2001 to June 30, 2003.

State	Source Category	Quantity of Sources	Emissions NO_x (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Colorado	State-permitted[1]	17	177.1	2.7	64.8	22.6
	RFFA	0	--	--	--	--
	RFD	0	--	--	--	--
	Excluded	203	--	--	--	--
Idaho	State-permitted[2]	17	568.4	(112.2)	61.6	61.6
	RFFA	0	--	--	--	--
	RFD	0	--	--	--	--
	Excluded	37	--	--	--	--
Utah	State-permitted[3]	126	2,619.9	47.1	424.5	424.1
	RFD	0	--	--	--	--
	RFFA	0	--	--	--	--
	Excluded	202	--	--	--	--
Wyoming	State-permitted[4]	34	733.5	1.0	8.3	8.3
	RFFA[5]	47	486.3	(1,407.0)	(1,282.8)	(586.6)
	RFD[6]	42	3,166.5	56.1	84.0	81.9
	Excluded	693	--	--	--	--
Total	State Permitted[7]	194	4,098.9	(61.4)	559.2	516.6
	RFFA	47	486.3	(1,407.0)	(1,282.8)	(586.6)
	RFD	42	3,166.5	56.1	84.0	81.9
	Excluded	1,135	--	--	--	--
Total Change		--	7,751.7	(1,412.3)	(639.6)	11.9

1 See Appendix C, Table C.1
2 See Appendix C, Table C.3.
3 Includes state-permitted oil and gas well emissions. See Appendix C, Tables C.5 and C.9.
4 Includes state-permitted oil and gas well emissions. See Appendix C, Tables C.7 and C.9.
5 See Appendix C, Table C.11.
6 See Appendix C, Table C.12.
7 Includes state-permitted oil and gas well emissions.

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}, $PM_{2.5}$, CO, NO_2, SO_2, and ozone [O_3]) and HAPs (BTEX, n-hexane, and formaldehyde) impacts that could occur within and near the JIDPA. 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 stake holders' group, including the EPA, USDA Forest Service, and WDEQ-AQD.

The EPA's proposed guideline dispersion model, AERMOD (version 02222), was used to assess near-field impacts of criteria pollutants PM_{10}, $PM_{2.5}$, CO, NO_2 and SO_2, and to estimate short-term and long-term HAP impacts. This version of AERMOD utilizes the PRIME building downwash algorithms which are the most recent "state of science" algorithms for modeling applications where aerodynamic building downwash is a concern. One year of JIDPA meteorology data was used with the AERMOD dispersion model to estimate these pollutant impacts. O_3 impacts were estimated from a screening methodology developed by Scheffe (1988) that utilizes NO_x and VOC emissions ratios to calculate O_3 concentrations. 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 JIDPA from project-related emissions sources for a range of scenarios to assure that the maximum near-field impacts were estimated. Impacts from scenarios considering 3,100 wells in production and at various well-spacing densities of 5, 10, 20, and 40 acres were modeled. Emissions from directional and straight drilling and construction of alternate well pads sizes of 3.8, 7.0, and 10.0 acres were evaluated.

3.2 METEOROLOGY DATA

One year of surface meteorological data, collected in the JIDPA from January 1999 through January 2000, was used in the analysis. A wind rose for these data is presented in Figure 3.1. The JIDPA 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 JIDPA 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 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.

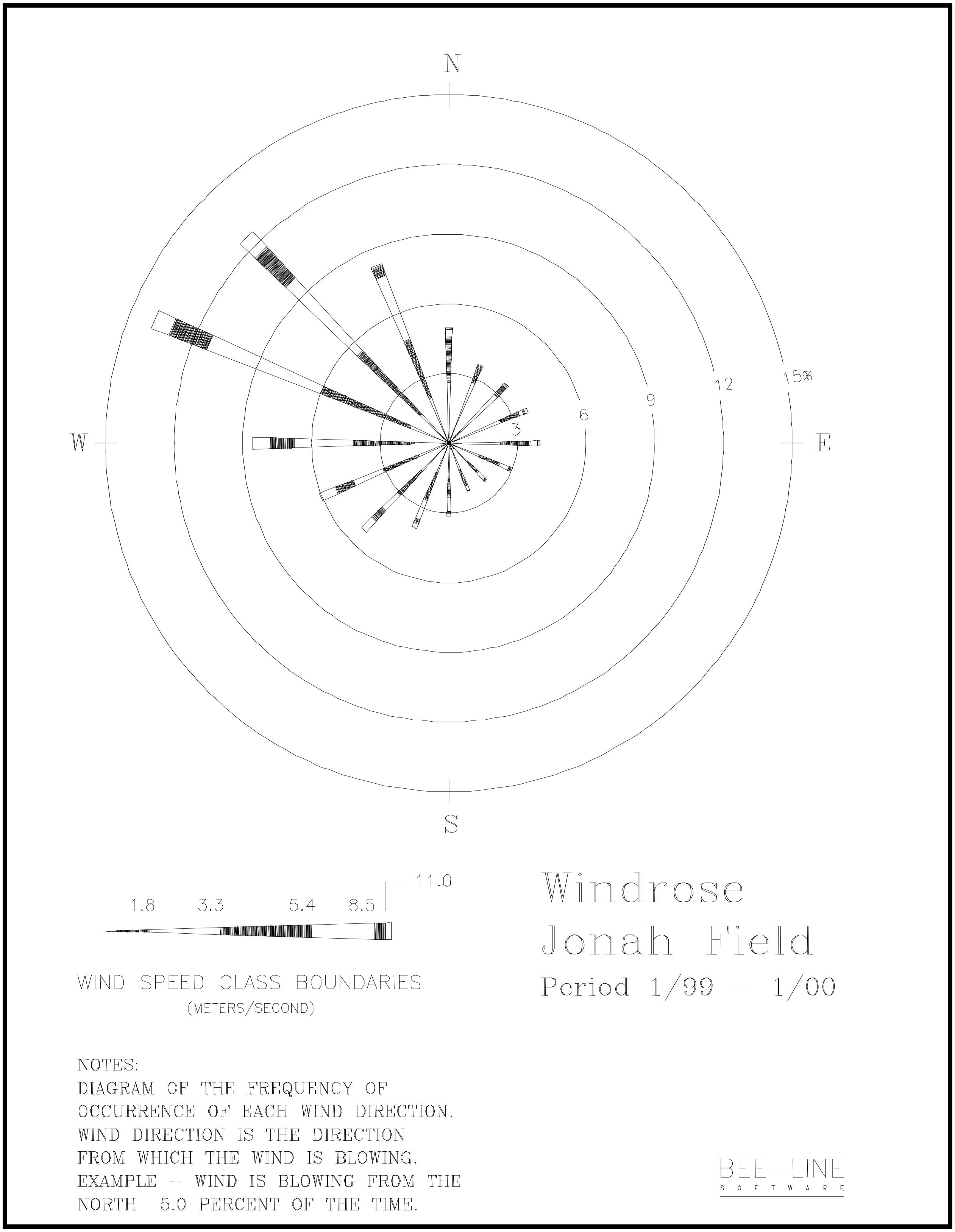


Figure 3.1 Wind Rose, Jonah Field, 1999.

Table 3.1 Near-Field Analysis Background Ambient Air Quality Concentrations (Micrograms per Cubic Meter [µg/m³]).

Pollutant	Averaging Period	Measured Background Concentration
CO[1]	1-hour	3,336
	8-hour	1,381
NO_2[2]	Annual	3.4
O_3[3]	1-hour	169
	8-hour	147
PM_{10}[4]	24-hour	33
	Annual	16
$PM_{2.5}$[4]	24-hour	13
	Annual	5
SO_2[5]	3-hour	132
	24-hour	43
	Annual	9

1 Data collected by Amoco at Ryckman Creek for an 8-month period during 1978-1979, summarized in the Riley Ridge EIS (BLM 1983).
2 Data collected at Green River Basin Visibility Study site, Green River, Wyoming, during period January-December 2001 (Air Resource Specialists [ARS] 2002).
3 Data collected at Green River Basin Visibility Study site, Green River, Wyoming, during period June 10, 1998, through December 31, 2001 (ARS 2002).
4 Data collected by WDEQ-AQD at Emerson Building, Cheyenne, Wyoming, Year 2001, second highest 24-hour concentrations. These data were determined by WDEQ-AQD to be the most representative co-located PM_{10} and $PM_{2.5}$ data available.
5 Data collected at LaBarge Study Area, 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}, $PM_{2.5}$, NO_2, SO_2, CO, and O_3 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
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[6]	--
Annual[4]	15	15[6]	--
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.
6 Standard not yet enforced in Wyoming.

The EPA's proposed guideline dispersion model, AERMOD, was used to model the near-field concentrations of PM_{10}, $PM_{2.5}$, CO, NO_2, and SO_2. AERMOD was run using one year of AERMET preprocessed JIDPA meteorology data following all regulatory default switch settings. Since PM_{10}/$PM_{2.5}$ emissions would be greatest during the resource road/well pad construction phase of field development, construction emissions sources were modeled to determine compliance with the PM_{10}/$PM_{2.5}$ WAAQS and NAAQS. Similarly, SO_2 emissions would be greatest from well drilling operations during construction. CO and NO_x emissions primarily from compressor stations would be greatest during well production.

O_3 impacts were estimated using the screening methodology developed by Scheffe (1988) which utilizes NO_x and VOC emissions ratios to calculate O_3 concentrations. NO_x and VOC emissions would be greatest during production activities, and these emissions were used to estimate O_3 impacts.

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. The impacts would be greatest at and immediately adjacent to their source and would decrease rapidly with distance. Three different approximate well pad sizes are proposed within the range of project alternatives; 3.8 acres, 7.0 acres, and 10.0 acres. Modeling scenarios were developed for each of these well pad sizes, with each scenario consisting of a well pad and a 2.5-mi resource road using the emissions estimates provided in Section 2.1. Model receptors were placed at 100-m intervals beginning 200 m from the edge of the well pad and road. Flat terrain was assumed for each modeling scenario. Figure 3.2 presents the configurations used to model each well pad and resource road scenario. Volume sources were used to represent emissions from well pads and roads. Hourly emission rate adjustment factors were applied to limit construction emissions to daytime hours. AERMOD was used to model each scenario 36 times, once at each of 36 10º rotations, to ensure that impacts from all directional layout configurations and meteorological conditions were assessed. Wind erosion emissions were modeled for all hours where the wind speed exceeded a threshold velocity defined by emissions calculations performed using AP-42 Section 13.2.5, Industrial Wind Erosion (EPA 2004).

Table 3.3 presents the maximum modeled $PM_{10}/PM_{2.5}$ concentrations, for each well pad 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 proposed standards for $PM_{2.5}$.

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

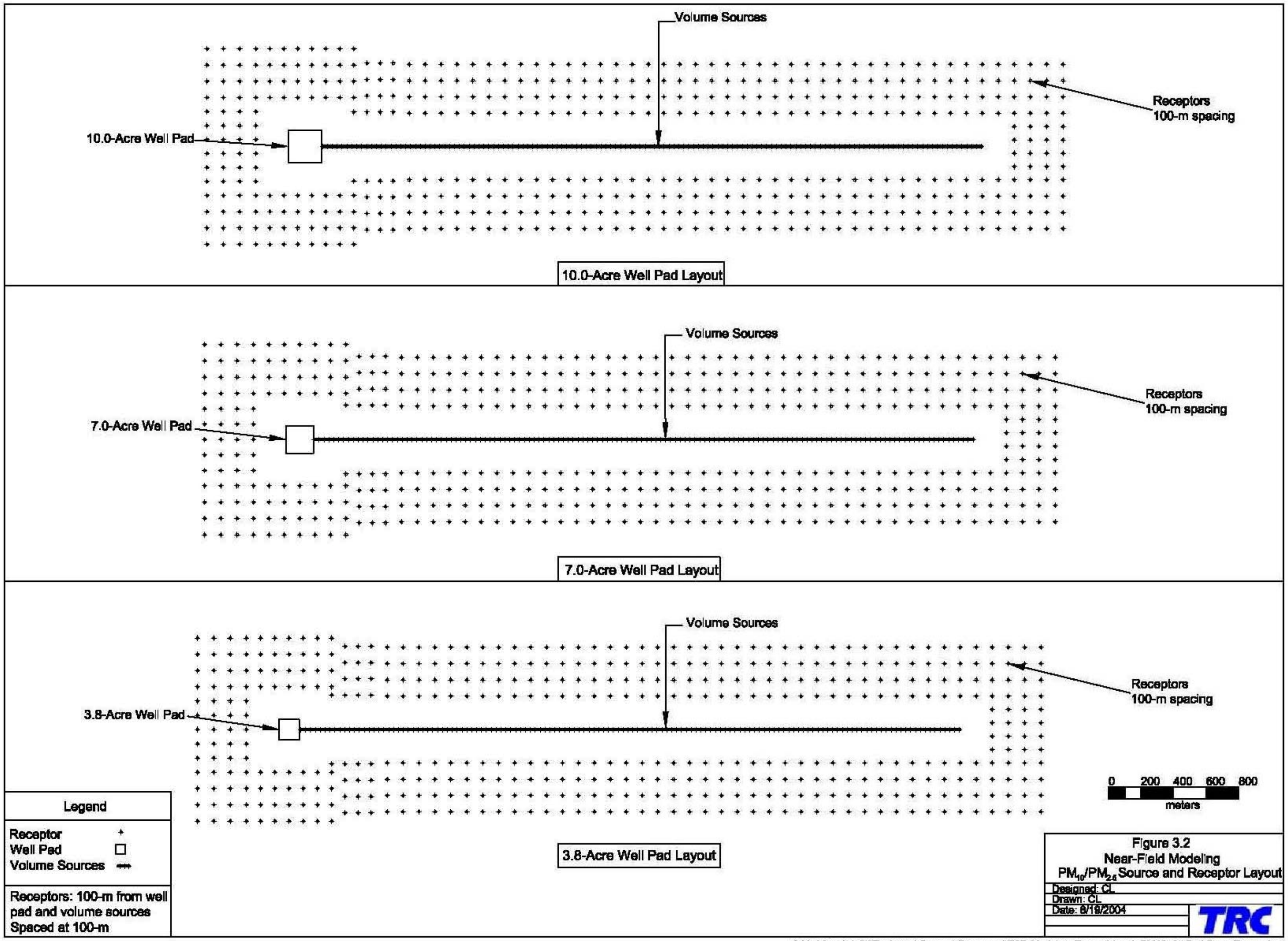


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Figure 3.2 Near-field Modeling PM_{10}/$PM_{2.5}$ Source and Receptor Layout.

Table 3.3 Maximum Modeled PM_{10}/$PM_{2.5}$ Concentrations, Jonah Infill Drilling Project.

Scenario	Pollutant	Averaging Time	Direct Modeled (μg/m³)	Background (μg/m³)	Total Predicted (μg/m³)	WAAQS (μg/m³)	NAAQS (μg/m³)
3.8-acre pad	PM_{10}	24-Hour	74.1	33	107.1	150	150
		Annual	3.4	16	19.4	50	50
	$PM_{2.5}$	24-Hour	27.0	13	40.0	65	65
		Annual	1.3	5	6.3	15	15
7-acre pad	PM_{10}	24-Hour	94.0	33	127.0	150	150
		Annual	4.7	16	20.7	50	50
	$PM_{2.5}$	24-Hour	31.0	13	44.0	65	65
		Annual	1.6	5	6.6	15	15
10-acre pad	PM_{10}	24-Hour	102.1	33	135.1	150	150
		Annual	5.6	16	21.6	50	50
	$PM_{2.5}$	24-Hour	32.2	13	45.2	65	65
		Annual	1.8	5	6.8	15	15

3.4.2 SO_2

Emissions from construction drilling operations would result in maximum SO_2 concentrations of all other project phases. Both straight well drilling and directional well drilling are proposed as part of the project. Therefore, modeling scenarios were developed that included a drilling rig at the center of a pad, with model receptors placed along 100-m intervals, 100 m from the drilling engines, for both straight and directional drilling operations. Drilling rigs were modeled as point sources, with aerodynamic building downwash from the rig structure. Figure 3.3 illustrates the modeling configuration used for drilling rig SO_2 emissions.

AERMOD was used to model drilling rig SO_2 emissions for both straight and directional drilling operations. The maximum predicted concentrations are provided in Table 3.4. The modeled SO_2 impacts, when added to representative background concentrations, are below the applicable standards. 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, Jonah Infill Drilling 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 ($\mu g/m^3$)
Straight Drilling	SO_2	3-Hour	103.8	132	235.8	1,300	1,300
		24-Hour	36.7	43	79.7	260	365
		Annual	5.2	9	14.2	60	80
Directional Drilling	SO_2	3-Hour	128.3	132	260.3	1,300	1,300
		24-Hour	45.3	43	88.3	260	365
		Annual	6.4	9	15.4	60	80

3.4.3 NO_2

Emissions from production activities (well site and compression) would result in the maximum near-field NO_2 concentrations. Analyses were performed to quantify the maximum NO_2 impacts that could occur within and nearby the JIDPA using the emissions from existing in-field compressor station and well emissions, anticipated future compression expansions, and proposed project alternatives. Proposed well emissions include those from well site heaters, truck traffic, and from a water disposal well engine. Although no increases to compression are proposed as part of the project, anticipated future compression expansions were obtained from the gas transmission companies that operate within the region and were considered in the modeling analyses. Anticipated future compression expansions were provided for the Bird Canyon, Falcon, Gobblers Knob, Jonah, Luman, and Paradise compressor stations. Bird Canyon, Falcon, Luman, and Jonah are primarily associated with the Jonah Field, whereas Gobblers Knob and Paradise are considered part of the Pinedale Anticline Project.

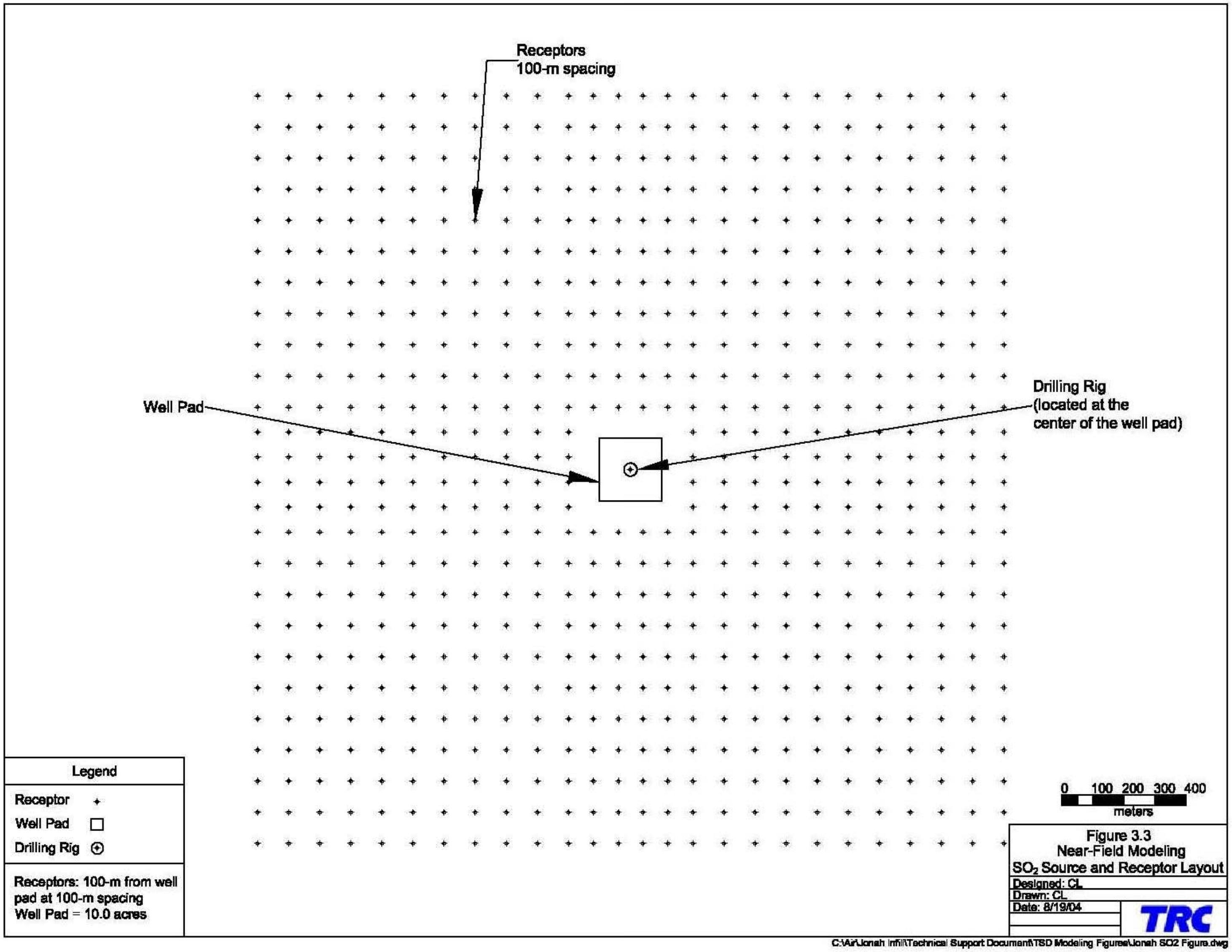

Figure 3.3 Near-field Modeling SO_2 Source and Receptor Layout.

Two modeling analyses were performed to estimate near-field NO_2 concentrations. Scenario 1 utilized compressor emissions from the proposed compressor station expansions within the Jonah Field in combination with well emissions from the Proposed Action and alternative expansions of 3,100 wells. Scenario 2 utilized the projected compression expansions proposed within the Jonah and Pinedale Anticline fields, well site heater emissions from 198 wells developed in the JIDPA since January 2002, well site emissions from 3,100 proposed wells and an inventory of existing regional compressor station emissions provided by the WDEQ-AQD. A WDEQ-AQD regional compressor station inventory has historically been required for use in ambient air quality compliance demonstrations performed under WDEQ-AQD guidance. The modeled impacts from the first analysis are reported as the maximum predicted direct impacts from the Proposed Action and alternatives, and results of the second analysis are representative of near-field cumulative impacts, since they include contributions from additional regional emissions. This near-field cumulative analysis is presented to further demonstrate regional compliance with ambient air quality standards and comparison to PSD increments.

Figure 3.4 illustrates all components of modeled Scenarios 1 and 2, above. NO_x emissions provided in Section 2.1.2 for well site heaters and truck tail pipe emissions were modeled using 1-km-spaced area sources placed throughout the JIDPA. Emissions scalars were used to adjust the heater emissions for seasonal variations. Point sources were used for modeling all compressor station emissions and water disposal well emissions. The compressor station emissions and modeling parameters utilized in near-field NO_x modeling Scenarios 1 and 2 are provided in Appendix D.

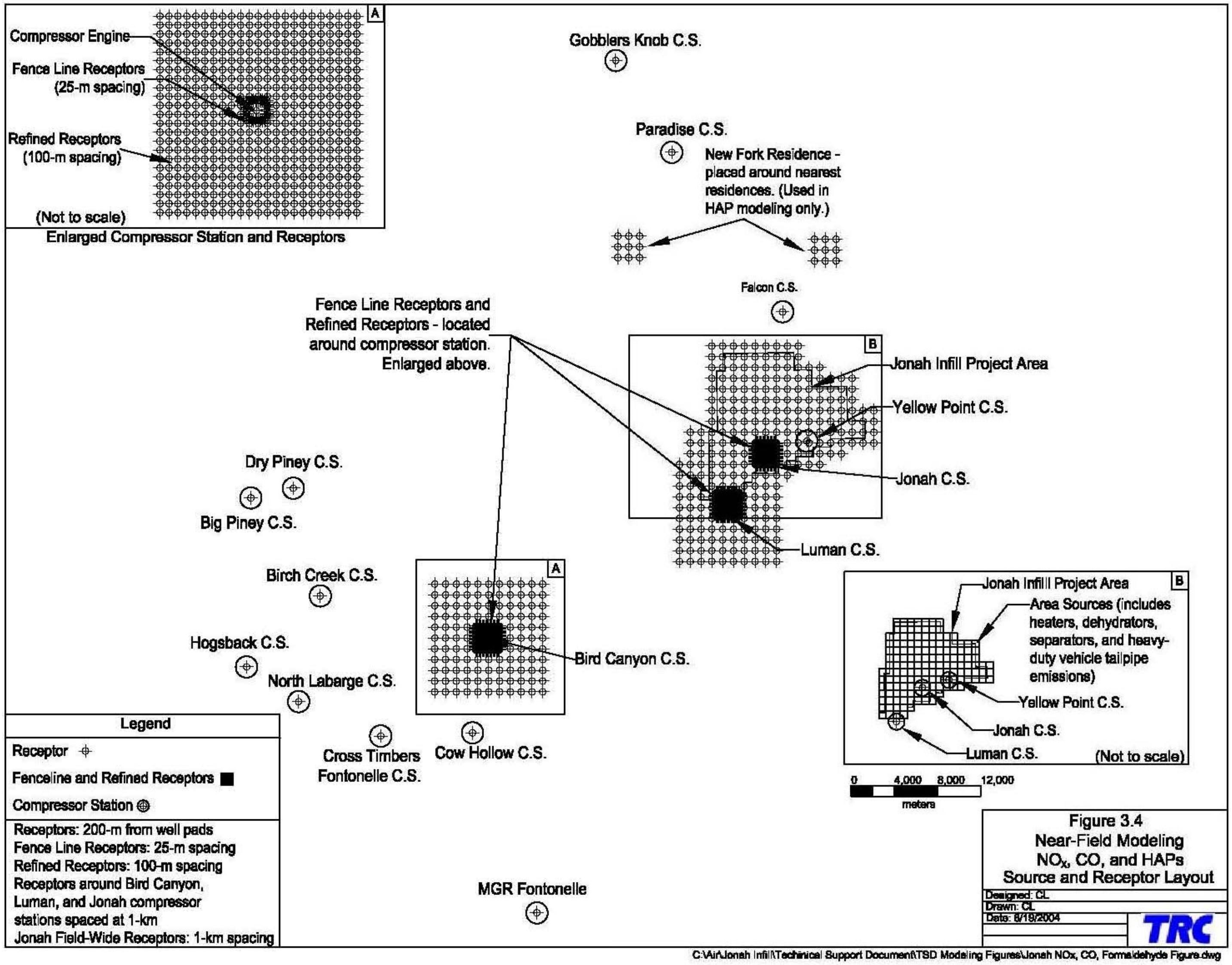

Figure 3.4 Near-field Modeling NO_x, CO, and HAPs Source and Receptor Layout.

Refined receptor grids were placed around the Bird Canyon, Jonah, and Luman compressor stations, which are the largest compressor stations associated with the Jonah Field operations. Model receptors were placed at 25-m intervals along the fence lines of these compressor stations and at 100-m intervals from the fence lines out to 2 km, and at 1-km intervals between 2 km and 5 km from the fence lines of the Bird Canyon and Luman compressor stations, and at 1-km intervals throughout the JIDPA. AERMAP was used to determine receptor height parameters from digital elevation model (DEM) data. Aerodynamic building downwash parameters were considered for each compressor station.

The AERMOD model was used to predict maximum NO_x impacts for modeled Scenario 1 (direct project impacts) and modeled Scenario 2 (cumulative impacts). The maximum modeled concentrations occurred near the Luman compressor station, near the southwest end of the JIDPA. 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, direct modeled NO_2 concentrations from both project sources and from cumulative sources are below the PSD Class II Increment for NO_2. In addition, when these NO_2 impacts are combined with representative background NO_2 concentrations, they are below the applicable WAAQS and NAAQS.

Table 3.5 Maximum Modeled Annual NO_2 Concentrations, Jonah Infill Drilling Project.

Scenario	Pollutant	Direct Modeled ($\mu g/m^3$)	PSD Class II Increment[1] ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Predicted ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
Scenario 1, Project Alone, 3,100 Wells	NO_2	6.8	25	3.4	10.2	100	100
Scenario 2, Cumulative Sources, 3,100 Wells	NO_2	18.9	25	3.4	22.3	100	100

[1] The PSD demonstrations serve information purposes only and do not constitute a regulatory PSD increment consumption analysis.

3.4.4 CO

Maximum CO emissions would occur from the same production activities (well site and compression) that result in maximum NO_2 impacts. The modeling scenarios used to model NO_2 impacts were also used to determine maximum CO direct project and cumulative impacts (see Figure 3.4).

AERMOD was used to predict maximum CO impacts for model Scenario 1 (direct project impacts) and model Scenario 2 (cumulative impacts). 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, Jonah Infill Drilling 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)
Scenario 1, Project Alone, 3,100 Wells	CO	1-Hour	425.3	3,336	3,761.3	40,000	40,000
		8-Hour	113.5	1,381	1,494.5	10,000	10,000
Scenario 2, Cumulative Sources, 3,100 Wells	CO	1-Hour	459.1	3,336	3,795.1	40,000	40,000
		8-Hour	266.0	1,381	1,647.0	10,000	10,000

3.4.5 O_3

O_3 is formed in the atmosphere as a result of photochemical reactions involving ambient concentrations of NO_2 and VOCs. Because of the complex photochemical reactions necessary to form O_3, compliance with ambient air quality standards cannot be determined with conventional dispersion models. The models that are available for estimating ozone formation are applicable for urban areas where high temperature, summertime, stagnant conditions can persist and are conducive to ozone formation. In rural southwest Wyoming, these meteorological conditions are not typical and therefore an estimation of the ozone formation was made using a nomograph developed from the Reactive Plume Model (Scheffe 1988) to predict maximum ozone impacts for rural areas. This screening methodology utilizes NO_x and VOC emissions ratios to estimate ozone concentrations.

NO_x and VOC emissions are greatest during production activities and these emissions were used to estimate O_3 impacts. Emissions from a 1-mi^2 "patch" of 128 wells, which is the maximum proposed project well density (128 wells per mi^2; 5-acre spacing) and the projected maximum emissions from the Jonah compressor station were used. This scenario was selected since the Jonah station is the largest compressor station and the largest NO_x source within the JIDPA. The emissions assumed for the Jonah station were 81.3 and 55.2 tons per year (tpy) of NO_x and VOC, respectively, and these emissions include anticipated future compression expansion. The emissions used for the 128 well section were 5.8 tpy NO_x and 2,378.7 tpy VOC. The well emissions estimates incorporate control assumptions provided from the field operators for wells operating in the JIDPA, which estimate that 50 percent of the well site storage tanks have VOC control, and that 25 percent of the well site dehydrators have BTEX control and 75 percent are controlled with a pump limit (limits the amount of glycol that is re-circulated in the dehydration unit). The ratio of total VOC emissions to total NO_x emissions is 2,433.9:87.1 or 28.0. At this ratio, the estimated maximum potential 1-hour O_3 concentration is 0.040 parts per million (ppm) or 78.2 micrograms/cubic meter ($\mu g/m^3$). Using EPA's recommended screening conversion factor of 0.7 to convert 1-hour concentrations to 8-hour values (EPA 1977), the predicted 8-hour O_3 concentration is 54.7 $\mu g/m^3$. Predicted maximum O_3 impacts are summarized in Table 3.7.

The maximum O_3 impacts shown in Table 3.7 represent the amount of O_3 that could potentially form within and nearby the JIDPA as a result of the ratio of direct project emissions of NO_x and VOC. Direct modeled concentrations shown in Table 3.7 were added to average hourly background O_3 conditions monitored as part of the Green River Basin Visibility Study (ARS 2002) during the period June 10, 1998, through December 31, 2001. This value 75.2 $\mu g/m^3$ is slightly higher than the background O_3 concentration of 62.6 $\mu g/m^3$ used in the RPM modeling to derive the Scheffe nomograph. The highest, second highest O_3 concentrations measured over the monitoring period of record, shown in Table 3.1, were not added to the concentrations estimated with the Scheffe method since it is overly conservative to add a maximum concentration to a screening level estimated concentration. O_3 formation is a complex atmospheric chemistry process that varies greatly due to meteorological conditions and the presence of ambient atmospheric concentrations of many chemical species. Adding NO_x and VOC emissions to the ambient air, where some amount of O_3 has already formed, is not necessarily an indication that the potential for ozone formation has increased. In fact, it could decrease, since the ambient background conditions that caused O_3 formation have changed, and the new mixture of chemical species in the atmosphere may not be conducive to O_3 formation. In addition, the concentrations shown in Table 3.7 are likely overestimates of the actual O_3 impacts that would occur, since the Reactive Plume Model nomograph used to derive these estimates was developed using meteorological conditions (high temperatures and stagnant conditions) more conducive to forming O_3 than the conditions found in southwestern Wyoming.

Table 3.7 Maximum Modeled O_3 Concentrations, Jonah Infill Drilling Project.

Pollutant	Averaging Time	Direct Modeled (μg/m^3)	GRBVS Average 1-hour Background (μg/m^3)	Total Predicted (μg/m^3)	WAAQS (μg/m^3)	NAAQS (μg/m^3)
O_3	1-Hour	78.2	75.2	153.4	235	235
	8-Hour	54.7	75.2	129.9	157	157

3.5 HAP IMPACT ASSESSMENT

AERMOD was used to determine HAP impacts in the immediate vicinity of the JIDPA emission sources for short-term (acute) exposure assessment and at the nearest residences to the JIDPA for calculation of long-term risk. Sources of HAPs include well-site fugitive emissions (BTEX and n-hexane), completion flaring and venting (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. Short-term exposure assessments were performed for production HAP emissions using various well densities, and for an individual well construction completion (venting and flaring) event.

Four modeling scenarios were developed for modeling short-term (1-hour) HAPs (BTEX, and n-hexane) from well-site fugitive emissions. These scenarios were developed to represent the complete range of well densities proposed for the Proposed Action and alternatives. The scenarios include one-section areas (1 mi^2), with wells at 5-, 10-, 20-, and 40-acre surface spacing. These modeling scenarios represent well densities of 128, 64, 32, and 16 wells per section, respectively. The purpose of modeling this range of well densities was to determine the maximum HAP short-term (1-hour) impacts that could occur within and near the JIDPA. Volume sources were used for modeling the well-site fugitive HAP emissions. The HAP emissions for wells with uncontrolled VOC emissions were used. Flat terrain receptors were spaced evenly and at a minimum distance of 100 m from a well throughout each section. The source and receptor layouts utilized for the short-term HAP modeling are presented in Figure 3.5.

A single scenario was developed for modeling long-term (annual) fugitive HAP emissions. This scenario utilized the same 1-km spaced area sources placed throughout the JIDPA that were used for modeling NO_x emissions from well site heaters (see Section 3.4.3 and Figure 3.4). Fugitive HAP model runs were performed for 3,100 wells in production. Field-wide emissions scenarios were developed using the individual well emissions provided in Section 2.2, assuming 50% of condensate storage tanks are equipped with a control device and 25% of dehydrators are equipped with a control device. Receptor grids (3 x 3) using 1-km spacing were placed at the nearest residential locations along the New Fork River north of the JIDPA (see Figure 3.4). Receptor elevations were determined from U.S. Geological Survey (USGS) DEM data using AERMAP.

For modeling 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. Formaldehyde emissions from anticipated future compression expansions at the Bird Canyon, Falcon, Gobblers Knob, Jonah, Luman, and Paradise compressor stations were modeled in combination with emissions from the WDEQ-AQD inventory of existing regional compressor stations. These emissions are provided in Appendix D. Modeled Scenarios 1 and 2 were analyzed as described in Section 3.4. The modeling parameters and receptor grids developed for the NO_x and CO impacts analyses and the receptor grids at the nearest residential locations along the New Fork River were utilized for modeling formaldehyde impacts. Long-term impacts are reported for the residential receptor locations. The source and receptor layout for modeling formaldehyde impacts is presented in Figure 3.4.

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 2002). Modeled short-term HAP concentrations are compared to REL and IDLH values in Table 3.8. As shown in Table 3.8 the maximum predicted short-term HAP impacts within and near the JIDPA would be below the REL or IDLH values under all project alternatives.

Table 3.8 Maximum Modeled 1-Hour HAP Concentrations, Jonah Infill Drilling Project.

	Direct Modeled Concentration by Modeling Scenario ($\mu g/m^3$)				REL or IDLH[1] ($\mu g/m^3$)
HAP	5-Acre Spacing	10-Acre Spacing	20-Acre Spacing	40-Acre Spacing	
Benzene	996	566	590	309	1,300[2]
Toluene	1,994	1,132	1,181	619	37,000[2]
Ethylbenzene	109	62	64	34	35,000[3]
Xylene	1,085	616	643	337	22,000[2]
n-Hexane	536	304	317	166	39,000[3]
	Project Alone	Cumulative Sources			
Formaldehyde	22.1	31.9	--	--	94[2]

1 EPA (2002).
2 Reference Exposure Level
3 Immediately Dangerous to Life or Health value divided by 10.

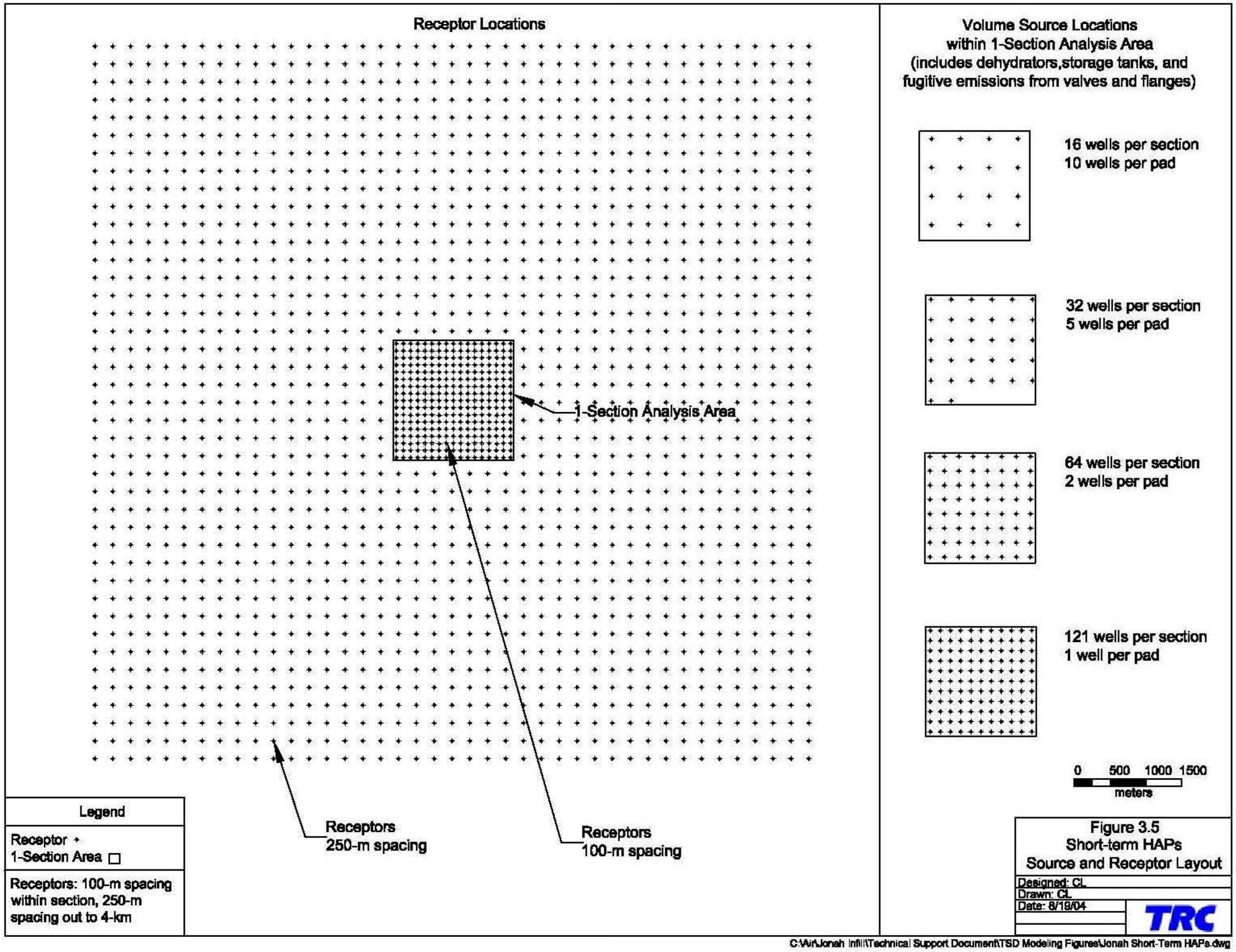

Figure 3.5 Short-term HAPs Source and Receptor Layout.

Additional modeling analyses with AERMOD were performed to quantify the maximum short-term HAP (BTEX and n-hexane) concentrations that could potentially occur from well site completion venting and flaring. For wells that require these activities, it is estimated that venting operations could last up to 4 hours and flaring could last up to 80 hours. A single volume source was used for modeling completion venting and a single point source was used for modeling flaring. 100-m spaced receptors beginning at a distance of 100 m from each source were used. The results of these modeling analyses indicated that from flaring operations, short-term HAP concentration would be below the REL or IDLH values. From venting operations short-term benzene concentrations could potentially exceed the thresholds within 500 meters of a completion venting operation; however, all other HAP concentrations would be below the REL or IDLH.

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 2002). The maximum predicted annual HAP concentrations at the nearest residential area are compared to the corresponding non-carcinogenic RfC in Table 3.9.

As shown in Table 3.9 the maximum predicted long-term (annual) HAP impacts at the nearest residence locations along the New Fork River would be below the RfCs for all alternatives. In addition, formaldehyde impacts at the nearest residence are shown to be below the RfC thresholds when project source impacts are combined with regional source impacts.

Table 3.9 Maximum Modeled Long-term (Annual) HAP Concentrations, Jonah Infill Drilling Project.

HAP	Direct Modeled Concentration at Nearest Residence by Modeling Scenario (μg/m³)		Non-carcinogenic RfC[1] (μg/m³)
Benzene	0.85		30
Toluene	1.73		400
Ethylbenzene	0.09		1,000
Xylene	0.93		430
n-Hexane	0.35		200
	Project Alone	Cumulative Sources	
Formaldehyde	0.003	0.02	9.8

1 EPA (2002).

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 x 10^{-6} to 1 x 10^{-4} 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 50 years (i.e., the LOP), corresponding to an adjustment factor of 50/70 = 0.71. 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 (0.71 x 1.0) = 0.71.

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 3.10. 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 x 10^{-6}. Under the MEI analyses, the incremental risk for formaldehyde is less than 1 x 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 x 10^{-6} to 1 x 10^{-4} as stated by EPA (EPA 1999).

Table 3.10 Long-term Modeled MLE and MEI Cancer Risk Analyses, Jonah Infill Drilling Project.

Modeling Scenario	Analysis	HAP Constituent	Modeled Concentration (μg/m^3)	Unit Risk Factor 1/(μg/m^3)	Exposure Adjustment Factor	Cancer Risk
3,100 Wells	MLE	Benzene	0.85	7.8 x 10^{-6}	0.0949	0.63 x 10^{-6}
		Formaldehyde	0.02	1.3 x 10^{-5}	0.0949	0.02 x 10^{-6}
Total Combined						0.6 x 10^{-6}
3,100 Wells	MEI	Benzene	0.85	7.8 x 10^{-6}	0.71	4.73 x 10^{-6}
		Formaldehyde	0.02	1.3 x 10^{-5}	0.71	0.18 x 10^{-6}
Total Combined[1]						4.9 x 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 MID-FIELD AND FAR-FIELD ANALYSES

The purpose of the mid-field and far-field analyses were to quantify potential air quality impacts on Class I and 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 Class II areas and at several mid-field PSD Class II areas. The PSD Class I areas and sensitive Class II areas analyzed are shown on Map 1.2 and include:

- the Bridger Wilderness Area (Class I);
- the Fitzpatrick Wilderness Area (Class I);
- the Popo Agie Wilderness Area (Class II);
- the Wind River Roadless Area (Class II)
- Grand Teton National Park (Class I);
- the Teton Wilderness Area (Class I);
- Yellowstone National Park (Class I); and
- the 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 mid-field analysis assessed direct project and regional source impacts at in-field locations within the JIDPA and other mid-field locations defined as Class II areas (regional communities) (see Map 1.2), which include the Wyoming communities of:

- Big Piney;
- Big Sandy;
- Boulder;
- Bronx;
- Cora;
- Daniel;
- Farson;
- La Barge;
- Merna; 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 5.53, Level 030709, and CALPUFF Version 5.711, Level 030625) was used for the mid-field and far-field modeling analyses. The CALMET meteorological model was used to develop wind fields for a year of meteorological data (1995) and the CALPUFF dispersion model combined these wind fields 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 1.2.

The CALMET and CALPUFF models were utilized in this analysis generally 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).

The CALMET wind fields developed for this analysis follow the CALMET methodologies established as part of the Southwest Wyoming Technical Air Forum (SWWYTAF) for southwest Wyoming, and were further enhanced through the use of additional meteorological datasets and revised CALMET model code.

4.2 PROJECT ALTERNATIVE MODELING SCENARIOS

Modeling scenarios were developed for the proposed project development scenarios including the Proposed Action, Alternative A, Alternative B and the Preferred Alternative. The Proposed Action, and Alternatives A and B, and the Preferred Alternative are proposals for 3,100 new wells. Development rates considered both straight and directional drilling operations and are generally consistent with the proposed project alternatives.

Maximum field-wide emissions scenarios were determined for each alternative and reflect the last year of field development, at the maximum WDR, combined with nearly full-field production.

An additional field-wide emissions scenario was developed which assumes only full-field development (i.e., maximum field-wide productions emissions from 3100 wells).

The maximum emissions scenarios conservatively assume that both production emissions (producing wellsites and operational ancillary equipment including compressor stations) and construction emissions (drilling rigs and pit flaring operations) occur simultaneously throughout the year. These modeling scenarios assumed the maximum field emissions, which could potentially occur concurrently, during a 24-hour (1-day) period. While not specifically proposed as a project feature, anticipated future compression expansions for the Bird Canyon, Falcon, Jonah, and Luman compressor stations were included in the field-wide emissions scenarios since it was known that these stations would require expansion to accommodate the additional natural gas production from the project in combination with other regional projects. Future compression in the field was assumed to operate at 90% of fully permitted capacity, which compression station operators indicated was a reasonable assumption based on field operation expectations. The WDR250 case assumed 20 drilling rigs and 3 pit flares operating continuously throughout the year and WDR75 assumed 6 drilling rigs and 1 pit flare.

Development rates considered both straight and directional drilling operations generally consistent with the proposed project alternatives. The Proposed Action and Alternative A assume all straight drilling. Alternative B assumes all directional drilling, and the Preferred Alternative assumes 50% straight drilling and 50% directional drilling.

The maximum field-wide emissions scenarios are summarized in Table 4.1 for the Proposed Action and Alternatives A and B, and the Preferred Alternative. The emissions for these scenarios assume continuous operation of drill rigs and completion flaring throughout the year and therefore are not comparable to annual field wide emissions estimates provided in Table 2.3 or in Appendix B. The emissions used to develop these field-wide scenarios are described in Chapter 2.0.

Table 4.1 Summary of Maximum Modeled Field-Wide Emissions (tpy), Jonah Infill Drilling Project, Sublette County, Wyoming[1].

Emissions	Maximum Production (3100 wells)	Proposed Action and Alternative A	Alternative B	Preferred Alternative[6]
Production Emissions				
Wells[1]				
NO_x	140.6	129.2	137.2	25.8
SO_2	0.0	0.0	0.0	0.0
PM_{10}	26.9	24.7	26.3	4.9
$PM_{2.5}$	26.9	24.7	26.3	4.9
Traffic[2]				
NO_x	26.0	23.9	25.4	4.8
SO_2	0.7	0.7	0.7	0.1
PM_{10}	709.2	652.0	692.0	130.4
$PM_{2.5}$	107.8	99.1	105.2	19.8
Compression[3]				
NO_x	211.0	211.0	211.0	42.2
SO_2	0.0	0.0	0.0	0.0
PM_{10}	0.0	0.0	0.0	0.0
$PM_{2.5}$	0.0	0.0	0.0	0.0
Construction Emissions				
Well Drilling				
NO_x	--	843.2	313.1	484.3
SO_2	--	27.2	10.0	32.4
PM_{10}	--	47.3	17.6	93.0
$PM_{2.5}$	--	47.3	17.6	93.0
Traffic[4]				
NO_x	--	13.5	4.1	2.7
SO_2	--	0.4	0.1	0.1
PM_{10}	--	225.1	67.5	45.0
$PM_{2.5}$	--	34.5	10.3	6.9
Flaring[5]				
NO_x	--	406.9	135.6	81.4
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

Table 4.1 (Continued)

Emissions	Maximum Production (3100 wells)	Proposed Action and Alternative A	Alternative B	Preferred Alternative[6]
Total Emissions				
NO_x	377.6	1,627.7	826.4	641.2
SO_2	0.7	28.3	10.8	32.6
PM_{10}	736.1	949.1	803.4	273.4
$PM_{2.5}$	134.1	205.6	159.4	124.7

1 Includes emissions from indirect heater, separator heater, and dehydrator heater.
2 Includes emissions from all traffic associated with full field production. Emissions calculations assume 20 wells can be visited per day.
3 Includes emissions from the following compressor stations: Bird Canyon, Luman, Falcon, and Jonah, and the Jonah water disposal well engine.
4 Includes emissions from all traffic associated with simultaneous drilling operations.
5 Includes emissions from "completion/testing" flares operating continuously during the year.
6 Includes emissions from Preferred Alternative Mitigation Analysis (80 % Emissions Reduction Scenario) (see Appendix G, Section G-2.3).

4.3 METEOROLOGICAL MODEL INPUT AND OPTIONS

CALMET was used to develop wind fields for the study area shown in Map 1.2. Model domain extent was selected based on available refined mesoscale meteorological model (MM5) data from the SWWYTAF study and the locations of the PSD Class I and sensitive Class II Wilderness areas that were selected for air quality analyses.

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 (-108.55°/42.55°) and first and second latitude parallels at 30° and 60°. The modeling grid consisted of 116 x 112 4-km grid cells that cover the project area and all analyzed Class I and sensitive Class II areas. The total area of the modeling domain is 288 x 278 mi (464 x 448 km). Ten vertical layers were used, with heights of 20, 40, 100, 140, 320, 580, 1,020, 1,480, 2,220, and 2,980 m.

The CALMET analysis utilized the MM5 data, (which was processed at a 20-km horizontal grid spacing), data from 55 surface meteorological stations and 155 precipitation stations, and four 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. Listings of the surface and upper air meteorological stations, and the precipitation stations that were used in this analysis are provided in Appendix E. The CALMET model was run following control switch settings that were developed as part of SWWYTAF to develop the one-year (1995) wind field data set, with the exception of the IKINE switch setting. The CALMET wind fields were developed using the IKINE "kinematic effects" CALMET switch setting option. The switch setting was originally selected based on peer review of the SWWYTAF wind fields, which indicated that surface wind speeds from CALMET were underestimated. The use of IKINE produced better agreement with surface wind observations. In addition, since the JIDPA is approximately 30 km from the Bridger Wilderness, the use of terrain was justified as "best science" to more appropriately model terrain effects. Subsequent peer review has indicated that this switch setting produced unrealistically high wind speeds in layer 2 of the wind field (first layer above the surface layer) for various hours during the year.

The modeling domain extended as far north as possible given the available refined MM5 data. The IWAQM guidance for CALMET/CALPUFF 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. Because the area of Yellowstone National Park included in the modeling is along the boundary of the modeling domain, and the northern portions of Grand Teton National Park, and the Teton and Washakie Wilderness Areas are less than 50 km from the modeling grid boundary, the recirculation wind patterns may not be completely resolved by CALMET in those areas. However, because the direct wind flow patterns that could transport potential project and regional source emissions to these areas are fully characterized in the modeling domain, any potential impacts from project sources in these areas should be fully captured.

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 O_3 data, for the meteorology 1995 modeling year, were available for six stations within the modeling domain:

- Pinedale, Wyoming,
- Centennial, Wyoming,
- Yellowstone National Park, Wyoming,
- Craters of the Moon National Park, Idaho,
- Highland, Utah, and
- Mount Zirkel Visibility Study, Hayden, Colorado.

Hourly O_3 data from these stations was used in the CALPUFF modeling, with a default value of 44.7 parts per billion (ppb) (7 a.m.-7 p.m. mean) used 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

Input to CALPUFF were model receptors at which the concentration, deposition, and AQRV impacts were calculated. Receptors were placed along the boundaries of all Class I and other sensitive areas at 2-km spacing, and within the boundaries of these areas on a 4-km Cartesian grid. Discrete receptors were placed on a Cartesian grid at 1-km spacing within the JIDPA. Individual receptor points were determined for each of the seven acid-sensitive lakes. Grids of at least 3 x 3 1-km spaced receptors were used for modeling each of the mid-field Wyoming communities. Receptor elevations for all sensitive Class I and Class II areas were determined from 1:250,000 scale USGS DEM data. Elevations for the sensitive lake receptors were derived from 7.5-minute USGS topographical maps. All model receptors utilized in the mid-field and far-field analyses are shown in Figures 4.1 and 4.2.

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 compressor stations, drilling rigs, pit flares, and water disposal well engines. Additionally, 148 1-km^2 area sources at 1-km spacing were placed throughout the JIDPA to idealize well site heater, vehicle traffic, and wind erosion emissions. Locations of Jonah Field compressor stations with anticipated future expansions are shown in Figure 4.3. Compressor station emissions and modeled parameters are provided in Appendix D. Parameters used in modeling the drilling rigs, pit flares, water disposal well, and wind erosion are given in Appendix B and illustrated in Figure 4.4. Field-wide emissions from well heaters and traffic for each project alternative are summarized in Section 4.2. Monthly emissions scalars were used to adjust the heater emissions for seasonal variations.

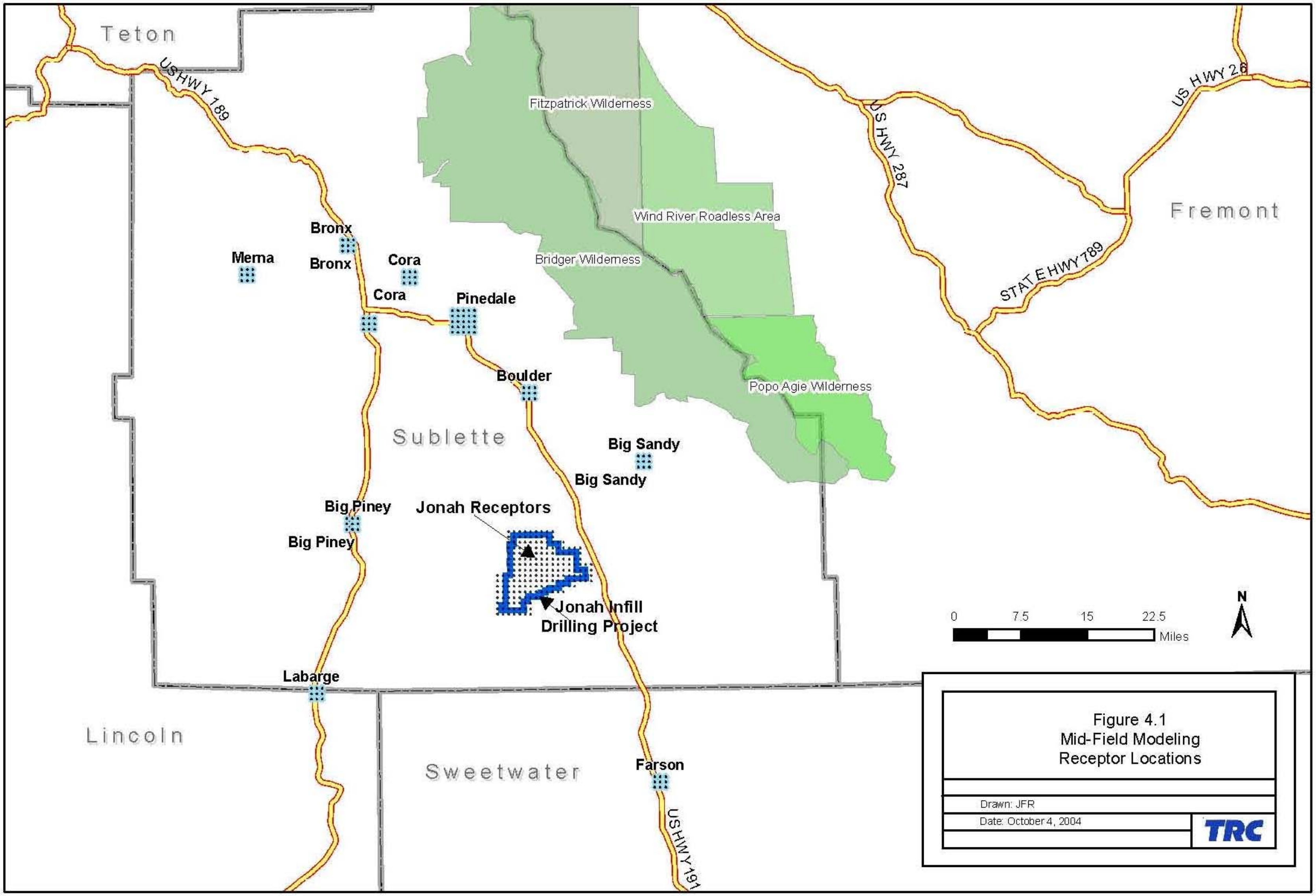

Figure 4.1
Mid-Field Modeling
Receptor Locations

3582

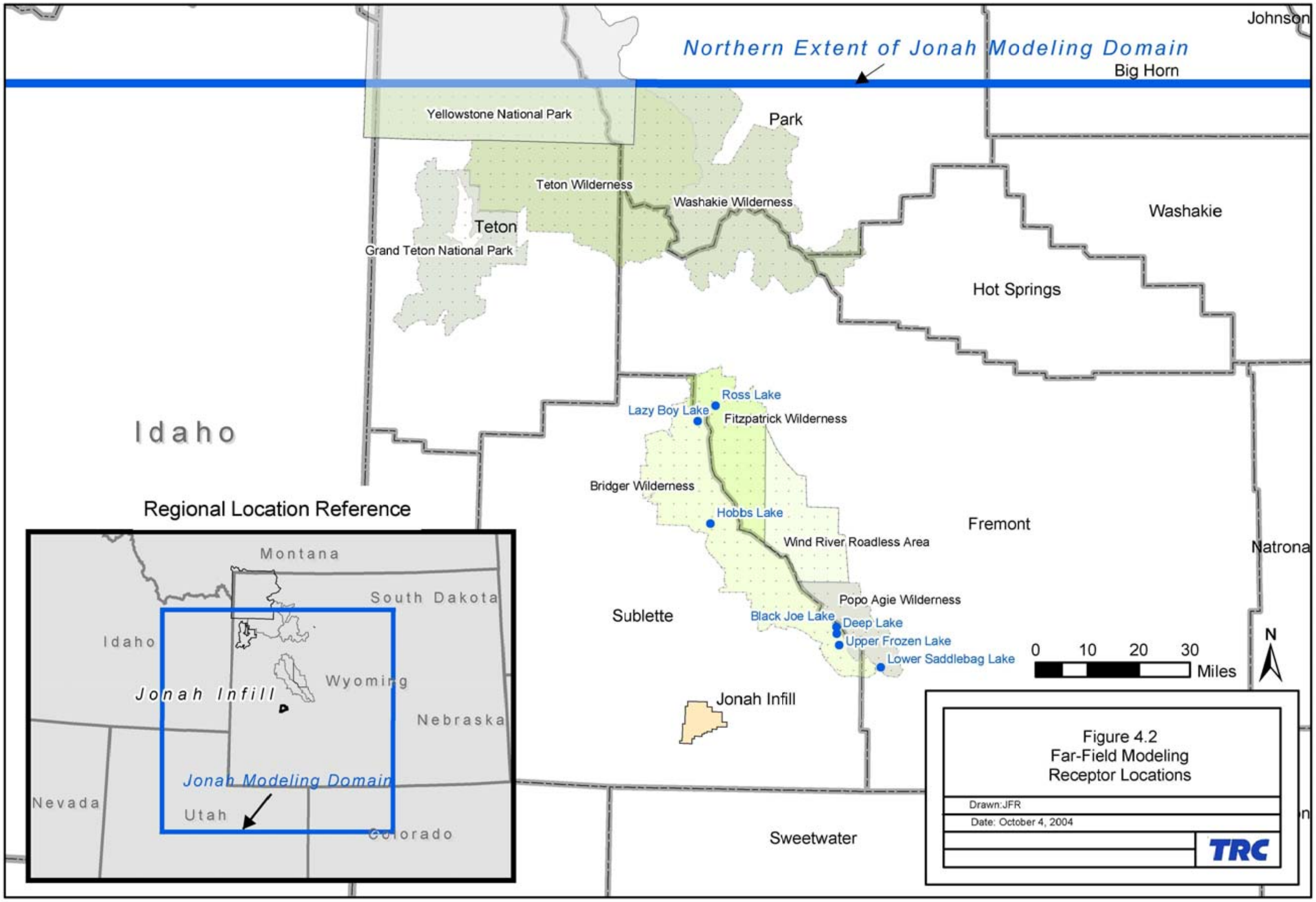

Figure 4.2
Far-Field Modeling
Receptor Locations

Non-project regional emissions were input to CALPUFF using area sources to idealize non-compression RFD sources and county-wide well sites, 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 C. 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 area sources developed for each RFD project are shown in Figure 4.5. County-wide well emissions were modeled using area sources developed as a “best fit” to the respective county area. The area sources used to model county-wide well site emissions are shown in Figure 4.6. 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.

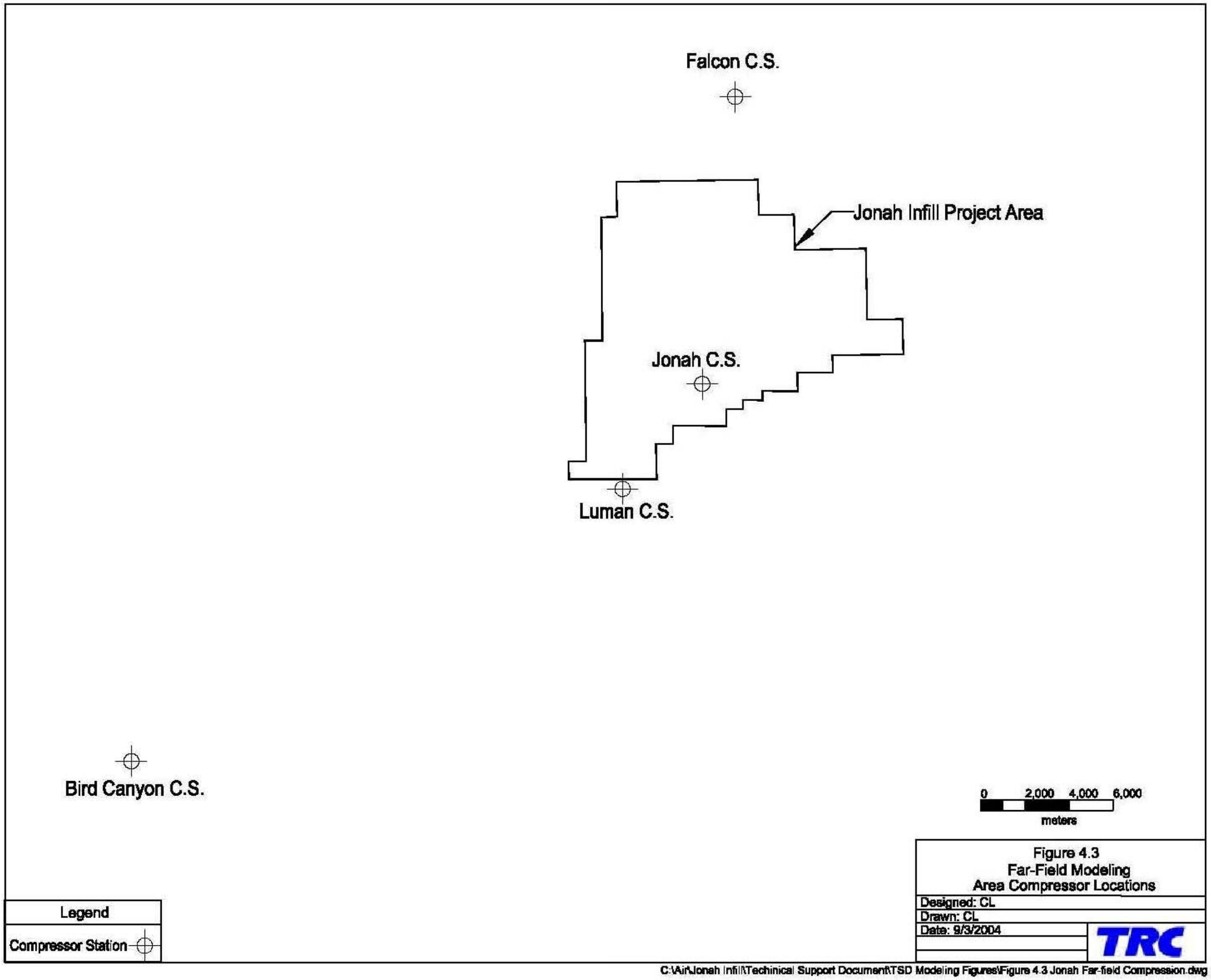

Figure 4.3
Far-Field Modeling
Area Compressor Locations

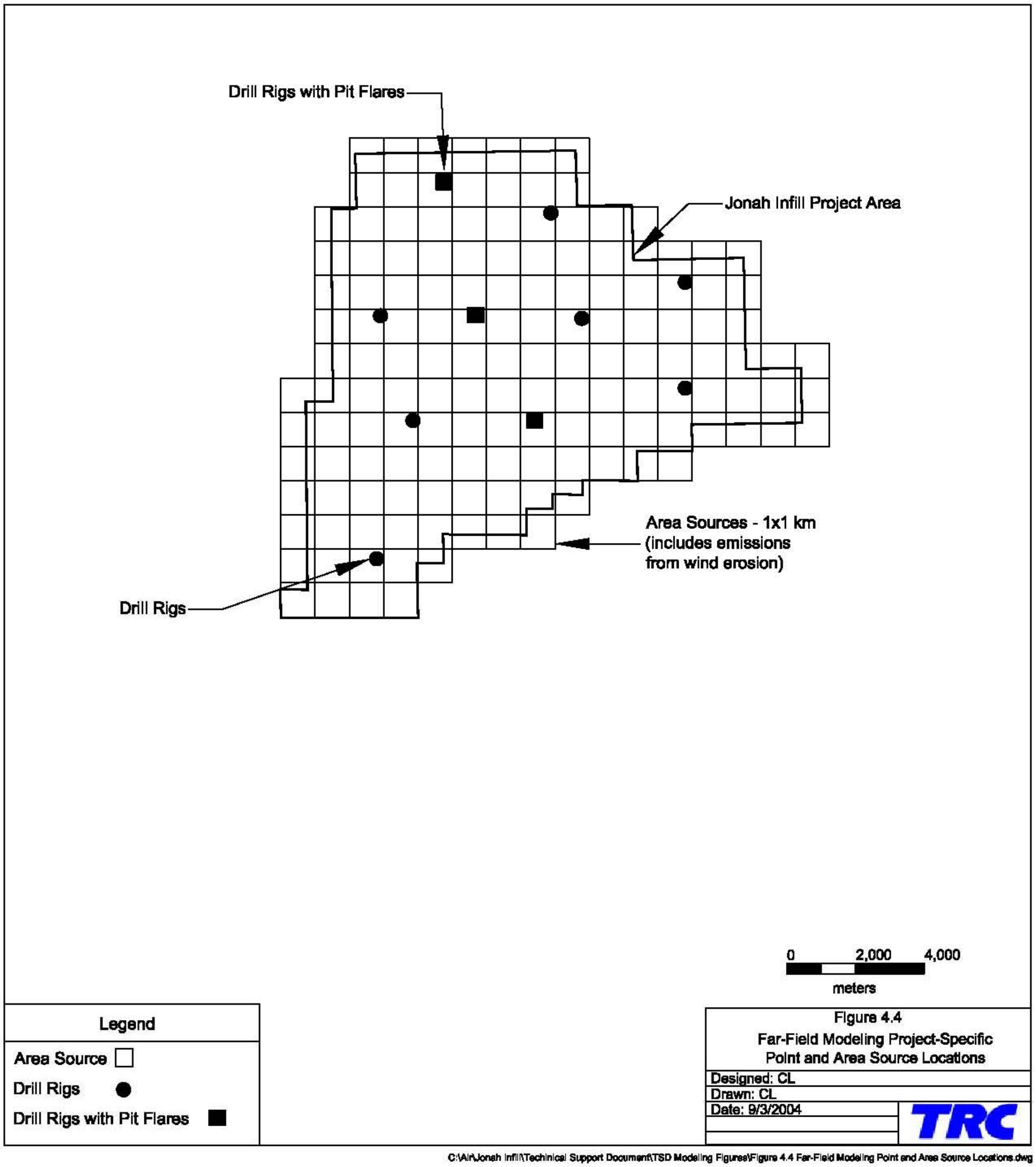

Figure 4.4 Far-field Modeling Project-Specific Point and Area Source Locations.

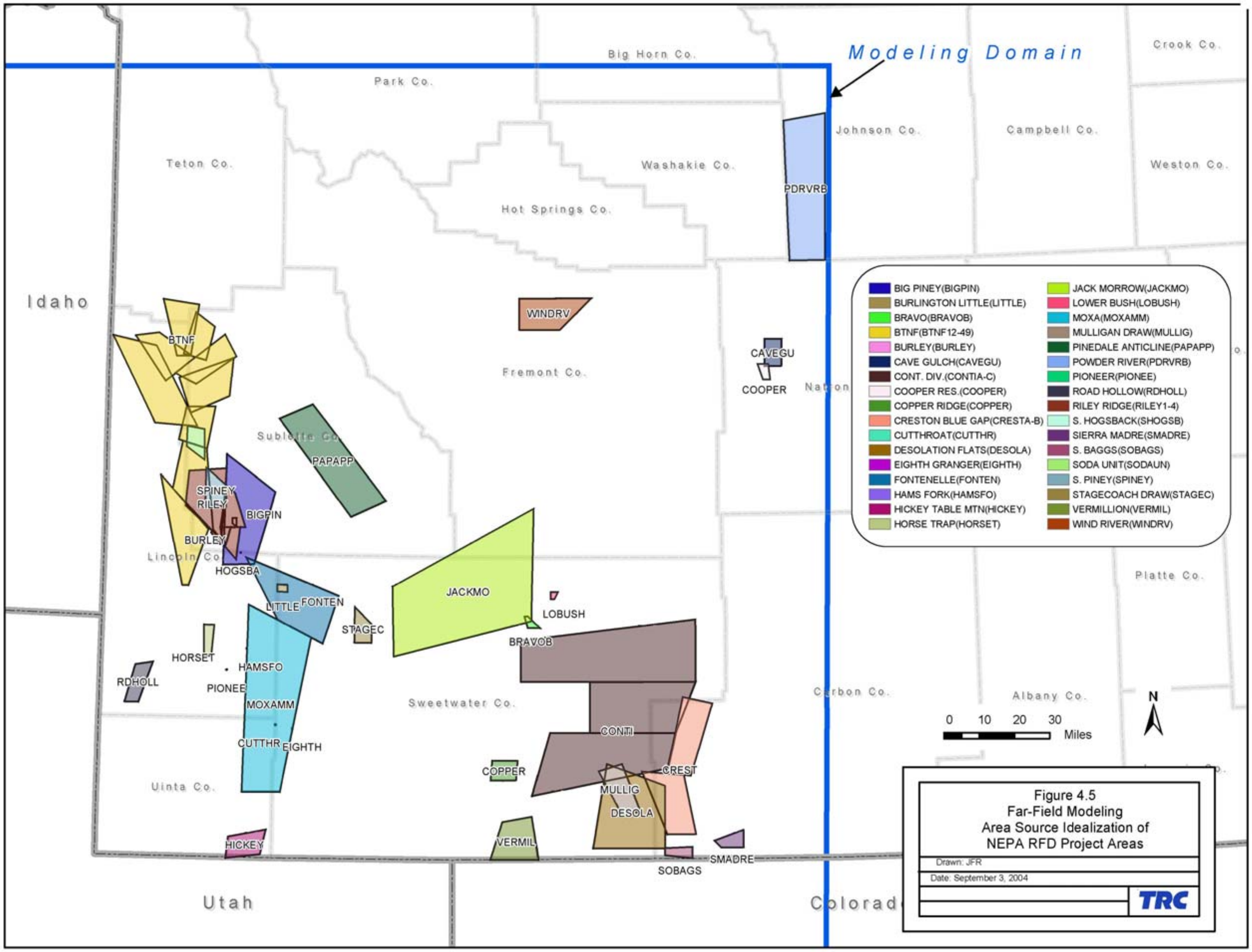

Figure 4.5
Far-Field Modeling
Area Source Idealization of
NEPA RFD Project Areas

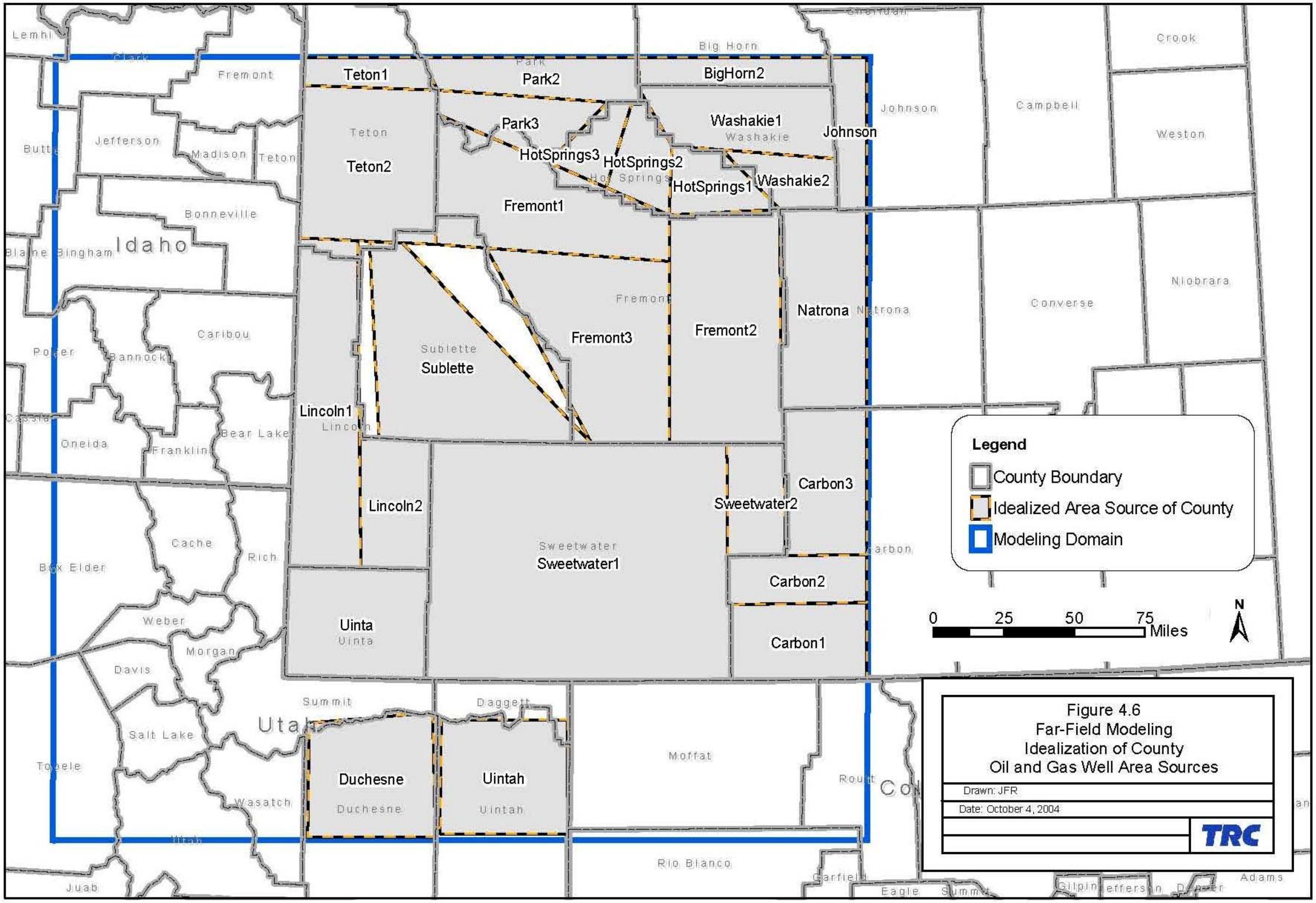

Figure 4.6
Far-Field Modeling
Idealization of County
Oil and Gas Well Area Sources

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 (PM_{10}, $PM_{2.5}$, NO_2, and SO_2), as identified by WDEQ-AQD, collected at monitoring sites in Wyoming and northwestern Colorado, are summarized in Table 4.2. Although O_3 is also a criteria pollutant, it is not utilized in the far-field modeling as a background concentration and is therefore excluded from this table. Maximum ozone impacts are anticipated to occur within or immediately adjacent to the JIDPA and are summarized in Section 3.4.5. 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.

4.5.2 Visibility

Background visibility data representative of the study area were collected from IMPROVE monitoring sites located at Yellowstone National Park and the Bridger Wilderness Area (Table 4.3). Background visibility data were used in combination with modeled pollutant impacts to estimate change in visibility conditions (measured as change in light extinction). 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 the historical monitoring period of record through December 2002.

Table 4.2 Far-field Analysis Background of Ambient Air Quality Concentrations (μg/m^3).

Pollutant	Averaging Period	Measured Background Concentration
NO_2[1]	Annual	3.4
PM_{10}[2]	24-hour	33
	Annual	16
$PM_{2.5}$[2]	24-hour	13
	Annual	5
SO_2[3]	3-hour	132
	24-hour	43
	Annual	9

1 Data collected at Green River Basin Visibility Study site, Green River, Wyoming during period January-December 2001 (ARS 2002).
2 Data collected by WDEQ-AQD at Emerson Building, Cheyenne, Wyoming, Year 2001.
3 Data collected at LaBarge Study Area at the Northwest Pipeline Craven Creek Site 1982-1983.

Table 4.3 IMPROVE Background Aerosol Extinction Values.[1]

IMPROVE Site	Quarter	Hygroscopic (Mm^{-1})[2]	Non-hygroscopic (Mm^{-1})[2]	Monitoring Period
Bridger Wilderness Area	1	0.845	1.666	1989-2002
	2	1.730	3.800	1988-2002
	3	1.902	5.637	1988-2002
	4	0.915	2.035	1988-2002
Yellowstone National Park	1	1.126	2.973	1988-2002
	2	1.502	4.531	1988-2002
	3	1.811	7.330	1988-2002
	4	1.033	2.990	1988-2002

1 Cooperative Institute for Research in the Atmosphere (2003).
2 Mm^{-1} = inverse megameters.

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 are provided in Table 4.4. 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 4.4 Background N and S Deposition Values (kg/ha-yr).

Site Location	Nitrogen Deposition	Sulfur Deposition	Year of Monitoring
Pinedale	1.5	0.75	2002

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 10^{th} percentile lowest ANC values are provided in Table 4.5.

Table 4.5 Background ANC Values for Acid Sensitive Lakes.

Wilderness Area	Lake	Latitude (Deg-Min-Sec)	Longitude (Deg-Min-Sec)	10th Percentile Lowest ANC Value (μeq/l)	Number of Samples	Monitoring Period
Bridger	Black Joe	42º44'22"	109º10'16"	67.0	61	1984-2003
Bridger	Deep	42º43'10"	109º10'15"	59.9	58	1984-2003
Bridger	Hobbs	43º02'08"	109º40'20"	69.9	65	1984-2003
Bridger	Lazy Boy	43º19'57"	109º43'47"	18.8	1	1997
Bridger	Upper Frozen	42º41'13"	109º09'39"	5.0	6	1997-2003
Fitzpatrick	Ross	43º22'41"	109º39'30"	53.5	44	1988-2003
Popo Agie	Lower Saddlebag	42º37'24"	108º59'38"	55.5	43	1989-2003

4.6 IMPACT ASSESSMENT

CALPUFF modeling was performed to compute direct project impacts for each of the alternatives and for estimating cumulative impacts from potential project and regional sources. The alternatives, as described in Section 4.2, include the Proposed Action, Alternatives A and B, and the Preferred Alternative. Maximum emissions scenarios for each alternative included the last year of field development, at the maximum annual construction activity rate, combined with nearly full-field production. An additional full-field development emissions scenario was developed for the Proposed Action assuming maximum production emissions. Regional emissions inventories of existing state-permitted RFD and RFFA sources, as described in Chapter 2.0, were modeled alone to estimate cumulative impacts for the No Action Alternative. These regional inventories were modeled in combination with project alternatives to provide cumulative impact estimates for each alternative. A total of 9 modeling scenarios were evaluated in this analysis. A list of these scenarios is summarized in Table 4.6.

Table 4.6 Modeling Scenarios Analyzed for Project Alternative and Regional Emissions, Jonah Infill Drilling Project, Sublette County, Wyoming, 2005.[1]

Modeling Scenario	Source Impacts Evaluated	Project Alternative	Number of New Wells in Production	Number of Wells under Construction	Well Drilling Rig Type
1	Direct Project	Maximum Production (3100 wells) all Alternatives	3,100	0	--
2	Direct Project	Proposed Action and Alternative A	2,850	250/year	Straight
3	Direct Project	Alternative B	3,025	75/year	Directional
4	Direct Project	Preferred Alternative	2,850	250/year	50% Straight/ 50% Directional
5	Cumulative	No Action[1]	0	0	--
6	Cumulative	Maximum Production (3100 wells) all Alternatives	3,100	0	--
7	Cumulative	Proposed Action and Alternative A	2,850	250/year	Straight
8	Cumulative	Alternative B	3,025	75/year	Directional
9	Cumulative	Preferred Alternative	2,850	250/year	50% Straight/ 50% Directional

[1] Includes 198 wells in Jonah Field which began production after 2001 as RFD.

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 significance thresholds, 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 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.

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, PSD Class I and Class II increments, and significance levels as shown in Table 4.7. 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 4.7 NAAQS, WAAQS, PSD Class I and Class II Increments, and PSD Class I and Class II Significance Levels for Comparison to Far-field Analysis Results ($\mu g/m^3$).

Pollutant/Averaging Time	NAAQS	WAAQS	PSD Class I Increment	PSD Class II Increment	PSD Class I Significance Level[1]	PSD Class II Significance Level[2]
NO_2						
Annual[3]	100	100	2.5	25	0.1	1.0
SO_2						
3-hour[4]	1,300	1,300	25	512	1.0	25.0
24-hour[4]	365	260	5	91	0.2	5.0
Annual[3]	80	60	2	20	0.1	1.0
PM_{10}						
24-hour[4]	150	150	8	30	0.3	5.0
Annual[3]	50	50	4	17	0.2	1.0
$PM_{2.5}$						
24-hour[5]	65	65	--	--	--	--
Annual [5]	15	15	--	--	--	--

1 Proposed Class I significance levels from 61 *Federal Register* 142, pg. 38292, July 23, 1996: Impacts above these levels do not necessarily indicate a significant impact, they generally are used to indicate the need for a more detailed modeling analysis.
2 Class I significance levels (EPA 1990b): Impacts above these levels do not necessarily indicate a significant impact, they generally are used to indicate the need for a more detailed modeling analysis.
3 Annual arithmetic mean.
4 No more than one exceedance per year is allowed.
5 Standard not yet enforced in Wyoming; -- = no current or proposed value.

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 each of the 9 modeled direct project alternatives and cumulative source scenarios, are provided in Appendix F. Predicted direct impacts are compared to applicable PSD Class I and Class II increments and significance levels, 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 F.1.1-F.1.9 provide the maximum modeled NO_2 concentrations at each of the sensitive areas. The maximum modeled SO_2 concentrations are provided in Tables F.2.1-F.2.9, and the maximum modeled PM_{10} and $PM_{2.5}$ impacts are provided in Tables F.3.1-F.3.9, and Tables F.4.1-F.4.9, respectively. Summaries of results by alternative for NO_2, SO_2, PM_{10}, and $PM_{2.5}$ are provided in Tables F.10.1-F10.2, F.10.3-F.10.4, F.10.5-F.10.6, and F.10.7-F.10.8, respectively.

The modeling results 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 (see Tables F.1.1-F.4.9). Direct project NO_2 impacts at the Bridger Class I Wilderness Area are above the proposed PSD Class I significance level of 0.1 μg/m^3 for NO_2. A direct project maximum NO_2 concentration of 0.13 μg/m^3 is predicted under the Proposed Action and Alternative A (see Table F.1.2). In addition, direct project impacts of 24-hour PM_{10}, concentrations are above the proposed Class I significance level of 0.3 μg/m^3 at the Bridger Wilderness Area under each alternative, with a maximum of 1.66 μg/m^3 predicted for the Proposed Action and Alternative A (see Table F.3.2).

In-Field Results

The maximum predicted concentrations of NO_2, SO_2, PM_{10}, and $PM_{2.5}$ within and nearby the JIDPA, for each of the 9 modeled direct project and cumulative scenarios are provided in Appendix F, Tables F.5.1 - F.5.9. A summary of results by alternative is provided in Tables F.10.9 - F.10.10. Predicted direct project and cumulative impacts are added to representative background pollutant concentrations and are compared to applicable NAAQS and WAAQS. As shown in Tables F.5.1 - F.5.9, there would be no exceedances of the NAAQS or WAAQS within and nearby the JIDPA from field-wide project sources or cumulative sources. This analysis further supports the compliance demonstrations shown in Section 3.4 for maximum near-field impacts.

4.6.2 Deposition

Maximum predicted S and N deposition impacts were estimated for each project alternative 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 Forest Service 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 alternatives are provided in Appendix F, Tables F.6.1 – F.6.4. A summary of results by alternative is provided in Tables F.10.11 - F.10.14. 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 there could be direct project N deposition impacts that are above the DAT at the Bridger and Popo Agie Wilderness Areas and at the Wind River Roadless Area for the Proposed Action and Alternative A scenarios and at the Bridger and Popo Agie Wilderness Areas for the Preferred Alternative (see Table F.6.1). The maximum predicted nitrogen deposition impacts occurred for the Proposed Action and Alternative A and are 0.03, 0.02, and 0.01 kg/ha-yr, at Bridger and Fitzpatrick Wilderness Areas, and at the Wind River Roadless Area, respectively (see Table F.6.1).

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 Forest Service 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 Forest Service as acid sensitive, Upper Frozen and Lazy Boy lakes are considered extremely acid sensitive.

ANC calculations were performed for each of the project alternative and cumulative source scenarios, with the results presented in Appendix F, Tables F.7.1 – F.7.9. A summary of results by alternative is provided in Tables F.10.15 - F.10.16. The modeling results indicate that deposition impacts from direct project and cumulative emissions 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 Class II areas and at mid-field regional community locations were post-processed with CALPOST to estimate potential impacts to visibility (regional haze) 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.

Visibility impairment calculations were performed using estimated natural background visibility conditions obtained from FLAG (2000) (FLAG method) and measured background visibility conditions from the Bridger Wilderness Area and Yellowstone National Park IMPROVE sites (IMPROVE method). IMPROVE-method data are based on the quarterly mean of the 20% cleanest days as shown in Table 4.3. 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 the historical monitoring period of record through December 2002.

For the FLAG method, estimated natural background visibility values as provided in Appendix 2.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. The natural background visibility data used with the FLAG visibility analysis for each area analyzed are shown in Table 4.8.

Table 4.8 FLAG Report Background Extinction Values.[1]

Site	Season	Hygroscopic (Mm^{-1})[2]	Non-hygroscopic (Mm^{-1})[2]
Bridger Wilderness Area[3]	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
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	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
3 Also used for Popo Agie Wilderness, Wind River Roadless Area, and regional communities.

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

Background visibility data monitored at the Bridger Class I Wilderness Area IMPROVE site were used to estimate potential visibility impairment at the regional community locations. These data were used because no visibility monitoring has been conducted in populated areas of the region. Since anthropogenic emissions (traffic, wood stoves, furnaces, etc.) exist in the residential locations it is likely that the visibility data measured in the Bridger Wilderness Area are more pristine than what would be measured in the residential areas. Therefore, since visibility impacts are calculated as percent increases of modeled concentrations above background values, the use of these data may overestimate the potential visibility impacts at these communities.

As recommended in EPA (2003b), monthly relative humidity factors determined from the Bridger IMPROVE site were used for the Bridger and Fitzpatrick Wilderness Areas; Yellowstone IMPROVE data were used for Yellowstone and Grand Teton National Parks and for the Teton Wilderness Area; and North Absaroka IMPROVE data were used for the Washakie Wilderness Area. Relative humidity data for the Bridger site were also used for the Popo Agie Wilderness Area and for the Wind River Roadless Area. Table 4.9 provides the relative humidity factors (f[RH]) that were used in the analyses.

Table 4.9 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
North Absaroka Wilderness Area[2]	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[3]	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 Fitzpatrick and Popo Agie Wilderness Areas, Wind River Roadless Area, and regional communities.
2 Also used for Washakie Wilderness Area.
3 Also used for Teton Wilderness Area and Grand Teton National Park.

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. 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. It is the responsibility of the Federal Land Manager (FLM) 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 USFS 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 (see Appendix G).

Far-Field Results

The maximum predicted far-field visibility impacts for each of the project alternatives are provided in Appendix F, Tables F.8.1 – F.8.9. A summary of results by alternative is provided in Tables F.10.17 - F.10.20. Predicted impacts are shown using both the FLAG and IMPROVE background visibility data. For each Class I and sensitive Class II area the maximum 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. Note that visibility is protected in Class I areas; Class II areas are included here to further define impacts in potentially sensitive areas.

Direct visibility impacts from the project sources were predicted to be above the 0.5-dv threshold at the Bridger, Fitzpatrick and Popo Agie Wilderness Areas, and at the Wind River Roadless Area for the Proposed Action and Alternative A, and above the 1.0-dv threshold at only the Bridger Wilderness for each alternative. The highest frequency of predicted visibility impacts occurred at the Bridger Wilderness for the Proposed Action and Alternative A where there were 22 days per year (FLAG) and 28 days per year (IMPROVE) when visibility impacts were predicted to be above the 0.5-dv threshold, and 9 days per year (FLAG) and 10 days per year (IMPROVE) above the 1.0-dv threshold (see Table F.8.2). The maximum dv change was estimated as 3.2 dv (FLAG) and 3.5 dv (IMPROVE) (see Table F.8.2).

Cumulative visibility impacts from the project and regional sources for the Proposed Action and Alternatives A and B were predicted to be above the 1.0-dv threshold at the Bridger Wilderness Area and at the Wind River Roadless Area. Cumulative impacts from the Preferred Alternative and regional sources were predicted to be above the 1.0-dv threshold at only the Bridger Wilderness Area. The highest frequency of predicted cumulative visibility impacts occurred at the Bridger Wilderness for the Proposed Action and Alternative A where there were 11 days per year (FLAG) and 17 days per year (IMPROVE) when visibility impacts were predicted to be above the 1.0-dv threshold (see Table F.8.7). The maximum dv change at the Bridger Wilderness Area was estimated as 3.7 dv (FLAG) and 4.0 dv (IMPROVE) (see Table F.8.7).

Tables are also provided in Appendix F (Tables F.8.10 – F.8.17), for each Class I and sensitive Class II area where the maximum predicted change in dv is estimated to potentially exceed 0.5 and 1.0 dv thresholds, that present all predicted impacts above the thresholds and lists the days when the impacts were predict to occur.

Mid-Field Results

The maximum predicted mid-field visibility impacts for each of the project Alternative scenarios are provided in Appendix F, Tables F.9.1 – F.9.9. A summary of results by alternative is provided in Tables F.10.21 - F.10.24. Predicted impacts are shown using both the FLAG and IMPROVE background visibility data. 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 using both the FLAG and IMPROVE background visibility data. The highest frequency of predicted visibility impacts from direct project sources occurred at Big Sandy under for the Proposed Action and Alternative A where there were 19 days per year (FLAG) and 23 days per year (IMPROVE) when visibility impacts were predicted to be above the 1.0-dv threshold (Table F.9.2). The maximum dv change, 3.8 dv (FLAG), and 4.3 dv (IMPROVE) was predicted to occur at Pinedale (see Table F.9.2). Modeling analyses using the maximum production emissions indicate that there would be only 1 day above the 1.0-dv threshold (IMPROVE), occurring at Pinedale, with a maximum impact of 1.1 dv (Table F.9.1).

The highest frequency of predicted cumulative visibility impacts is estimated for Big Sandy for the Proposed Action and Alternative A where there were 31 days per year (FLAG) and 34 days per year (IMPROVE) when the visibility impacts were predicted to be above the 1.0-dv threshold (see Table F.9.7). The maximum dv change, 3.9 dv (FLAG), and 4.4 dv (IMPROVE) was predicted to occur at Pinedale (see Table F.9.7).

Tables are also provided in Appendix F (Tables F.9.10 – F.9.29), for each regional community location, that present all predicted impacts above the visibility 1.0 dv threshold and lists the days when the impacts were predict to occur.

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APPENDIX A:

AIR QUALITY ASSESSMENT PROTOCOL

AIR QUALITY IMPACT ASSESSMENT PROTOCOL, JONAH INFILL DRILLING PROJECT, SUBLETTE COUNTY, WYOMING

Prepared for

Bureau of Land Management
Pinedale Field Office
Pinedale, Wyoming

and

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Prepared by

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September 2003
Revised October 2003

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LIST OF ACRONYMS AND ABBREVIATIONS

ANC	Acid neutralizing capacity
AQD	Air Quality Division
AQRV	Air Quality Related Value
ARS	Air Resource Specialists
BACT	Best Achievable Control Technology
BLM	Bureau of Land Management
C.F.R.	*Code of Federal Regulations*
CAAQS	Colorado Ambient Air Quality Standards
CDPHE/APCD	Colorado Department of Public Health and Environment/Air Pollution Control Division
CD/WII	Continental Divide/Wamsutter II
CO	Carbon monoxide
COGCC	Colorado Oil and Gas Conservation Commission
dv	Deciview
EIS	Environmental Impact Statement
EnCana	EnCana Oil & Gas (USA) Inc.
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
IAAQS	Idaho Ambient Air Quality Standards
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
JIDPA	Jonah Infill Drilling Project Area
kg/ha/yr	Kilograms per hectare per year
LAC	Level of Acceptable Change
LOP	Life of Project
MEI	Maximally Exposed Individual
MLE	Most Likely Exposure
N	Nitrogen
NAAQS	National Ambient Air Quality Standards
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

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

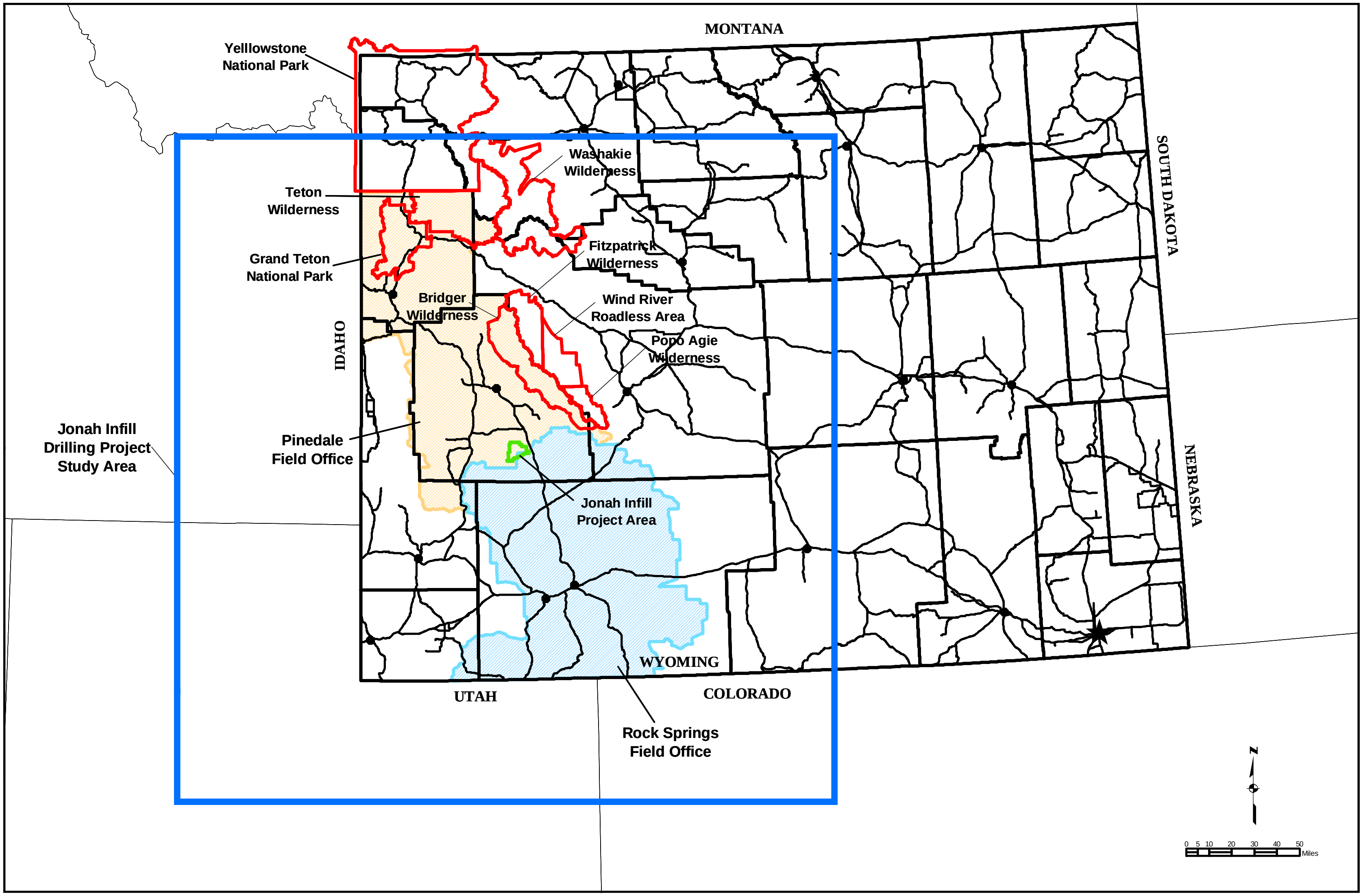
NWS	National Weather Service
O_3	Ozone
Operators	EnCana Oil and Gas (USA) Inc., BP America, and other oil and gas companies
PAPA	Pinedale Anticline Project Area
PFO	Pinedale Field Office
PM_{10}	Particulate matter less than or equal to 10 microns in size
$PM_{2.5}$	Particulate matter less than or equal to 2.5 microns in size
ppb	Parts per billion
Project	Jonah Infill Drilling Project
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 actions
RMP	Resource Management Plan
ROD	Record of Decision
S	Sulfur
SO_2	Sulfur dioxide
SO_4	Sulfate
SWWYTAF	Southwest Wyoming Technical Air Forum
TRC	TRC Environmental Corporation
UAAQS	Utah Ambient Air Quality Standards
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
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
WYDOT	Wyoming Department of Transportation
ìeq/l	Microequivalents per liter
$\mu g/m^3$	Micrograms per cubic meter

1.0 INTRODUCTION

TRC Environmental Corporation (TRC) has prepared this Air Quality Impact Assessment Protocol (Protocol) to identify the methodologies for quantifying potential air quality impacts from the proposed Jonah Infill Drilling Project (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 that other interested parties have the opportunity to review the Protocol and provide input before the study is initiated. The Project's location in west-central Wyoming will require the examination of Project and cumulative source impacts in Wyoming, northwestern Colorado, northeastern Utah, and southeastern Idaho within the study area shown on Map 1.1. The study area and a significant portion of the analysis are similar to cumulative analyses performed for previous natural gas development projects in Wyoming. However, the approach presented in this Protocol differs from previous regional cumulative analyses in two primary aspects. First, the analysis will utilize the most recent visibility and NO_x background data available to more accurately reflect current conditions in the region and will advance the emissions inventory start-date to reflect this more recent background data. Second, the proposed Class I modeling approach will be consistent with recent federal guidance for performing regional Class I analyses and will comply with Wyoming Department of Environmental Quality-Air Quality Division (WDEQ-AQD) recommendations.

1.1 PROJECT DESCRIPTION

EnCana Oil & Gas (USA) Inc. (EnCana) of Denver, Colorado, has notified the BLM, Pinedale Field Office (PFO), that it and other oil and gas companies including BP America (collectively referred to as the Operators), propose to continue development of natural gas resources located within the Jonah Infill Drilling Project area (JIDPA) (Map 1.2). The proposed project area is generally located in Townships 28 and 29 North, Ranges 107 through 109 West, Sublette County, Wyoming. The total project area encompasses approximately 30,200 acres, of which 28,280 acres are federal surface/federal mineral estate, 1,280 acres are State of Wyoming surface/mineral estate, and 640 acres are private surface/federal mineral estate.



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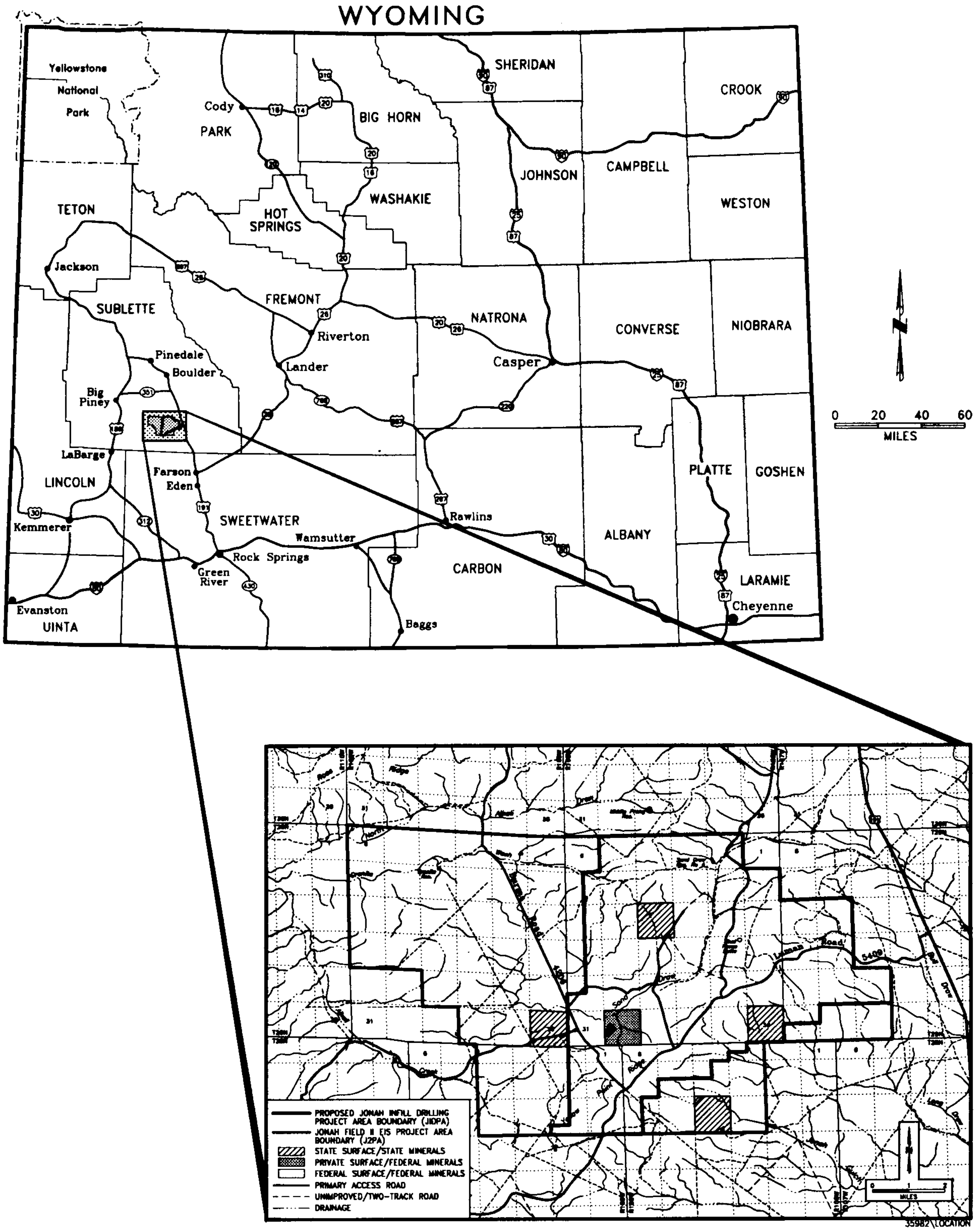
Map 1.1 Air Quality Study Area.



Map 1.2 Jonah Infill Drilling Project Location Map, Sublette County, Wyoming.

The Operator Proposed Action for this Project involves the development of 1,250 new natural gas wells on 850 new surface locations in the JIDPA. However, additional alternatives involving greater well numbers will also be analyzed in the *National Environmental Policy Act* (NEPA) Environmental Impact Statement (EIS) for this project. The maximum number of wells would be 3,100, assuming an approximately 5- to 10-acre down-hole well spacing throughout the JIDPA. Drilling operations are expected to last from approximately 4 to 20 years, with a life-of-project (LOP) of 30-50 years. The JIDPA is currently accessed by existing developed roads.

Approximately 63-87 days would be required to develop each well (four days to construct the well pad and access road, from one to four days for rig-up, generally from 18 to 36 days for drilling [an average of 23 days is proposed for use in the air quality analysis], 35 days over a 60-day period for completion, from one to four days for rig-down, and four days for pipeline construction). The estimated size of each drill site location is 3.8 acres, of which approximately 2.9 acres would be reclaimed after the well is completed and the gas gathering pipeline is installed. A reserve pit would be constructed at each drill site location to hold drilling fluids and cuttings. Non-productive and non-economical wells would be reclaimed immediately to appropriate federal, state, or private landowner specifications.

The gas produced within the JIDPA would be transported by existing pipelines from the field. To facilitate a complete cumulative impact assessment and since gas compression needs for the proposed Project cannot reasonably be separated from those necessary for the adjacent Pinedale Anticline Project Area (PAPA), future compression requirements for the PAPA will also be considered in the air quality analysis. Projections of future compression requirements supporting both the JIDPA and the PAPA have been requested from pipeline companies working within these areas. This total regional compression estimate will be analyzed as part of both the Proposed Action and the Maximum Well Number Alternatives.

1.2 RELATIONSHIP TO EXISTING PLANS AND DOCUMENTS

The BLM Pinedale Resource Management Plan (RMP)/Record of Decision (ROD) (BLM 1988) and the Green River RMP ROD (BLM 1997) direct the management of BLM-administered lands within the JIDPA. Management of oil and gas resources, as stated in the RMPs, provides for leasing, exploration, and development of oil and gas while protecting other resource values. According to the RMPs, all public lands in the JIDPA are suitable for oil and gas leasing and development, subject to certain stipulations.

The study area for this impact analysis (CALMET/CALPUFF modeling domain) will be similar to the domain used for the Southwest Wyoming Technical Air Forum (SWWYTAF) (Earth Tech 2001) and the Pinedale Anticline EIS (BLM 1999a). These study areas were identical and included portions of southwest Wyoming, southeast Idaho, northeast Utah, and northwest/north-central Colorado and utilized the CALMET/CALPUFF modeling system to estimate regional air quality impacts. The proposed modeling domain not only includes these areas but also extends farther north to include Grand Teton National Park, Teton and Washakie Wilderness Areas, and the southern edge of Yellowstone National Park.

1.3 PROPOSED WORK TASKS

The air quality analysis will address the impacts on ambient air quality and Air Quality Related Values (AQRVs) resulting from: 1) air emissions from construction and production activities proposed in the JIDPA 1,250 new wells; 2) 3,100 new wells; and 3) 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] and acid deposition) will be quantified and compared to applicable thresholds as defined in the Federal Land Managers' (FLMs') Air Quality Related Values Workgroup (FLAG), Interagency Workgroup on Air Quality Modeling (IWAQM) guidance documents (FLAG 2000; 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 five tasks.

- Develop Jonah Infill Drilling Project construction and production emissions inventories (see Section 2.1).
- Compile a cumulative emissions inventory within the study area, including new sources permitted through June 30, 2003, 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 impacts (pollutant concentration, visibility, and acid deposition impacts) within the modeling domain and at Class I and other sensitive areas from Project emissions sources (see Sections 4.0 and 5.2).

2.0 EMISSIONS INVENTORY

2.1 PROJECT EMISSIONS

The Proposed Action for the project includes the development of from 1,250 to 3,100 natural gas wells. Additional alternatives would also be proposed to represent intermediate development scenarios, scenarios designed to limit well pad numbers, and/or limit the rate of development. Drilling would continue for approximately 4 to 20 years, with an approximate 30- to 50-year LOP. Relevant production facilities associated with each well would include a separator, dehydrator, water tank, condensate tank, and methanol tank. Ancillary facilities would include new compressor engines at existing compressor stations inside and outside the JIDPA.

Emissions inventories for 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 both construction and production activities and for 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 Maximum Development Alternative with assistance from the Operators, using reasonable but conservative scenarios identified for each activity. The inventory will be developed using manufacturer's emissions data, the Environmental Protection Agency's (EPA's) AP-42 (EPA 1995), Gas Research Institute (GRI) emission factors, and other accepted engineering methods as described below.

2.1.1 Construction Emissions

Emissions-generating construction activities include: wellpad and access road construction; drilling; flow-back/flaring; vehicle travel during the drilling and completion phase; and construction and vehicle travel during gas pipeline installation. Drilling engine and flaring emissions will be calculated using AP-42 or other acceptable engineering methods. Both controlled and uncontrolled flaring emissions will be calculated. Flaring emissions calculations and assumptions will be forwarded to WDEQ-AQD for review during development of the inventory. Fugitive particulate emissions from vehicle travel and construction activities, wind erosion emissions from areas disturbed during construction, and combustion source emissions will be calculated using AP-42 emission factors and GRI-HAPCalc® (GRI 1999). It will be assumed that adequate dust suppression (e.g., watering or dust suppressants) will be applied to achieve a control efficiency of 50%.

2.1.2 Production Emissions

Sources of pollutant emissions during the production phase will include combustion emissions from well-site facilities 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. Combustion equipment emissions will be calculated using AP-42, manufacturer's, and/or GRI emission factors, in accordance with WDEQ-AQD oil and gas permitting guidance (WDEQ 2001) where applicable guidance exists. 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 stored liquids. Both fugitive and flashing emissions will be calculated using representative constituent analyses of natural gas and stored liquids, respectively, as well as a discussion of Best Achievable Control Technology (BACT) applicability and requirements, will be included for emissions sources as appropriate, in accordance with WDEQ-AQD oil and gas permitting guidance (WDEQ 2001).

2.2 CUMULATIVE EMISSIONS INVENTORY

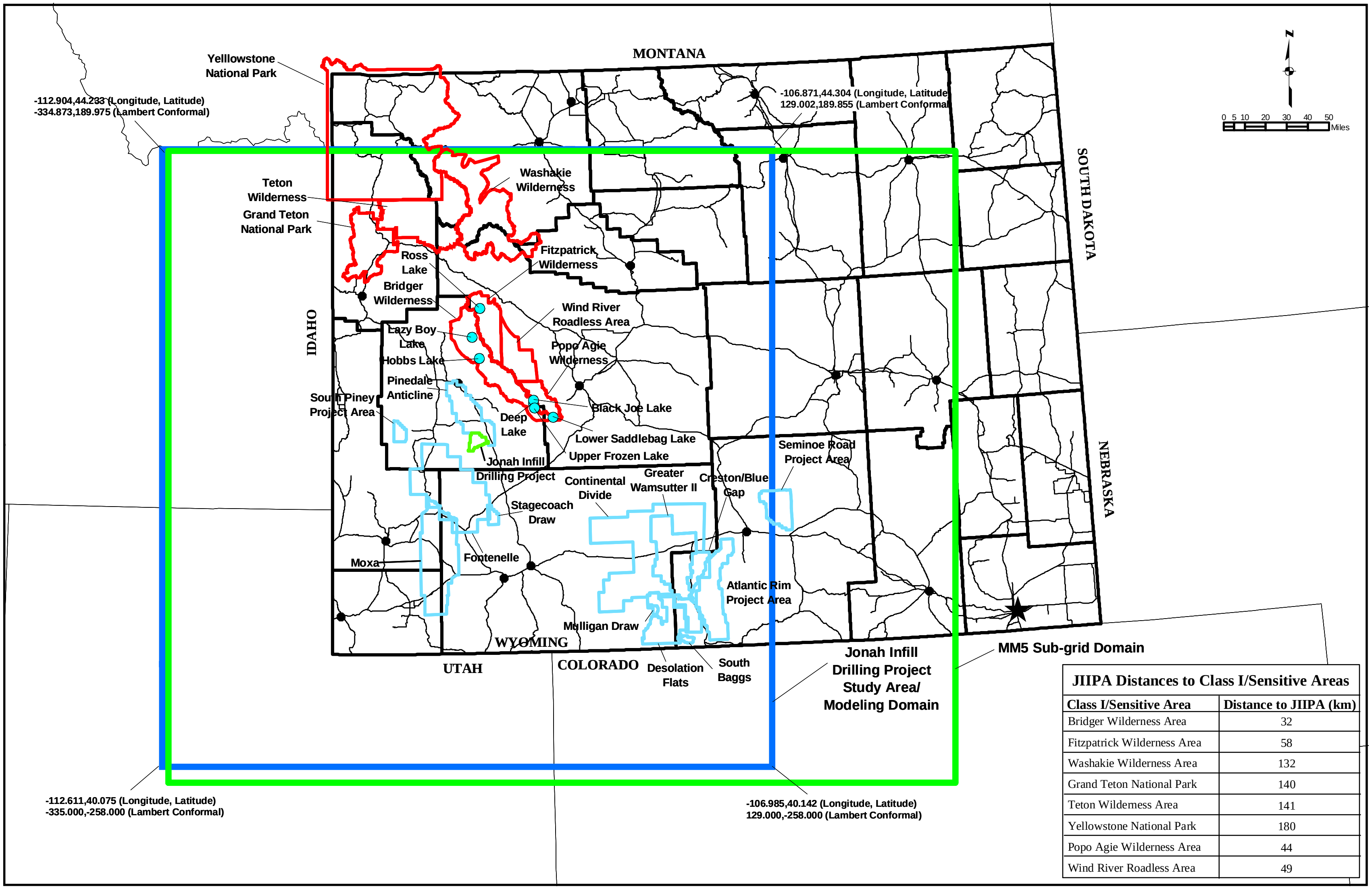
An inventory of existing and proposed emissions sources within the study area will be conducted and will include the identification of permitted sources, oil and gas wells, RFD, and RFFA. The cumulative inventory will be completed using methods similar to previous inventories performed in support of regional analyses. 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 Environment Quality (IDEQ), Idaho Oil and Gas Conservation Commission (IOGCC), BLM, and other agencies as required.

The time period of emissions data to be inventoried will differ from that of previous regional studies in the use of updated visibility and NO_x background data in the cumulative analysis. These data are described in greater detail in Sections 4.2.4.2 and 4.2.4.3 of this Protocol. The inventory period proposed in this Protocol has been selected based on the availability of current background data through 2001; as a result, the inventory will begin in January 2001 and end on a month-end date contemporary to this Protocol, June 30, 2003. If significant schedule changes occur as the analysis progresses, the cutoff dates will be adjusted to ensure that no data is unreasonably excluded from the analysis. Some overlap between emission sources which began operating in 2001 and background data monitored during 2001 will exist; however, this overlap provides additional conservatism to the analysis. Furthermore, the updated background values more accurately reflect current background conditions, and the reduction in years of emissions sources modeled helps to simplify the analysis.

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.

2.2.1 Existing Inventory

Three cumulative inventories have been completed as part of NEPA projects in southwest Wyoming, and they all included a portion of the study area proposed for the Project. The first



JIIPA Distances to Class I/Sensitive Areas

Class I/Sensitive Area	Distance to JIIPA (km)
Bridger Wilderness Area	32
Fitzpatrick Wilderness Area	58
Washakie Wilderness Area	132
Grand Teton National Park	140
Teton Wilderness Area	141
Yellowstone National Park	180
Popo Agie Wilderness Area	44
Wind River Roadless Area	49

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Map 2.1 Study Area/Modeling Domain, Jonah Infill Drilling Project.

was completed as part of the Continental Divide/Wamsutter II (CD/WII) EIS (BLM 1999b) and the second was performed for the Pinedale Anticline EIS (BLM 1999a). A third cumulative inventory in the region has been prepared for the Desolation Flats EIS (BLM 2003). The Desolation Flats EIS study utilized the CD/WII EIS study area and built upon the previous studies listed above, and it included emissions sources permitted through December 31, 2000. The Desolation Flats EIS cumulative inventory will be consulted to obtain emissions data for sources proposed and operating during the time period that overlaps between the proposed inventory time-frame and the end-date of the Desolation Flats EIS study. Both the CD/WII EIS and Pinedale Anticline EIS study end-dates precede the start-date of the proposed JIDPA analysis.

2.2.2 Permitted Sources

The cumulative emissions inventory for the Project will include emissions sources that:

- are located within the study area;
- emit NO_x, SO_2, or PM_{10}/$PM_{2.5}$;
- began operation on or after January 1, 2001;
- began operation or were permitted before June 30, 2003; and
- were permitted within 18 months of January 1, 2001, but are not yet operating (will be inventoried and included as RFFA [see Section 2.2.4]).

To illustrate the inventory cut-off date, an emissions source which was permitted *and* began operation in late 2000 would not be included in the inventory. However, an emissions source that was permitted in late 2000 but began operation in early 2001 would be included in the inventory. An emissions source permitted in late 2000 (and therefore within 18 months prior to January 1, 2001), but not yet operating would be included as RFFA. An emission source that begins operation in July 2003, after the inventory cut-off date, would be included only if it was permitted on or before June 30, 2003.

Actual emissions will be used if a minimum of 1 year of actual data is available; otherwise, potential-to-emit (maximum permitted) emission rates will be used. Emissions decreases will be included only if the decrease occurs at a major source and if the decrease is verifiable by WDEQ-AQD. Sources operating under permit waivers will not be inventoried due to their insignificant nature, and a qualitative discussion of waivers will be presented in the Technical Support Document. 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 included in this analysis.

2.2.3 WOGCC/COGCC/UDNR-DOGM/IOGCC Sources

A list of well drilling permits issued between January 1, 2001, and June 30, 2003, will be compiled using permit data obtained from WOGCC, COGCC, UDNR-DOGM, and 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.

2.2.4 RFD and RFFA

An inventory of RFD and 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, 1999, but the source is not yet operating. The primary source of RFFA information will be state permit records obtained through a file data search.

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 for the JIDPA commences). RFD information 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 these authorized projects will be obtained from BLM records tracking project development to determine total wells or other equipment yet undeveloped. For instance, for 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, 250 wells would be included under permitted oil and gas wells and the remaining 1,750 would be considered RFD. RFD information from not-yet-authorized projects will be obtained from contractors working on ongoing air quality analyses for NEPA projects.

Full development of proposed projects inventoried as RFD may or may not coincide with full development of the Project. As a result, the inclusion of RFD in the cumulative analysis may result in overly conservative impact estimates. To ensure "reasonable, but conservative" analysis results for all stages of Project development, the cumulative modeling analysis discussed later in this Protocol will be performed both with and without RFD sources. 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 with significant pollutant emissions during production activities will be included as RFD. The BLM will be consulted to determine the existence of additional NEPA-authorized projects

Table 2.1 Potential RFD in the Study Area.

Big Piney-LaBarge	Desolation Flats	Jonah II	Road Hollow
Bird Canyon	Dripping Rock/Cedar Breaks	Kennedy Oil Pilot	Sierra Madre
Bird-Opal Loop Pipeline	East LaBarge	Merna Pipeline	Soda Unit
BTA Bravo	Essex Mountain	Moxa Arch	South Baggs
Burley	Fontenelle II	Mulligan Draw	South Piney
Castle Creek	Hay Reservoir	Opal Loop Pipeline	Stagecoach
Continental Divide/Wamsutter II	Hickey-Table Mountain	Pinedale Anticline	Vermillion Basin
Copper Ridge	Horse Trap	Pioneer Gas Plant	
Creston-Blue Gap	Jack Morrow Hills	Riley Ridge	

or the necessity for including as RFD any additional projects that do not meet the above definition. During completion of this analysis, 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 June 30, 2003, or quantified as of the beginning of the modeling analysis, will be included in the JIDPA analysis. For RFD quantified after the inventory end-date, a qualitative discussion will be presented describing the proposed development(s). Similarly, a qualitative discussion will be presented for development currently proposed in the Powder River Basin Coalbed Methane Development Project, located outside of the JIDPA study domain in northeast Wyoming's Powder River Basin.

3.0 CRITERIA POLLUTANT NEAR-FIELD MODELING

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 area resulting from construction and production emissions. EPA's proposed guideline model, AERMOD (version 02222), will be used to assess these near-field impacts.

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. A wind rose for these data is presented in Figure 3.1.

The AERMOD preprocessor AERMET will be used to process Jonah Field meteorological data into formats compatible with AERMOD. In addition to the data collected in the Jonah Field, AERMET requires an upper air, twice daily sounding, meteorological data set and, at a minimum, cloud cover parameters or net radiation data. If net radiation data is available, AERMET will accept it in lieu of cloud cover data. If solar radiation data is available, AERMET will use it in combination with cloud cover data. Twice daily sounding data collected from Riverton, Wyoming; cloud cover data collected at Big Piney, Wyoming; and solar radiation measurements collected at Pinedale, Wyoming, are available and will be used for this analysis.

3.2 BACKGROUND DATA

Background concentration data collected for criteria pollutants at regional monitoring sites will be 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 are shown in

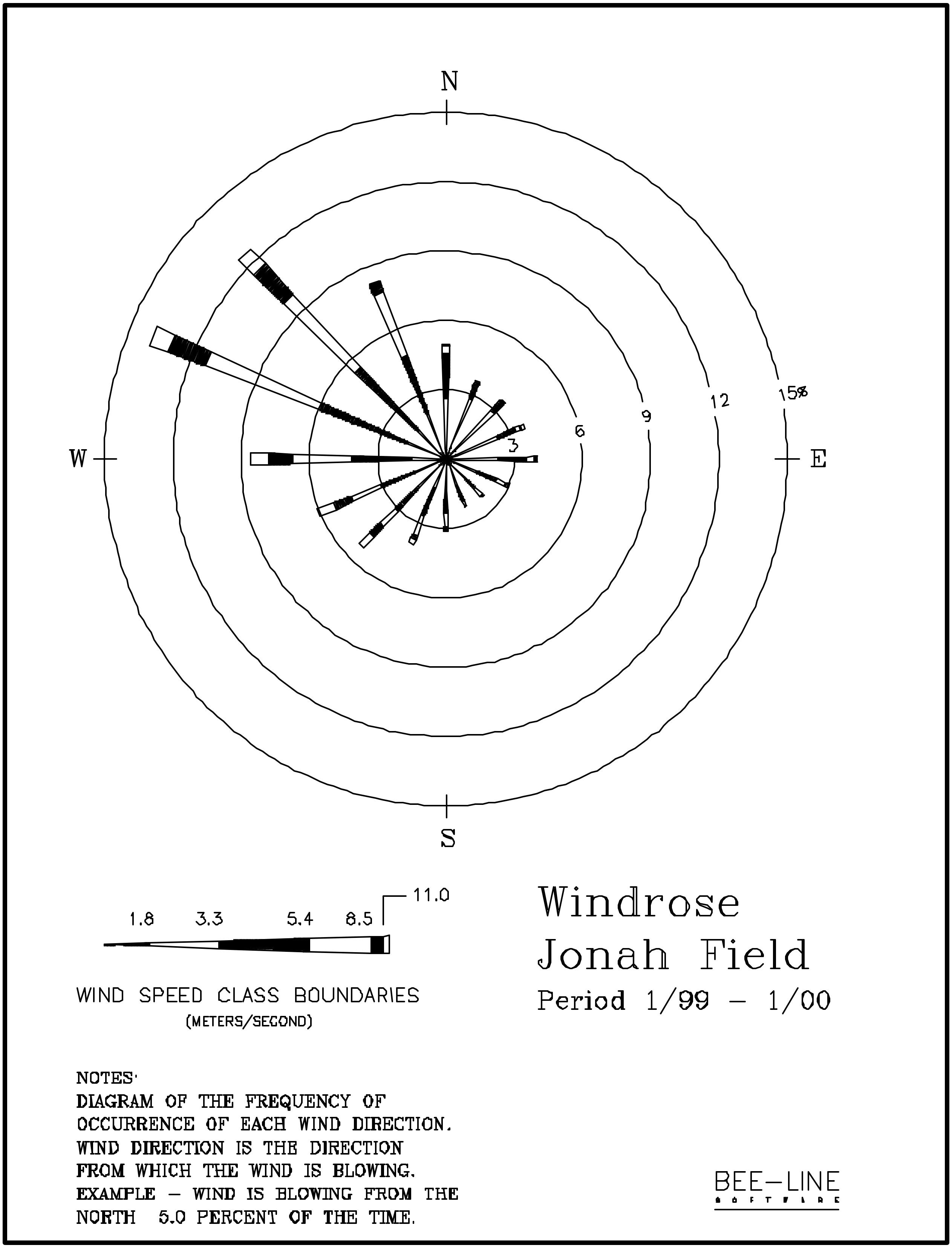

Figure 3.1 Wind Rose, Jonah Field, 1999.

Table 3.1. Further research will be conducted to determine if more recent CO and/or SO_2 background data are available at alternative monitoring sites and if those data are suitable for this analysis. Background concentrations of HAPs are not available and are assumed to be minimal; furthermore, comparison thresholds are based on incremental exposure rather than total exposure, as discussed in Section 5.0 of this Protocol.

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 NO_x and VOC emissions using a screening methodology developed by Scheffe (1988) and provided in Appendix A of this Protocol. For all other pollutants, emissions of each pollutant will be examined to determine the development phase (i.e., construction or production) during which emissions will be greatest, and it will be this development-phase/emission-rate combination that will be modeled to determine near-field project impacts. Based on previous analyses, it is expected that construction activities will generate the greatest PM_{10}, $PM_{2.5}$, and SO_2 emissions, and that production activities will generate the greatest NO_x and CO emissions.

For construction activities, a representative well pad and resource/access road will be developed for modeling which represents a reasonable but conservative well pad/road layout. 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, and SO_2 concentrations will be calculated for 3-hour, 24-hour, and annual averaging periods.

Table 3.1 Near-Field Analysis Background Ambient Air Quality Concentrations (μg/m^3).

Pollutant	Averaging Period	Measured Background Concentration
Carbon monoxide (CO)[1]	1-hour	3,336
	8-hour	1,381
Nitrogen dioxide (NO_2)[2]	Annual	3.4
Ozone (O_3)[3]	1-hour	169
	8-hour	147
PM_{10}[4]	24-hour	47
	Annual	16
$PM_{2.5}$[4]	24-hour	15
	Annual	5
Sulfur dioxide (SO_2)[5]	3-hour	132
	24-hour	43
	Annual	9

1 Data collected by Amoco at Ryckman Creek for an 8-month period during 1978-1979, summarized in the Riley Ridge EIS (BLM 1983).

2 Data collected at Green River Basin Visibility Study site, Green River, Wyoming, during period January-December 2001 (Air Resource Specialists [ARS] 2002).

3 Data collected at Green River Basin Visibility Study site, Green River, Wyoming, during period June 10, 1998, through December 31, 2001 (ARS 2002).

4 Data collected by WDEQ-AQD at Emerson Building, Cheyenne, Wyoming, Year 2002.

5 Data collected at LaBarge Study Area, Northwest Pipeline Craven Creek Site 1982-1983.

Four production scenarios will be analyzed. Each scenario will include an existing infill compressor station and representative well configuration. The first production scenario will analyze a well configuration based on 10 wells on a single pad (approximately 13 pads/640-acre section), the second scenario will analyze five wells on a single pad (approximately 26 pads/640-acre section), the third scenario will analyze two wells on a single pad (64 well pads per 640-acre section), and the fourth scenario will include 128 single-well pads per 640-acre section. Analyzing these scenarios will ensure that maximum possible production impacts from wells and compression combined are identified. For each production scenario, annual average nitrogen dioxide (NO_2) concentrations and 1-hour and 8-hour CO concentrations will be predicted.

Point sources will be used for modeling NO_x and CO emissions from compressors and well-site combustion equipment, and for modeling SO_2 emissions from drilling rigs during construction activities. Volume sources will be used for modeling PM_{10} and $PM_{2.5}$ emissions from road travel and wind erosion during construction activities.

Model receptors will be located a minimum of 100 m from construction 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. Sources of HAPs are expected to include well-site fugitive and smokeless flare emissions and compressor combustion emissions. 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. The four representative production scenarios described in Section 3.3 will also be analyzed in this HAPs analysis.

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. The nearest residence is expected to be located along the New Fork River.

Short-term (1-hour) HAP concentrations will be compared to acute Reference Exposure Levels (RELs), shown in Table 3.2. 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 (IDLH) 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 2002).

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 2002). Annual modeled HAP concentrations for all HAPs emitted will be compared directly to the non-carcinogenic RfCs shown in Table 3.3.

RfCs for suspected carcinogens benzene and formaldehyde are expressed as risk factors, shown in Table 3.4. 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 3.2 Acute RELs.

HAP	REL (mg/m^3)
Benzene	1.3 [1]
Toluene	37 [1]
Ethylbenzene	35 [2]
Xylene	22 [1]
n-Hexane	39 [2]
Formaldehyde	0.094 [1]

1 EPA Air Toxics Database, Table 2 (EPA 2002).
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 2002).

Table 3.3 Non-Carcinogenic HAP RfCs.

HAP	Non-Carcinogenic RfC [1] (μg/m^3)
Benzene	30
Toluene	400
Ethylbenzene	1,000
Xylenes	430
n-Hexane	200
Formaldehyde	9.8

1 EPA Air Toxics Database, Table 1 (EPA 2002).

Table 3.4 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	1.3×10^{-5}	0.0949
MEI	Benzene	7.8×10^{-6}	0.71
MEI	Formaldehyde	1.3×10^{-5}	0.71

1 MLE = most likely exposure; MEI = maximally exposed individual.
2 EPA Air Toxics Database, Table 1 (EPA 2002).

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 50 years (i.e., the LOP), corresponding to an adjustment factor of 50/70 = 0.71.

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 (0.71 x 1.0) = 0.71. EPA unit risk factors and adjustment factors are shown in Table 3.4.

4.0 FAR-FIELD ANALYSIS

4.1 METHODOLOGY

The purpose of the far-field analysis is to quantify the impacts on Class I and other sensitive areas from air pollutant emissions 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. Cumulative impacts also will be quantified by including in the analysis other documented sources of air pollutant emissions within the study area. To achieve these goals, the most current long-range modeling analysis tools will be used in conjunction with the most recent guidance for their utilization.

As requested by BLM and generally accepted for long-range modeling analyses, the CALMET/CALPUFF modeling system (Earth Tech 2003) will be used in this analysis. The study will be performed in accordance with the following recent and major guidance sources:

- direct guidance provided by representatives of the BLM, the National Park Service, and the U.S.D.A. Forest Service;
- *Guideline on Air Quality Models*, 40 *Code of Federal Regulations* (C.F.R.), Part 51, Appendix W;
- *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).

Air emissions of NO_x, SO_2, PM_{10}, and $PM_{2.5}$, from 1) 1,250 wells, 2) 3,100 wells, and 3) cumulative emissions, including all currently operating, proposed, and RFD emissions sources within the modeling domain, 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 4.2.

The proposed modeling domain for this analysis includes the domain developed for SWWYTAF and used for Pinedale Anticline EIS, but extends approximately 50 km farther to the north. The extent of the domain, along with other regional features, is shown in Map 2.1. The CALPUFF dispersion model will be run with CALMET wind field data, developed for year 1995, to predict the transport and dispersion of pollutants. The CALPUFF model accounts for changes in the wind field, variability in surface conditions, terrain influences, chemical transformation, wet removal from precipitation, and dry deposition, and calculates concentration and deposition at receptors input to the model.

CALPUFF output will be post-processed with POSTUTIL and CALPOST to derive concentrations for comparison to ambient standards, significance thresholds, and Class I and II Increments; deposition rates for comparison to sulfur (S) and nitrogen (N) deposition thresholds and to calculate acid neutralizing capacity (ANC) for sensitive water bodies; and light extinction 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 4.3 of this Protocol.

4.2 MODEL INPUT

4.2.1 Model Selection and Settings

The recently released regulatory version of the CALMET/CALPUFF modeling system (CALMET Version 5.5 dated March 4, 2002, CALPUFF Version 5.7 dated March 4, 2002) will be used to develop wind fields and calculate both ambient concentrations and AQRV impacts. The SWWYTAF CALMET methodology is proposed for use in combination with meteorological data updated for use in the Pinedale Anticline EIS. This approach ensures consistency with the well-accepted SWWYTAF study while incorporating improved data quality resulting from extensive quality assurance/quality control (QA/QC) procedures performed on data used in the Pinedale Anticline EIS (BLM 1999a).

The CALMET wind fields utilized in the Pinedale Anticline EIS study were based upon wind fields developed by Earth Tech for the SWWYTAF study (Earth Tech 2001). As part of the Pinedale Anticline EIS, Air Sciences performed extensive review and QA/QC of surface station and precipitation data used in SWWYTAF and corrections were made. These surface data will be used in this analysis, along with additional available surface meteorological data sites within the newly extended northern portion of the domain. Table 4.1 lists the additional sites that will be added to the analysis.

Precipitation data for the stations used in the SWWYTAF study will be used for this analysis, since they include stations throughout the proposed Jonah Infill modeling domain. The Pinedale Anticline modeling analysis identified problems with the original SWWYTAF precipitation data files, specifically, that the data for the month of December were missing. The precipitation data proposed for use in this analysis have been corrected.

Table 4.1 Additional Surface Meteorological Data Sites.

Site	Data Source
Craters of the Moon, Idaho	National Park Service (NPS)
Yellowstone, Wyoming	NPS
Cody, Wyoming	National Weather Service (NWS)
Idaho Falls, Idaho	NWS
Salmon, Idaho	NWS
Sheridan, Wyoming	NWS
Meeteetse, Wyoming	Wyoming Department of Transportation (WYDOT)
Interstate 25 (I-25) Divide	WYDOT

Other differences between the SWWYTAF study and the Pinedale Anticline EIS study include: 1) upper air observations were not used in the Pinedale Anticline EIS and 2) changes were made to CALMET input settings in the Pinedale Anticline EIS from those originally used in SWWYTAF. A detailed description of the modeling methodology used in the Pinedale Anticline EIS can be found in the supporting air quality technical document (BLM 1999b).

This analysis proposes to utilize the SWWYTAF CALMET methodology, the regional mesoscale meteorological (MM5) data subgrid processed to 20-km spacing, surface and precipitation data updated for use in the Pinedale Anticline EIS as discussed above and including data from 75 surface meteorological stations and 155 precipitation stations, and four upper air meteorological stations to supplement MM5 upper air estimates, in accordance with current NPS recommendations.

The uniform horizontal grid is processed to 4-km resolution, based on a Lambert Conformal Projection defined with a central longitude/latitude at (-108.55°, 42.55°) and first and second latitude parallels at 30° and 60°. The modeling domain consists of 116 x 112, 4-km grid cells, and covers the project area and Class I and other sensitive areas with a sufficient buffer zone to allow for potential recirculation or flow reversal effects to be evaluated. The total area of the modeling domain is 464 x 448 km. Ten vertical layers exist at heights of 20, 40, 100, 140, 320, 580, 1,020, 1,480, 2,220, and 2,980 m. The extents of the horizontal grid, which form the extents of the cumulative study area, are shown in Map 2.1.

The CALPUFF model will be run using the IWAQM-recommended default switch settings for all parameters. Chemical transformation will be based on the MESOPUFF II chemistry 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 run. 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. Electronic copies of CALMET, CALPUFF, and CALPOST input files will be included with the Technical Support Document.

4.2.2 Emissions

4.2.2.1 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 from both the construction phase and well production (field operation) phase will be modeled. Emissions from construction activities and production activities over the LOP will be examined to determine an annual period representing a maximum combination of production and construction.

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 JIDPA 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 JIDPA.

The analysis for both 1,250 and 3,100 wells will include future regional compression requirements projected by the pipeline companies working in the Jonah and Pinedale Anticline fields. Compressor-engine emissions will be input as point sources with actual expected stack parameters at their anticipated locations.

4.2.2.2 Cumulative Source Emissions

Cumulative sources, including permitted sources, RFD, and RFFA inventoried following the methodology described in Section 2.2, will be input to the CALPUFF model as point sources or area sources. As part of the emissions inventory, source location and exit parameter data will be obtained. Permitted and proposed sources will be modeled both alone and with RFD and RFFA sources to provide a clear analysis of the impacts attributable to each.

Pollutant emissions from stacks will be modeled as point sources in the CALPUFF model. EIS development project emissions will be assessed to determine worst-case emission levels (i.e., full production vs. interim production level + drilling). Multiple stacks within single facilities will be combined into a single, worst-case stack to reduce model run-time. This procedure was followed in the Pinedale Anticline EIS and other EIS cumulative source inventories. Worst-case stack parameters will be selected based on the potential for the greatest long-range impacts (i.e., greater stack height, greater exhaust flow rate). For already aggregated facilities that have undergone modifications, sources will be de-aggregated and re-examined for source parameters before combining into a single source.

Fugitive emissions 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 disclosed in the technical support document. Because regional paved and unpaved roadway travel not associated with any specific regional well development field and biogenic sources are considered to be included in the ambient air background concentrations described in this Protocol, those fugitive sources will not be modeled.

4.2.3 Receptors

Model receptors will be input to CALPUFF, at which concentration, deposition, and other impacts will be calculated. A gridded Cartesian receptor grid will be created at the computational grid resolution of 4 km throughout the modeling domain to calculate domain-wide cumulative impacts. Receptors will be placed along the boundaries of all Class I and sensitive areas at 2-km spacing, and within the boundaries of those areas at 4-km resolution.

Prevention of Significant Deterioration (PSD) Class I and other sensitive areas located within the modeling domain and the distance of each from the JIDPA are shown in Map 2.1. Federal Class I areas to be evaluated are:

- Bridger Wilderness Area,
- Fitzpatrick Wilderness Area,
- Teton Wilderness Area,
- Washakie Wilderness Area,

- Grand Teton National Park, and
- Yellowstone National Park.

Because the southern portion of Yellowstone National Park is along the boundary of the modeling domain, the wind patterns surrounding those receptors may not be accurately modeled by CALMET and treatment of receptors at boundary locations may be suspect. A discussion of the uncertainty of modeling results for Yellowstone will be included in the TSD.

Several PSD Class II areas are located within the modeling domain for which ambient air and AQRV impacts assessments are not mandatory but have been requested. These Class II sensitive areas are:

- Popo Agie Wilderness Area (Federal Class II), and
- Wind River Roadless Area (Federal Class II).

In addition, discrete receptors will be placed at the following sensitive lakes identified as the most sensitive to acid deposition:

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

4.2.4 Background Data

4.2.4.1 Criteria Pollutants

Ambient air concentration data collected at monitoring sites in the region provide a measure of background conditions in existence during the most recent available time period. Regional monitoring-based background values for criteria pollutants (PM_{10}, $PM_{2.5}$, CO, NO_x, and SO_2)

were collected at monitoring sites in Wyoming and northwestern Colorado, and are summarized in Table 4.2. These ambient air background concentrations will be added to modeled pollutant concentrations (expressed in micrograms per cubic meter [$\mu g/m^3$]) to arrive at total ambient air quality impacts for comparison to National Ambient Air Quality Standards (NAAQS), Wyoming Ambient Air Quality Standards (WAAQS), Colorado Ambient Air Quality Standards (CAAQS), Utah Ambient Air Quality Standards (UAAQS), and Idaho Ambient Air Quality Standards (IAAQS), as discussed in Section 5.0.

4.2.4.2 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,

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

Pollutant	Averaging Period	Measured Background Concentration
Carbon monoxide (CO)[1]	1-hour	3,336
	8-hour	1,381
Nitrogen dioxide (NO_2)[2]	Annual	3.4
Ozone (O_3)[3]	1-hour	169
	8-hour	147
PM_{10}[4]	24-hour	47
	Annual	16
$PM_{2.5}$[4]	24-hour	15
	Annual	5
Sulfur dioxide (SO_2)[5]	3-hour	132
	24-hour	43
	Annual	9

1 Data collected by Amoco at Ryckman Creek for an 8-month period during 1978-1979, summarized in the Riley Ridge EIS (BLM 1983).
2 Data collected at Green River Basin Visibility Study site, Green River, Wyoming during period January-December 2001 (ARS 2002).
3 Data collected at Green River Basin Visibility Study site, Green River, Wyoming during period June 10, 1998, through December 31, 2001 (ARS 2002).
4 Data collected by WDEQ-AQD at Emerson Building, Cheyenne, Wyoming, Year 2002.
5 Data collected at LaBarge Study Area at the Northwest Pipeline Craven Creek Site 1982-1983.

respectively. While ammonia concentrations are thought to be fairly uniform spatially, ozone concentrations vary greatly over time and space. A review of background ozone data indicates that six ozone stations are available in the region for year 1995. 1995 ozone data is used because it is concurrent with the CALMET windfields, which were created using 1995 surface and MM5 datasets. Ozone stations proposed for use are as follows:

- Pinedale, Wyoming,
- Centennial, Wyoming,
- Yellowstone National Park, Wyoming,
- Craters of the Moon National Park, Idaho,
- Highland, Utah, and
- Mount Zirkel Visibility Study, Hayden, Colorado.

Hourly ozone data from these stations will be included in the CALPUFF modeling, with a default value of 44.7 parts per billion (ppb) (7 a.m.-7 p.m. mean, used for SWWYTAF) used for missing hours. A background ammonia concentration of 1.0 ppb as suggested in the IWAQM Phase 2 guidance (for arid lands) will be used.

4.2.4.3 Visibility

The proposed analysis differs from previous Wyoming NEPA cumulative air quality analyses in its update of visibility background to include the most current data available at the time of this Protocol. Monitored visibility background data that have undergone QA/QC are currently available through December 31, 2001. This analysis proposes to utilize IMPROVE visibility data for the period of record 1989 through 2001 and 2001 NO_x background data collected in the final year of the Green River Basin Visibility Study, and to revise the period of regional emissions inventory to reflect industrial activity occurring during and since that updated background to represent the most appropriate combination of measured background and modeled impacts. If 2002 IMPROVE visibility data are available by the time the analysis is conducted, that data will be utilized.

WDEQ-AQD has prepared an annual report on Wyoming's long-term strategy for visibility protection in Class I areas (WDEQ 2003). An assessment of visibility monitoring data is presented as Appendix F of that report, including an analysis of trends in visibility monitored at Wyoming IMPROVE and Wyoming Visibility Monitoring Network sites. Bridger Wilderness and Yellowstone National Park IMPROVE sites are the closest monitoring sites to the Project area, and data reported from these sites extends from January 1989 through December 2001. As a result, visibility trends at these sites are of particular interest. These visibility trends are well-illustrated by two graphs in WDEQ-AQD's report, Graph 3 and Graph 6, presented in Appendix B of this Protocol. A detailed description of the data and assumptions behind these graphs is not presented here; rather, the reader is referred to the WDEQ-AQD report (WDEQ 2003).

As the graphs indicate, visibility conditions at Bridger Wilderness have not decreased since 1989, and an improvement in monitored visibility conditions has occurred at Yellowstone National Park since 1989 (Appendix B). It is important to note the significant fluctuations in monitored visibility during the period from 1995 through 1997 and that previous Wyoming NEPA cumulative air quality analyses utilized visibility background data monitored through 1997. Updating background visibility will improve the quality of the analysis by providing a longer period of record and resulting in a better estimate of long-term visibility conditions in the region.

CALPOST will be used to estimate change in light extinction from CALPUFF model concentration results. At the request of the BLM and following the most current agency recommendations, two separate methods are proposed for this analysis: FLAG and WDEQ.

The FLAG method uses seasonal natural background visibility conditions and relative humidity factors at Class I areas. This method is highly conservative since values of estimated natural background are generally less than measured background, and a calculated light extinction value will therefore comprise a greater percentage of the total light extinction (background + calculated). For the FLAG method proposed for this analysis, estimated natural background visibility values as provided in Appendix 2.B of FLAG (2000), and monthly relative humidity factors as provided in the *Draft Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule* (EPA 2001) will be used. Because natural background data are provided for Federal Class I areas only, data from the nearest Federal Class I area will be used for other areas analyzed but not classified as Federal Class I areas. The natural background visibility data that will be used with the FLAG visibility analysis for each area analyzed are shown in Table 4.3.

Table 4.3 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
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	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).

The WDEQ method uses reconstructed IMPROVE aerosol total extinction data. Background visibility data will be based on the seasonal mean of the 20% cleanest days measured at the Bridger Wilderness Area and Yellowstone National Park IMPROVE sites. The WDEQ method will also utilize monthly relative humidity factors as provided in the *Draft Guidance for Estimating Natural Visibility Conditions Under the Regional Haze Rule*. The seasonal mean of the 20% cleanest days visibility data will be determined using data from the historical record through December 2001 or through December 2002 if available at the time of the analysis.

Seasonal visibility data from the Bridger Wilderness Area IMPROVE site will be used for the Bridger, Fitzpatrick, and Popo Agie Wilderness Areas and for the Wind River Roadless Area, and visibility data from the Yellowstone National Park IMPROVE site will be used for the Teton and Washakie Wilderness Areas and for Grand Teton and Yellowstone National Parks. Monthly relative humidity data 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 Popo Agie Wilderness Area and for the Wind River Roadless Area analyses.

4.2.4.4 Lake Chemistry

The most recent lake chemistry background ANC data have been obtained from the FLMs for each sensitive lake listed in Section 4.2.4. The 10th percentile lowest ANC values were calculated for each lake following procedures provided from the U.S.D.A. Forest Service. The ANC values proposed for use in this analysis and the number of samples used in the calculation of the 10^{th} percentile lowest ANC values are provided in Table 4.4.

Table 4.4 Background ANC Values for Acid Sensitive Lakes.

Wilderness Area	Lake	Latitude (Deg-Min-Sec)	Longitude (Deg-Min-Sec)	10th Percentile Lowest ANC Value (μeq/l)	Number of Samples
Bridger	Black Joe	42º44'22"	109º10'16"	65.8	55
Bridger	Deep	42º43'10"	109º10'15"	60.6	47
Bridger	Hobbs	43º02'08"	109º40'20"	70.3	54
Bridger	Lazy Boy	43º19'57"	109º43'47"	18.8	1
Bridger	Upper Frozen	42º41'08"	109º09'38"	3.0	3
Fitzpatrick	Ross	43º22'41"	109º39'30"	60.4	33
Popo Agie	Lower Saddlebag	42º37'24"	108º59'38"	54.2	32

4.3 POST-PROCESSING

4.3.1 Concentration

CALPOST will be used to process the CALPUFF concentration output file to compute maximum 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).

4.3.2 Visibility

As discussed in Section 4.2.4.3, visibility impacts (measured as change in light extinction) will be calculated using two separate methods, which differ by the background data used to derive the percent change in visibility. Changes in light extinction will be estimated for both Project emissions and cumulative source emissions at receptor locations outlined in Section 4.2.3 of this Protocol.

CALPOST will first be run using the FLAG method recommended screening mode (MVISBK = 6), 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 monthly relative humidity factors, and CALPUFF-predicted particle species concentrations. Seasonal background extinction values used for the FLAG method are shown in Table 4.3. 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, with the results reported in percent change in light extinction and change in deciview (dv). The FLAG method conservatively assumes that the seasonal natural visibility conditions occur on every day during the entire season.

CALPOST will then be run using the WDEQ method to calculate the change in light extinction using the seasonal mean of the 20% cleanest days particle mass data as background conditions. Seasonal speciated aerosol data for the 20% cleanest days, measured at the Bridger Wilderness Area and Yellowstone National Park IMPROVE sites will be used. This method uses the seasonal background aerosol concentrations and monthly averaged relative humidity factors to estimate the change in light extinction. The CALPOST switch 'MVISBK' is set to 6 for this method. Similar to the FLAG method, the WDEQ method also conservatively assumes that the cleanest seasonal visibility conditions occur on every day during the entire season.

4.3.3 Deposition

The POSTUTIL utility provided with the CALPUFF modeling system will be used to estimate total S and N fluxes from CALPUFF-predicted wet and dry fluxes of SO_2, SO_4, NO_x, NO_3, HNO_3, PM_{10}, and $PM_{2.5}$. CALPOST will be used to summarize the annual S and N deposition values from the POSTUTIL program.

5.0 ASSESSMENT OF AIR QUALITY IMPACTS

5.1 NEAR-FIELD

Pollutant significance levels are set forth in Wyoming Air Quality Standards and Regulations (WAQSR). Under the New Source Review (NSR) process, an emission source which models pollutant concentrations (from its operations alone) that are below these significance levels is typically exempt from additional modeling analyses for the insignificant pollutant. In this near-field modeling analysis, significance levels will be compared to Project concentrations predicted by AERMOD as an indicator of the magnitude of impact from the Project alone. Another demonstration of project-only impacts will be made by comparison of Project concentrations to Class II PSD Increments. This 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.

In addition, the WDEQ-AQD has been authorized by EPA to enforce ambient air quality standards set forth in the *Clean Air Act* through approval of the Wyoming State Implementation Plan. The NAAQS and ambient standards adopted by state regulatory agencies set absolute upper limits for specific air pollutant concentrations (expressed in $\mu g/m^3$) at all locations where the public has access. Modeled concentrations occurring from construction and production operations will be added to the existing ambient air quality background concentrations shown in Table 3.1, and the total concentrations will be compared to corresponding NAAQS and state ambient air quality standards (i.e., WAAQS, CAAQS, UAAQS, IAAQS) shown in Table 5.1.

Ambient air quality standards, significance levels, and PSD Class II Increments are shown in Table 5.1.

Table 5.1 Ambient Standards, Class II PSD Increments, and Significance Levels For Comparison to Near-Field Analysis Results (µg/m^3).[1]

Pollutant/Averaging Time	Ambient Air Quality Standards				PSD Class II Increment	Class II Significance Level
	National	Wyoming	Colorado	Utah and Idaho		
Carbon monoxide (CO)						
1-hour[1]	40,000	40,000	40,000	40,000	--	2,000
8-hour[1]	10,000	10,000	10,000	10,000	--	500
Nitrogen dioxide (NO_2)						
Annual[2]	100	100	100	100	25	1
Ozone (O_3)						
1-hour	235	235	235	235	--	--
8-hour[3]	157	157	--	157	--	--
PM_{10}						
24-hour[1]	150	150	150	150	30	5
Annual[2]	50	50	50	50	17	1
$PM_{2.5}$						
24-hour[4]	65	65	--	65	NA	--
Annual [4]	15	15	--	15	NA	--
Sulfur dioxide (SO_2)						
3-hour[1]	1,300	1,300	700[5]	1,300	512	25
24-hour[1]	365	260	100[5]	365	91	5
Annual[2]	80	60	15[5]	80	20	1

1 No more than one exceedance per year.
2 Annual arithmetic mean.
3 Average of annual fourth-highest daily maximum 8-hour average.
4 Proposed.
5 Category III Incremental standards (increase over established baseline).

5.2 FAR-FIELD

5.2.1 Class I and Class II Increments

Under federal and state PSD regulations, increases in ambient air concentrations in Class I areas are limited by PSD Class I Increments. Specifically, emissions associated with a particular development may increase ambient concentrations above baseline levels only within those specific increments developed for SO_2, PM_{10}, and NO_2. PSD Class I Increments are set forth in federal and state PSD regulations and are shown in Table 5.2. EPA has also proposed modeled significance levels for Class I areas which would eliminate further analysis under the NSR program if ambient concentrations were shown to be below significance levels, which are also shown in Table 5.2. PSD Class II Increments are applicable in Class II areas and are shown in Table 5.1

Modeled concentrations predicted in Federal PSD Class I areas from the Project alone will be compared to Class I significance levels and Class I Increments, and cumulative modeling results predicted within Federal PSD Class I areas will be compared to Class I Increments. Project and cumulative impacts predicted at sensitive areas designated as PSD Class II areas will be compared to Class II Increments.

These demonstrations are for information only and are not regulatory PSD Increment consumption analyses, which would be completed as necessary during WDEQ-AQD permitting processes.

5.2.2 Visibility

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). The thresholds are defined as 5% and 10% of the reference background visibility (or 0.5 and 1.0 dv) for projects sources alone and cumulative source impacts, respectively. In general, if impacts are

Table 5.2 PSD Class I Increments and Significance Level Concentrations (μg/m^3).

Pollutant	Averaging Period	Class I Increment	Significance Level[1]
SO_2	Annual	2	0.1
	24-hour	5	0.2
	3-hour	25	1.0
PM_{10}	Annual	4	0.2
	24-hour	8	0.3
NO_2	Annual	2.5	0.1

[1] Proposed Class I significance levels, *Federal Register*/Vol. 61, No. 142, pg. 38292, July 23, 1996.

greater than these thresholds, FLMs may consider conditions (magnitude, frequency, duration, etc.) of the impact on a case by case basis. These thresholds and the FLAG guidelines were developed for NSR applications where an AQRV analysis is required as part of a PSD permit application.

5.2.3 Deposition

CALPUFF will be used to predict the total wet and dry fluxes of SO_2, SO_4, NO_x, NO_3, and HNO_3 at the sensitive receptor areas. The modeled deposition flux of each oxide of S or N will then be adjusted for the difference of the molecular weight of their oxide and then summed to yield a total deposition flux of S or N. The total S deposition and N deposition from Project emissions will be calculated and presented in kilograms/hectare/year (kg/ha/yr). These values will be compared to the 0.005 kg/ha/yr deposition analysis thresholds defined by NPS for total N and total S in the western U.S. (NPS 2001). Estimated total deposition fluxes of S and N from cumulative source impacts at sensitive areas will be compared with threshold values for terrestrial ecosystems presented by the U.S.D.A. Forest Service in its screening procedure to evaluate effects of air pollution in eastern region wildernesses cited as Class I air quality areas (Fox et al. 1989). These threshold values are 5 and 3 kg/ha/yr for total S and N deposition fluxes, respectively.

5.2.4 ANC

The CALPUFF-predicted annual deposition fluxes of S and N at sensitive lake receptors listed in Section 4.2.3 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* (U.S.D.A. Forest Service 2000). The predicted changes in ANC will be compared with the U.S.D.A. Forest Service's Level of Acceptable Change (LAC) thresholds of 10% for lakes with ANC values greater than 25 microequivalents per liter (ìeq/l) and 1 ìeq/l for lakes with background ANC values of 25 ìeq/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.

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AIR QUALITY IMPACT ASSESSMENT PROTOCOL
APPENDIX A:

EPA OZONE SCREENING METHODOLOGY

NOTICE: This document has been recreated by Greg Remer, Nevada Bureau of Air Pollution Control, July 27, 1998 from a copy of an original. Although every attempt has been made to ensure exact duplication of the original document, it is an electronic re-creation of the original and there may be errors. It is used here due to the poor print quality of the document available through U.S. EPA; however, all calculations will be performed in accordance with the official printed document.

VOC/NOx POINT SOURCE SCREENING TABLES

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September, 1988

United States Environmental Protection Agency
Office of Air Quality Planning and Standards
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1.O INTRODUCTION

This document provide a simple screening procedure presented in tabular form to calculate the ozone increment due to a VOC dominated (i.e, VOC mass emissions greater than NOx emissions) point source. [Throughout this document, ozone increment refers to a calculated increase in ozone above an assumed ambient value due to the effect of a single point source.] The tables are based on a series of applications of the Reactive Plume Model-II (RPM-II), a Lagrangian based photochemical model. Anticipated applications would include evaluation of the impact on ambient ozone due to new or modified point sources emitting more than 25 tons/year NMOC (nonmethane hydrocarbons). The screening technique is presented as two separate tables intended for appilcation in urban and rural areas, respectively.

The user is directed to Section 3 of this report for appilcation procedures needed to conduct an ozone increment screening analysis. Required inputs for determining an ozone increment are limited to estimates of NMOC and NOx mass emissions rates. As a screening technique the procedure has been designed be both robust and simple to use, while maintaining several inherent assumptions which lead to conservative (high ozone)ozone increment predictlons. The user is not required to characterize ambient meteorology or source emission and ambient speciation profiles. This technique is not intended to to substituted for a realistic photochemical modeling analysis; rather it is to be used only in the context of a firt-step proecdure which potentially can preclude further resource intensive analyses. The ozone increment estimates produced from this analysis should be interpreted as conservative predictions which would exceed ozono formation produced by actual episodic events.

A description of the protocol and asumptions used in developlng the screening tables is given in Appendix A.

2.0 BACKGROUND

Estimations of impacts of point sources emitting ozone precursors (NOx and/or VOC emissions) on ambient ozone provide regulatory agencies with data to address air quality issues involving proposed new or modified sources. In theory many issues can be resolved by applylng a photochemical air quality model. However, two questions regarding model application must be resolved: (1) what is the most appropriate model for a particular application, and (2) how could that model be applied (i.e., how are model inputs developed and output interpreted)?

The Guideline on Air Quality Models (1986) recommends application of two photochemical models for addressing ozone air quallty issues, the Urban Airshed Model (UAM) or EKMA. The EKMA model is not desgined to handle point sources, as point source emissions are immediately spread into a broadly based urban mix and the individual contribution of a single point source is quenched by such broad spatial dilutlon. Although the UAM explicitly handles spatial resolutlon of point sources through spatially gridded cells, the degree of resolution typically offered by such gridding (4-5 km) is still insufficient to account for near-source behaviour. Also, the resources and input data required by the UAM are very extensive; consequently, it is an inefficient means for evaluating effects of individual sources.

The Reactive Plue Model-II (RPM-II) is an alternative air quality model whlch was developed in the late 1970's to address photochemically reactive plumes. The model’s inherent flexibility accomodates recently developed chemical mechanisms; this work was based on use of the Carbon Bond Mechanism-Version IV (CBM-IV), which is consistent with oter, current EPA photochemical models (ROM, EXMA).

The RPM-II is an appropriate choice for case by case refined (i.e, not an initial screening estimate) modelling applications. However, the prospective model user faces the possibility of conducting an exhaustive compilation of meteorological and emissions source data. Consequently, use of photochemical models to assess individual point sources has been lmited. The development of a screening analysis may eliminate, in certain applicatlons, the nedd for a more intensive refined modeling analysis. Current modeling guidelines do not offer recommendatlons for screening of individual source impacts on ozone. The tables presented herein are intended to serve as a means for screening effects on ozone from individual point sources so that subsequent, more refined analyses can be focused on sources where it is warranted.

3.0 SCREENING TABLES

The interpretation or definition of a “rural” or “urban” area within the framework of this technique is intended to be rather broad and flexible. The rationale for having rural and urban tables stems from the need to account for the coupled effect of point source emissions and background chemistry on ozone formation. Background chemistry in the context of this procedure refers to a characterization of the ambient atmospheric chemistry into which a polnt source emits. The underlying model runs used to develop the rural table (Table 1) were performed with spatially invariant background chemistry representative of “clean” continental U.S. areas. Model runs used to develop the urban table (Table 2) are based on background chemistry incorporating daily temporal fluctuatlons of NOx and hydrocarbons asociated with a typical urban atmosphere (refer to Appendix A for details regarding background chemistry). Background chemistry is an important factor in estimating ozone formation; however, characterization of background chemistry is perhaps the most difficult aspect of reactive plume modeling because of data scarcity and the level of resources required to measure or model (temporally and spatially) the components necessary to charcterize the ambient atmospheric along the trajectory of a point source plume.

Recognizing the conflicting needs of using simple characterizations of background chemistries and applylng this screning technique in situations where sources are located in or impact on areas which can not be simply categorized, the following steps should be used to choose an appopriate table:

(1) If the source locatlon and downwind impact area can be decribed as rural and where ozone exceedances have never been reported, choose the rural area table.

(2) If the source location and downwind impact area are of urban characte, choose the urban area table.

(3) If an urban based source potentially can impact a downwind rural area, or a rural based source can potentially impact a downwind urban area, use the highest value obtained from applying both tables.

The VOC point source screninq tables (Tables 1 and 2) provided ozone increments as a function of NMOC (nonmethane organic carbon) mass emissions rates and NMOC/NOx emissions ratios. To determine an ozone impact the user is required to apply best estimates of maximum daily NMOC emissions rate, and estimated annual mass emissions rates of NMOC and NOx which are used to determine NMOC/NOx ratio for ascribing the applicable column in Table 1 or 2. The reasons for basing application on daily maximum NMOC emissions rates are (1) to avoid underestimates resulting from discontinuous operations and (2) the underlying modeling simulations are based on single day episodes. The NMOC emissions rates in Tables 1 and 2 are given on an annual basis; consequently the user must project daily maximum to annual emissions rates illustrated in the example application given below. One purpose of the technique is to provide a simple, non-resource intensive tool; therefore, annual NMOC/NOx emissions ratios are used because consideration of daily fluctuations would require a screening application applied to each day.

Parameters describing background chemistry, episodic meteorology, and source emissions speciation affect actual ozone impact produced by a point source. However, as a screening methodology the application should be simple, robust and yield conservative (high ozone) values. Thus, only NMOC and Nox emissions rates are required as input to Tables 1 and 2.

Rural Example Application

A manufacturing company intends to construct a facility in an isolated rural location where ozone exceedances have never been observed. The pollution control agency requires that the company submit an analysis showing that operation of the proposed facility will not result in an ozone increment greater than X ppm in order to permit operation. The estimated daily maximum NMOC emissions rate is 9000 lbs/day. The annual estimated emissions rates for NMOC and NOx are 1000 tons/yr and 80 tons/yr, respectively. The company's strategy is to provide a screening analysis using the rural area table to prove future compliance. If the screening result exceeds X ppm, the company will initiate a detailed modeling analysis requiring characterization of source emissions speciation, ambient chemistry, and episodic meteorology.

Screening Estimate:

1 - Determine which column of Table (l) is applicable:

The NMOC/NOx ratio is based on annual estimetes; thus, 1000/80 = 12.5 and middle column values are applied.

2 - Calculate annual NMOC emissions rates in tons/yr from maximum daily rate:

(9000 lbs/day)(1 ton/2000 1bs)(365 days/yr) = 1643 ton~/yr

3 - Interpolate linearly between 1500 tons/yr and 2000 tons/yr to produce an interpolated column 2 ozone increment:

(1643-l500)(3.84-3.05)/(2000-1500) + 3.04 = 3.27 pphm

3.27pphm(1 ppm/100 pphm) = 0.0327 ppm

If 0.0327 ppm is below the criterion value (X ppm), no further modeling analyis required and operation may be pemitted. Otherwise, the company wil1 procede with an additional case-specific modeling analysis.

Table 1. Rural based ozone increment (pphm) as a function of NMOC emissions and NMOC/NOx ratios.

NMOC EMISSIONS (TONS/YR)	NMOC/NOx TONS NMOC/TONS NOx (PPMC/PPM)		
	> 20.7 (>20)	5.2-20.7 (5-20)	< 5.2 (< 5)
50	0.4	0.4	1.1
75	0.4	0.4	1.2
100	0.4	0.5	1.4
300	0.8	1.0	1.7
500	1.1	1.4	1.9
750	1.6	1.9	2.3
1000	2.0	2.4	2.7
1500	2.7	3.0	3.3
2000	3.4	3.8	3.7
3000	4.8	5.2	4.3
5000	7.0	7.5	4.8
7500	9.8	10.1	5.1
10000	12.2	12.9	5.4

- multiply pphm by 0.01 to obtain ppm

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Table 2. Urban based ozone increment (pphm) as a function of NMOC emissions and NMOC/NOx ratios.

	NMOC/NOx TONS NMOC/TONS NOx (PPMC/PPM)		
NMOC EMISSIONS (TONS/YR)	> 20.7 (>20)	5.2-20.7 (5-20)	< 5.2 (< 5)
50	1.1	1.1	1.0
75	1.2	1.1	1.1
100	1.3	1.2	1.1
300	1.8	1.6	1.9
500	2.2	2.0	2.8
750	3.3	2.6	3.9
1000	4.1	3.2	4.7
1500	5.8	4.2	4.9
2000	7.1	5.4	4.9
3000	9.5	7.8	6.5
5000	13.3	12.0	9.3
7500	17.3	16.7	12.5
10000	21.1	20.8	15.5

- multiply pphm by 0.01 to obtain ppm

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4.0 REFERENCES

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APPENDIX A

DEVELOPMENT OF SCREENING TABLES

RPM-II DESCRIPTON

Screening tables presnted in this report were derived using the Reactive Plume Model-II (RPM-II). RPM-II was originally developed by Systems Applications, Incorporated (SAI) under contract to EPA in the late 1970's. RPM-II is a Lagrangian based model which describes the downwind tranport and chemical behaviour of a plume emitted from a point source. Plume concontrations are a function of meteorological source emission and ambient air quality inputs. Downwind plume dimensions are either calculated through Gaussian dispersion formulae using Pasquill-Gifford stability classes, or dimensions are manually set. The plue is resolved lnto several well-mixed columns aligned transverely wlth the mean wlnd flow. Mass transfer of reactive species occurs across cell boundaries. As the plume expands it entrains backgound air which then is incorporated within the reactive plume mix. A thorough descrlption of the nodel formulation can be found in the RPM-II User's Guide (SAI, 1980). Listed below are general categories of model inputs used during RPM-II applications for developing the screening tables.

Model Inputs:

The followlng summary of model inputs addresses the major input data requirements used ln developing the screening tables; a comprehenslve list or required modeling inputs is found in the User's Guide. The RPM-II source code addresses a single input vhlch includes followlng:

Meteorological Coniderations - Required meteorological inputs include time-dependent values of wlnd speed and either stability class to determine horizontal and/or vertical plume dimensions or values reflecting user-determined plume depths and/or horizontal plume widths. The program has been modified to accept ambient temperature to adjust temperature dependent raaction rate constants.

Chemistry Considerations - The RPM-II was designed to accept different chemical mechanisms; a particular mechanism is entered as input data. The original RPM-II and subsequent variations have used an older mechanism, Carbon Bond 2 (CB2). The source code was modified to accept an array of eleven time-dependent photolysis rate constants so that the most recent version of the Carbon Bond-4 mechanism, which is also used in EKMA/OZIPM4 (EPA, 1988), could be applied. Additional code was installed to accept activation energies to determine temperature dependent reaction rates These code modifications and the operation of CB4 within RPM-II were evaluated by comparing RPM-ll predictions with EKMA/OZIPM4 Both models were run in batch reactor mode with identical sunlight, temperature and initial conditions over the course of a ton-hour run, both models produced nearly identical time profiles for all species.

Air Quality Considerations - The model requires initialization of all CB4 surrogate and explicit species concentrations, and concentrations air of background air Time-variant concentrations off background air can be input manually, or the model will calculate temporal profiles of all species based on a user-supplied initial mix and diurnal variation in photolytic reaction rates.

Emissions Estimates - Principal emissions inputs are emissions rate of organic and inorganic species. Although any species included in thee CB4 mechanism can be declared as an emissions input, typical inputs include NO; NO2; CO; CB4 surrogate organic groups - parrafins (PAR), olefins (OLE), higher aldehydes (ALD2) and explicit organic groups - formaldehyde (FORM), ethylene (ETH), toluene (TOL) and xylene (XYL).

DERIVATION OF SCREENING TABLE

The concept of a screening procedure for ozone precursors is immediate with an immediate contradiction: A screening tool must be simple to apply and robust, but the inclusion of photochemical phenomena in a modeling analysis typically is complicated and case specific. A major difficulty in applying a model such as RPM-II is specifying background concentrations because the model is particularly sensitive to ambient air quality. Hydrocarbon and NOx composition vary spatially and temporally throughout any region. A thorough refined modeling exercise would require temporal profiles of all dominant inorganic and organic species in the CB4 mechanism. Such data are scarce for even a single location. The problem is handled explicitly in grid modeling (e.g., UAM application) by assimilating appropriate emissions inventories and generating ambient air quality estimates (in combination with invoking reasonable assumptions regarding initial and boundary conditions). Similarly, it is feasible to generate ambient air quality data with a trajectory model like RPM-II, with appropriate placement of emissions sources. However, that approach is cumbersome within the model framework as well as application specific and, consequently, not amenable to developing a robust screening tool. To overcome this difficulty, simplifying assumptions regarding background chemistry quality must be invoked. Such assumptions should yield conservative answers (i.e., high ozone generation) and, as a consequence of building in "conservatism" via air qualitiy assumptions, the need for case-specific representativeness diminishes. Accordingly, these screening tables are based on "prototypical", assumed characterizations of background chemistries, representing rural and urban locations. The following discussions outline the procedures used to develop base cave meteorological and chemical inputs so that conservative estimates of ozone formation would be produced from model runs performed with the various source emissions scenarios incorporated in the screening tables.

DEVELOPMENT OF REASONABLE WORST-CASE MODEL INPUTS (RURAL)

Background Air Chemistry

Ambient concentrations of all CB4 species (Table A1) assumed for rural background air are identical to those utilized in rural ozone modeling studies (PEI, 1988) performed with EPA's Regional Oxidant Model (ROM). Those concentrations were generated by applying the CBM-RR chemical mechanism (a more detailed version of the carbon bond mechanism) in a batch reactor mode under sequential 12-hour alternating periods of full sunlight and darkness until a relatively aged, steady state mixture was produced. Initial concentrations of NOx, CO, and NMOC were derived by EPA's Atmosphorlc Science and Research Laboratory (Schere, 1988).

The ambient NOx and hydrocarbon concentrations in Table A1 reflect generally low ozone precursor concentrations which might suggest a minimum of ozone forming potential, relative to a more concentrated urban mix. Although sonewhat counter-intuitive results derived from running various emissions mixes (VOC don$nated) with rural or urban background concentrations showed a greeter ozone increment with rural background air, under equivalent emission rates. This might simply be explained by considering that ozone forming potential already exists in urban air due to a large mass of pollutants implied in urban background concentrations. In contrast, ozone forming potential in rural air may be lacking key ingredients (NOx, reactive VOC) which when supplied results in a larger increment Also, low NO concentrations in rural air probably results in less ozone scavenging through direct titration.

Meteorological and Source Speciation Inputs

A prospective user of the screening tables would select an appropriate mass emission rate and NMOC/NOx emissions ratio to determine the ozone increments due to individual VOC/NOx sources. The tables have no provisions for specifying values of meteorological variables (such rigidity is common for most screening analyses). Furthermore, adjustment of the mix of emitted hydrocarbon fractions is not permitted, again keeping within reasonable restrictions imposed by a screening technique.

A base-case input file incorporating a single set of base-case values for meteorological parameters and one emissions reactivity mix was developed with the intention of providing conservative (worst case) ozone formation estimates. The screening tables represent runs based on those meteorological parameters with selected adjustments in emissions rates.

The set of meteorological parameters were chosen by running the model over a range of discrete values for one variable, while holding all other variables constant. A true factorial analysis of all possible combinations of wind speed plume dimensions, starting time and temperature was not performed because of the range, continuous nature and number of variables involved.

The procedures used to determine base-case meteorological inputs are listed below and followed by a discussion of the results from that analysis. For clarity, throughout the discussion "standared value" refers to the value which each variable is maintained while other variables are varied; the "standard value" should not be confused with "base-case" value, the determination of which was the object of this exercise.

Background Air - Concentrations of CB4 species representative of rural, continental U.S. locations as presented in Table A1 were held constant throughout each modeling run.

Emissions - A continuous mass emission rate of 10,000 tons/year NMOC was used for all runs designed to produce base-case values for meteorological variables. The NMOC/NOx; NOx/NO; CO/NMOC and hydrocarbon speciation partitioning were based on EKMA default values (EPA, 1988):

PPM CO/PPMC NMOC	-	1.2
PPMC NMOC/PPM NOx	-	10
PPM NOx/PPM NO	-	4

CB4 group fraction on PPMC basis

ETH	0.037
OLE	0.035
ALD2	0.052
FORM	0.021
TOL	0.089
XYL	0.117
PAR	0.564
NR	0.085

Additional related issues involving emissions scenarios are discussed below within the context of reactivity.

Location - In terms of model inputs, location only translates to diurnal variation of solar zenith angle. The EKMA default location of Los Angeles, California (Lat. 34.058; Long. 138.256; 6/21/75) was used in all runs, virtually no sensitivity resulted from varying latitude.

Starting Time - Starting times (i.e., plume emergence were incremented hourly from 0600 to 1200 LST (0800 standard start).

Wind Speed - Wind speeds were incremented by 1 m/s over a range from 1 m/s to 4 m/s. The standard wind speed for all rune was 4 m/s.

Plume Width - Spatially variant downwind plume widths were generated by specifying standard Pasquill-Gifford stability classes 1-5 with class 3 used as the standard stability class.

Plume Depth - Plume depths were incremented 200 m over a range from 300 m to 1500 m (500m standard depth).

Temperature - Temperatures were incremented 8 K over a range from 287 K to 311 K (303 K was standard).

Emissions NMOC Mix - In addition to the standard EKMA mix with a NMOC/NOX of 10, runs were performed with single-component NMOC emissions representing each CB4 class (except isoprene) and different NMOC/NOx ratios. To overcome numerical problems requiring excessive computational time for olefins, a mix of 70% olefins end 30% parafins was used in place of pure olefins.

These single-component emissions were run with mass emissions rates of CO and NOx that were identical to those applied for the standard EKMA emissions mix. Consequently, NMOC/NOx (PPMC/PPM basis) ratios varied somewhat due to differences in effective molecular weights among the emissions scenarios. All NMOC emissions were based on the standard mass emission rate of 10,000 tons/year. Also, additional NMOC/NOx ratios of 5 and 2 (based on standard EKMA mix) were applied for all emissions mixes.

RESULTS AND DISCUSSION

Meteorology:

Sensitivities of maximum ozone increments within a point source plume due to independent variation of several meteorological parameters are presented in Figures 1-5. Based on 13 these results and consideration of consistency among meteorological variables, the following values based on the subsequent analysis were chosen for base-case meteorological inputs to provide conservative ozone increment estimates:

wind speed - 1 m/s
horizontal stability - class C
plume depth - 700 m
ambient temperature - 311 K
start time - 1000 LST (NMOC/NOx > 5)
- 0700 LST (5 > NMOC/NOx > 1)
- 0600 LST (NMOC/NOx < 1)

Starting Time - Only minor sensitivity was attributed to varying starting time from 0600 to 1200 LST for standard mix with NMOC/NOx = 10 (Figure 1). Sensitivity to starting time increased as NMOC/NOx ratio decreased; at lower NMOC/NOx ratios earlier starting times produced larger ozone increments (Figures 2-3).

Sensitivity to starting time is strongly coupled to optimizing both NO to NO2 conversion and prividing adequate reactive VOC. At highNMOC/NOx, NO titration of ozone is not dominant and exposure of high incident radiation to concentrated NMOC (short time after start-up) produces large ozone increments. In contrast, at low NMOC/NOx ratios NO titration is a problem and the plume requires extended time to reach optimum ozone forming potential. Accordingly, an earlier start time which provides intense incident radiation upon segments sufficiently downwind such that a substantial percentage of NO has been converted (as well as diluted).

Wind Speed - Wind speed variations impart the greatest degree of sensitivity on maximum ozone increments (Figure 4). Successively smaller decreases in ozone impacts occur as wind speed increases from 1 to 5 m/s; a reasonable response since, in effect, a 2-fold increase in wind speed represents a 50% decrease in the effective emissions rate injected into a plume segment. In addition, a dilution effect due to increased dispersion near the source accompanies elevated wind speeds.

Stability Class (Horizontal dispersion) - Ozone formation increased as stability classes were changed from Class A(1) to

Class E(5) (Figure 5), an expected response related to successively less downwind dilution when proceeding through higher stability categories. In the context of this analysis Class D and E stabilities yield large ozone increments; but these classes are clearly inconsistent with other optimal ozone forming conditions (full sunlight, light winds). In following a conservative approach consistent with any screening protocol selection of Class C stability is appropriate. Actually, the selection of a more stable dispersion scenario is consistent with the notion of plume meander whereby plume dispersion calculated from standard dispersion parameters encompasses a complete crosswind profile due to plume meander, yet the effective crosswind plume dimension (where reactions occur) is governed by an instantaneous crosswind dimension. While plume meander certainly increases areal exposure to a particular plume, reactivity is dependent on actual crosswind dimensions at a point in time.

Plume depth - The ozone formation response to plume depth (held constant throughout time) is similar to that for wind speed (Figure 6), an apparent dilution phenomenom. The selection of 700 m maximum plume depth is, admittedly, somewhat arbitrary. Certainly an upper bound must be imposed to account for low mixing heights, otherwise a plume would grow indefinitely, and rather rapidly, over time. While the existence of 700 m mixing heights is not uncommon, the occurrence of such a low mixing height under optimal ozone forming conditions is not likely in many locations. Nevertheless, an upper bound must be imposed and, as illustrated in Figure 6, the difference in maximum ozone increments between 700 mand 900 m is about 15 %. Furthermore, observed summertime, afternoon measurements of plume depths taken from the Tennessee Plume Study (Ludwig et a1., 1981) show plume depths typically ranging from 500 m to 700 m.

Temperature - Ozone formation increased with increased temperature (Figure 7), a result consistent with observed correlations among high temperature and high ozone levels. The selection of 311 K (100 °F) is not unreasonably high.

VOC Emissions Reactive Mix

The apportioning of emissions by CB4 classes would typically be set by a particular source profile for a refined modeling application. Since screening tables are designed to provide a simple and robust screening procedure, out of necessity the emissions mix becomes a bariable which must be addressed when developing a worst-case baseline input file. A robust method conceivably should bracket the limitless variety of VOC mixes, a rather encompassing objective. To that end a crude attempt at bracketing a range of all possible VOC point source emissions was developed by running the RPM-II with single-component NMOC emissions for each CB4 category.

Results of this analysis ara shown in Figures 8-l0 for three different NMOC/NOx ratios. All VOC emissions rates were held at 10,000 tons/year, and NMOC/NOx and NMOC/CO ratios were based on the standard EKMA mix. The large NMOC emissions rate of 10,000 tons/year was not intended to be representative; the rate was used to better indentify trends which otherwise might have been lost in numerical noise. The ratios varied slightly among the different mixes because of differences in VOC molecular weights. To provide consistency all mass rates for NOx (at a given NMOC/Nox ratio) and CO were identical for different mixes (the NMOC/NOx ratio is volume based). Consequently, different NMOC molar emissions rates existed among mixes, with higher molar emission rates for lower weight classes (e.g. paraffins). The decision to base this analysis on mass emissions is based on the expectation that the anticipated users of this screening technique will address permitting issues based on mass emission rates.

As shown in Figures 8-10, variation in ozone increments predicted for different CB4 components range up to about 1.5 times the ozone increment obtained with a standard EKMA urban mix. Accordingly, the EKMA mix is retained for all screening analyses and application will requre a scale-up factor of 1.5. It should be noted that a 70 % olefln mix is unrealistic as most olefin-named compounds are composed of chains dominated by paraffin bonds. At first glance the magnitude of differences among various mixes is surprising within the context of k-OH values for the various CB4 groups (listed bolow) - thls topic is pursued further in a later section regarding urban table development.

CB4 Class	k-OH (min^{-1})
ETH	5824
OLE	20422
ALD2	11833
FORM	15000
TOL	1284
XYL	4497
PAR	1203
EKMA MIX	3180

Rural Area Screening Tables

Results from a matrix of runs covering a range of VOC emission rates and NMOC/NOx emissions ratios are presented in Table A2. In order to maintain a consistent basis for data evaluation, all Table A2 results are based on a 1000 LST start time. Several trends exist among the data in Table A2:

* At NMOC ratios greater than 3, any increase in NMOC loading leads to an increased ozone maximum

* As VOC loading rate increases an optimal NMOC/NOx emissions ratio exists, and this ratio shifts to lower values as NMOC source size increases.

* At NMOC/NOx emissions ratios less than 3, VOC loading increases can lead to relative decreases in ozone maximums as wall as oxone deficits during one solar day.

A simplified version of Table A2 is presented as the rural area screening table in section 3.0 (Table 1). The effects of NMOC/NOx ratios have been attenuated somewhat by presenting three broad NMOC/NOx ratios. The results under each range reflects a scale-up factor of 1.5 and are based on the most conservative (maximum ozone producing) NMOC/NOx ratio each rango > 20 (NMOC/NOx = 20); 5-20 (12 - see Figure 11); < 5 (5). In addition the results in Table 1 are based on optimal starting times for different NMOC/NOx ratios and adjusted by using a reactivity scale-up factor of 1.5.

DEVELOPMENT OF REASONABLE WORST-CASE MODEL INPUTS (URBAN)

Unless listed below, all model inputs used to develop urban screening tables were identical to those used for rural tables.

Specifically, these similar inputs include plume geometry, wind speed and ambient temperature.

<u>Background Air Chemistry</u>

A diurnal concentration and composition profile for background air chemistry was prepared by conducting 8 A.M.-6 P.M. simulations using the ambient mode option (batch reactor) in RPM-II followed by a plume simulation using a 10,000 ton/yr VOC emissions source with composition described above in the rural table development secton. The ambient mode sumulation develops background profiles for all CB4 species (inorganics, intermediates, precursors and sinks). In turn, the background air devoloped by the ambient simulation can become entrained (and available for reaction) within the source emissions plume during the subsequent plume simulation.

A rather crude attempt at determining a "reasonable worst-case" background profile consisted of running various simulations using different precursor levels to identity a set of precursors which produces 1) a relative maximum ozone increment during the plume simulation and 2) a background profile characteristic, in a broad sence, of urban air quality. Initial concentrations of precursors used to drive tho ambient simulation were based on starting with OZIPM4 default values (listed below) for NMOC, NOx and CO composition and concentration, and scaling those values downward and across-the-board (i.e., reducing total precursor concentration yet retaining default composition) such that conditions 1) and 2) were achieved. The downward scaling is required because the ambient mode option in RPM-II has no provision for adjusting mixing height; consequently, a set of precursors which might produce a realistic profile with typical diurnal dilution yields highly concentrated, unrealistic cancentrations with a constant reactor volume constraint.

OZIPM4 DEFAULT PRECURSOR INPUTS

NMOC Total	1.0	ppmc	OLE	0.0175	ppm
Nox Total	0.1	ppm	ETH	0.0185	ppm
NO2	0.025	ppm	FORM	0.021	ppm
NO	0.075	ppm	TOL	0.0127	ppm
CO	1.2	ppm	ALD2	0.026	ppm
PAR	0.564	ppm	NR	0.085	ppm
XYL	0.146	ppm	H2O	20,000	ppm

The results of several simulations are presented in Figure 12. The OZIPM4 default set of precursors without reduction produces an excessively high peak background ozone concentration of 46.4 pphm. subsequent simulations with across-the-board precursor reductions resulted in successively larger ozone increments and lower peak ambient ozone concentrations. The set of precursor inputs corresponding to 16 % of default values produced the largest ozone increment while achieving ambient ozone above 12 pphm. Accordingly, that set of precursors were used for developing the urban screening tables (unadjusted - Table A3, adjusted - Table 2, main text).

Starting Time

The precursor concentrations reflect 6-9 A.M. values. Thus, to provide consistency with precursor composition, all simulations started at 8 A.M. LST.

VOC Emissions Reactive Mix

Results of modal runs conducted with single-component CB4 mixes at different NMOC/NOx ratios show substantial differences on formation of ozone increments (Figure 12). These results contrast sharply with the analogous set of rural based simulations (Figures 8-10). The urban based ozone increment due to olefins is more than five times that of the EKMA mix at an NMOX/NOx ratio of 10, whereas only a 50 % increase occurred in the rural analysis. Differences among the more reactive urban mixes and the EKMA mix diverge further at lower XMOC/NOx ratios. Also, a large dependence on NOx which produces a shift from reactive to much less reactive (high to low NMOC/NOx ratio) occurs with formaldehyde.

For the purpose of preparing a "single" urban screening table, a scale-up factor of 3 was applied to the results in Table A3 (urban area increments as a function of VOC emissions rates and NMOC/NOx emissions ratios) to derive the urban screening table (Table 2). The value of 3 is not entirely arbitrary. Based on the results in Figure 13, a scale-up factor of 5 might be more appropriate. However, because so much conservatism is built in to the meteorological and, to a certain degree, the background chemistry inputs, collecting the most reactive mixes for scale-up would probably result in a screening out of nearly all VOC point sources. The factor 3 was determined by surveying the weighted k-OH values of VOC species profiles in the Air Emissions Speciation Manual (EPA, 1988). The weighted k-OH of the 90th percentile (about 9000 min-1) was nearly three times that of the standard EKMA mix used in formulating Table A3 (Baugues, 1988). Considering that the highest weighted k-OH values for the VOC species profiles exceeded 20,000 min-1, scaling by 3 might be viewed as a less drastic approach.

CONCLUDING REMARKS

These reactivity-sensitivity simulations suggest that background chemistry is a limiting factor in determining ozone increments due to ozone precursor emissions - hardly a surprising outcome. Such dependency on source composition, especially within urban atmospheres, infers that a single scale-up factor, as used for the rural table, is not adequate. One can always resort to more refined source specific analyses. Ideally, a thorough refined analysis would formulate background chemistry with the best available modeling techniques and let a source plume entrain those concentrations - the basic concept of the PARIS model which imbeds RPM-II within the Urban Airshed Model (UAM), which can utilize available meteorological, air quality and emissions (all categories) information to formulate background chemistry profiles. Such an exercise is highly resource intensive, and thus a motivation for developing a usable screening approach. _

Clearly, a need exists for accommodating variations in point source VOC speciation within the context of a screening analysis. It is suggested that the concept of an extended screening approach which allows source specific emissions speciation inputs be pursued. a possible approach could utilize the apparent, conservative meteorological inputs developed for these tables (and/or from additional efforts) as default inputs to RPM-II in combination with best estimates of the composition of a specified source. This approach would eliminate the major difficulties in operating a model such as RMP-II - characterization of meteorology and background chemistry.

Table A1. Background species concentrations (ppm) taken to be representative of "clean" atmospheric conditions

ALD2	9.005E-5	NO	5.054E-5
H2O2	1.084E-3	OH	2.947E-7
MGLY	1.529E-6	PHO	4.124E-9
O	1.496E-10	XYL	1.296E-9
PAR	3.224E-3	ETH	1.681E-5
XO2	1.171E-5	HO2	2.496E-5
C2O3	7.389E-7	NO2	1.491E-4
N2O5	1.723E-9	OLE	4.676E-9
O3	3.193E-2	FORM	1.148E-3
PHEN	4.286E-5	ISOP	0.000E+0
XO2N	1.417E-6	NO3	2.041E-8
CO	9.873E-2	PAN	5.167E-5
HNO3	1.646E-3	TOL	1.219E-5

from (PEI, 1988)

Table A2. Rural based ozne increment (pppm) as a function of NMOC emissions and NMOC/NOx emissions ratios.

NMOC EMISSIONS (TONS/YR)	ALL VOC	NMOC/NOx (PPMC/PPM) 30	20	15	12	10	5	3	1
50	0.21	0.23	0.24	0.25	0.25	0.27	0.35	0.42	0.70
75	0.21	0.24	0.25	0.27	0.29	0.32	0.42	0.53	0.83
100	0.20	0.27	0.28	0.31	0.34	0.36	0.49	0.63	0.92
300	0.19	0.44	0.53	0.60	0.69	0.72	0.94	1.09	1.14
500	0.18	0.63	0.76	0.88	0.96	1.02	1.25	1.36	0.87
750	0.16	0.85	1.05	1.17	1.29	1.32	1.55	l.55	0.39
1000	0.15	1.08	1.33	1.46	l.57	1.59	1.80	1.68	0.12
1500	0.15	1.47	1.82	2.01	2.03	2.15	2.20	1.70	-
2000	0.15	1.86	2.24	2.48	2.56	2.65	2.44	1.61	-
3000	0.15	2.63	3.20	3.39	3.46	3.54	2.87	1.29	-
5000	0.15	3.93	4.65	4.88	5.00	4.97	3.22	0.90	-
7500	0.14	5.49	6.52	6.63	6.73	6.63	3.40	0.75	-
10000	0.13	6.83	8.11	8.22	8.57	8.06	3.62	0.65	-

- indicates no discernible ozone enhancement

Table A3. Urban based ozone increment (pphm) as a function of NMOC emissions and NMOC/NOX ratios.

NMOC EMISSIONS (TONS/YR)	ALL VOC	NMOC/NOx (PPMC/PPM) 30	20	15	10	5	3	1
50	0.38	0.27	0.36	0.36	0.36	0.34	0.32	0.21
75	0.39	0.39	0.38	0.38	0.38	0.3S	0.32	0.20
100	0.42	0.40	0.40	0.40	0.39	0.3S	0.32	0.22
300	0.59	0.57	0.54	0.52	0.51	0.42	0.34	0.62
500	0.74	0.71	0.68	0.68	0.62	0.46	0.48	0.93
750	1.09	0.90	0.87	0.85	0.78	0.61	0.65	1.31
1000	1.38	1.08	1.07	1.02	0.91	0.74	0.89	1.56
1500	1.93	1.61	1.41	1.36	1.21	1.02	1.27	1.64
2000	2.35	2.07	1.80	1.68	1.48	1.33	1.63	1.24
3000	3.16	2.81	2.59	2.28	2.00	1.95	2.17	0.14
5000	4.43	4.31	4.01	3.43	3.11	2.99	3.09	-
7500	5.34	5.76	S.56	4.92	4.37	4.17	3.64	-
10000	5.90	7.03	6.93	6.31	5.49	5.17	3.55	-

- indicates no discernible ozone enhancement

Figure 1. Starting Time

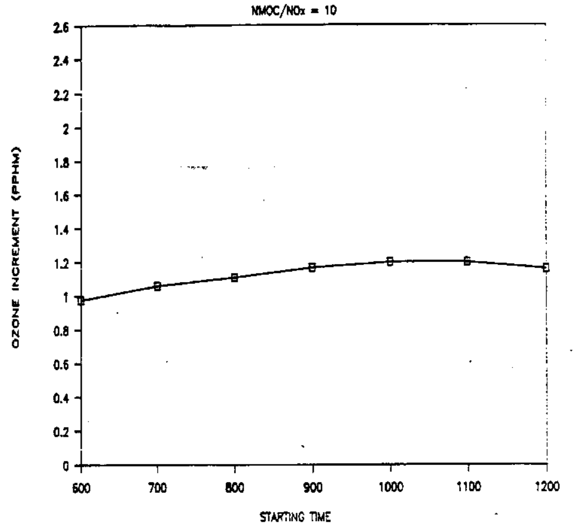


Figure 2. Starting Time

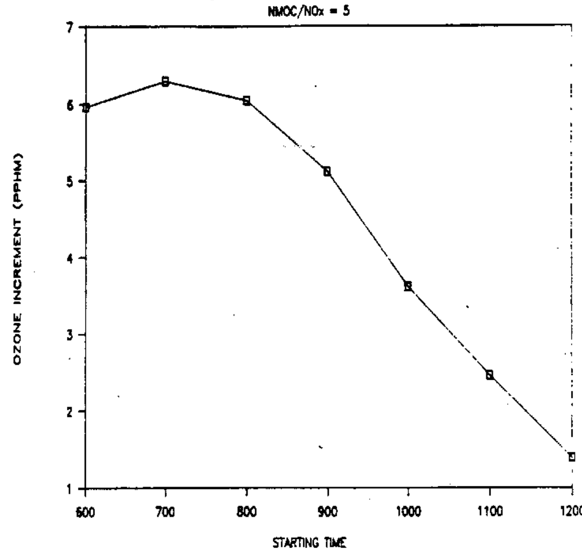


Figure 3. Starting Time

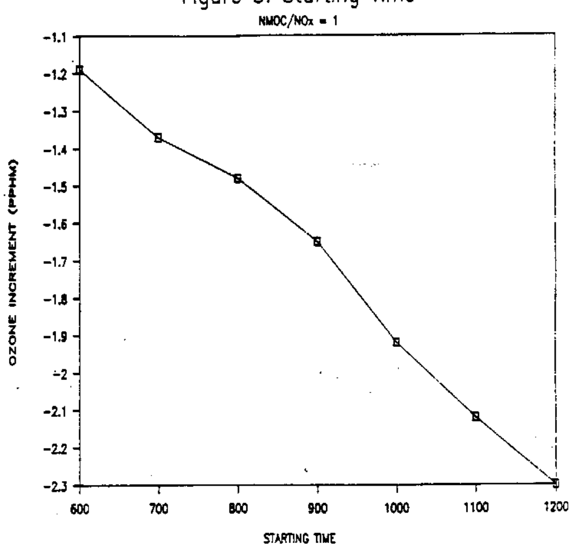


Figure 4. Wind Speed

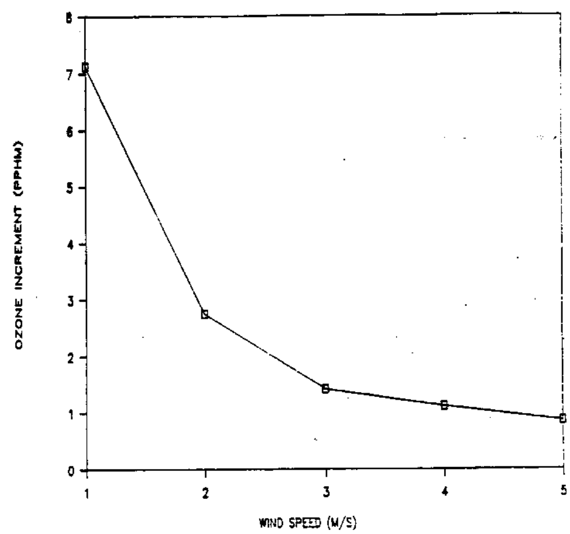


Figure 5. Stability Class

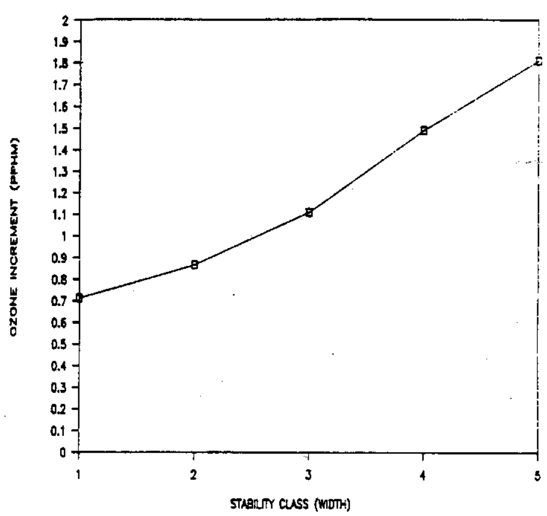


Figure 6. Plume Depth

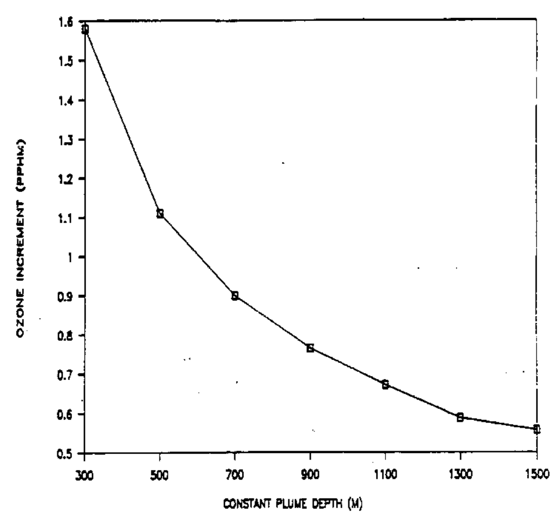


Figure 7. Temperature

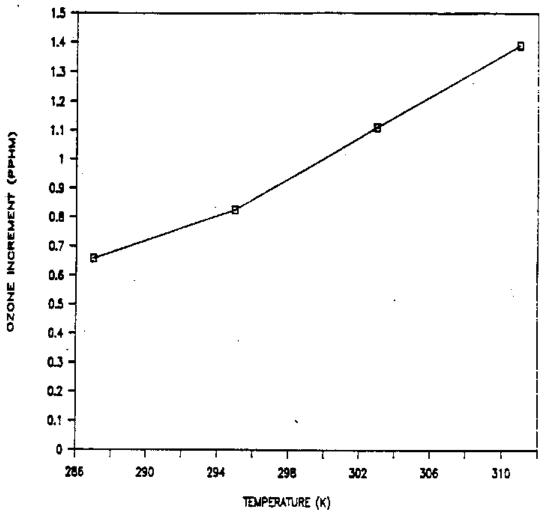


Figure 8. Single component CB4 emissions

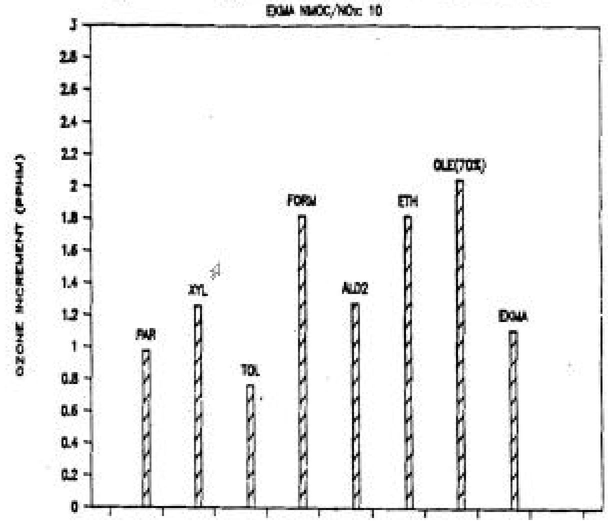


Figure 9. Single component CB4 emissions

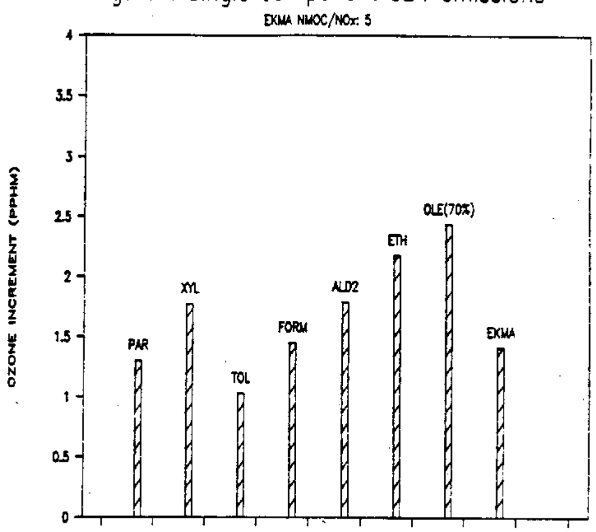


Fig. 10. Single component CB4 emissions

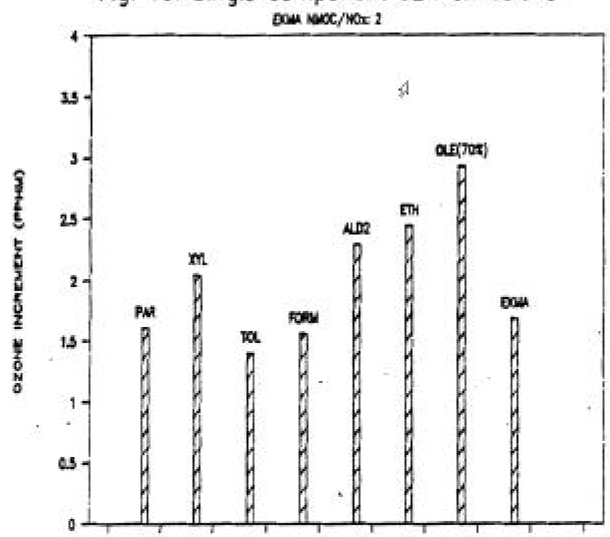


Figure 11. NMOC/NOx effect on ozone

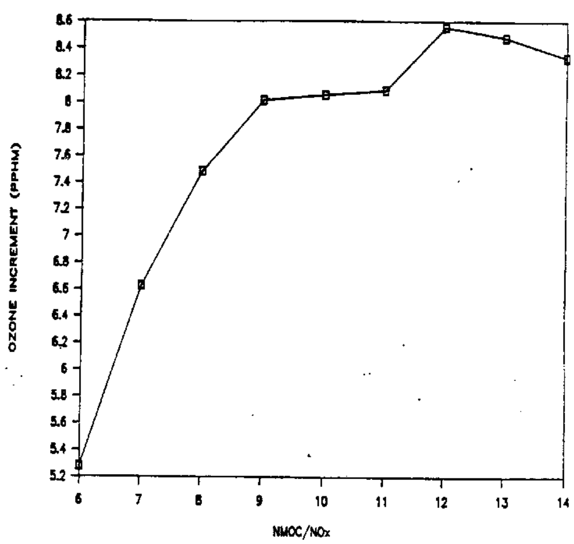


Figure 12. Effect of Urban Precursor Levels on Ozone Increment

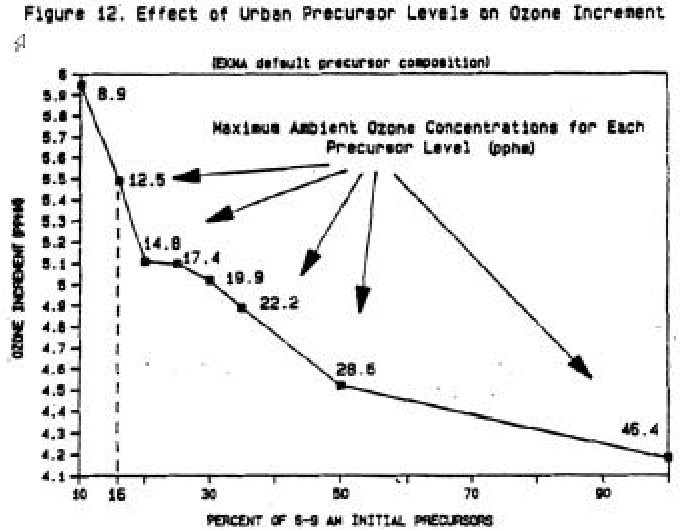
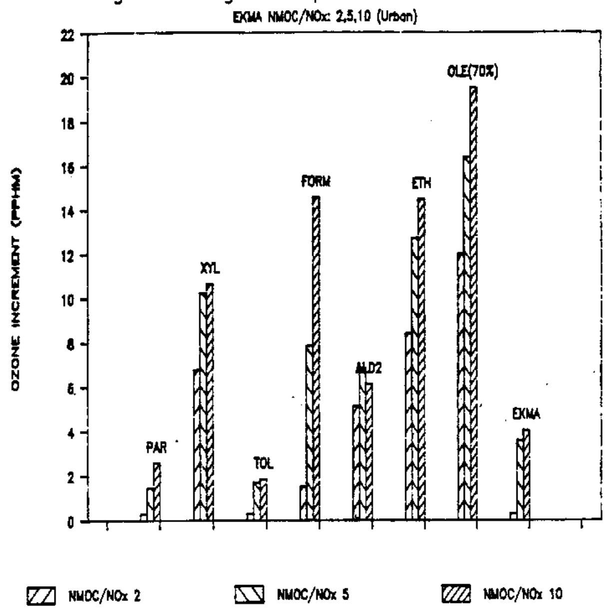


Fig. 13. Single Component CB4 Emissions

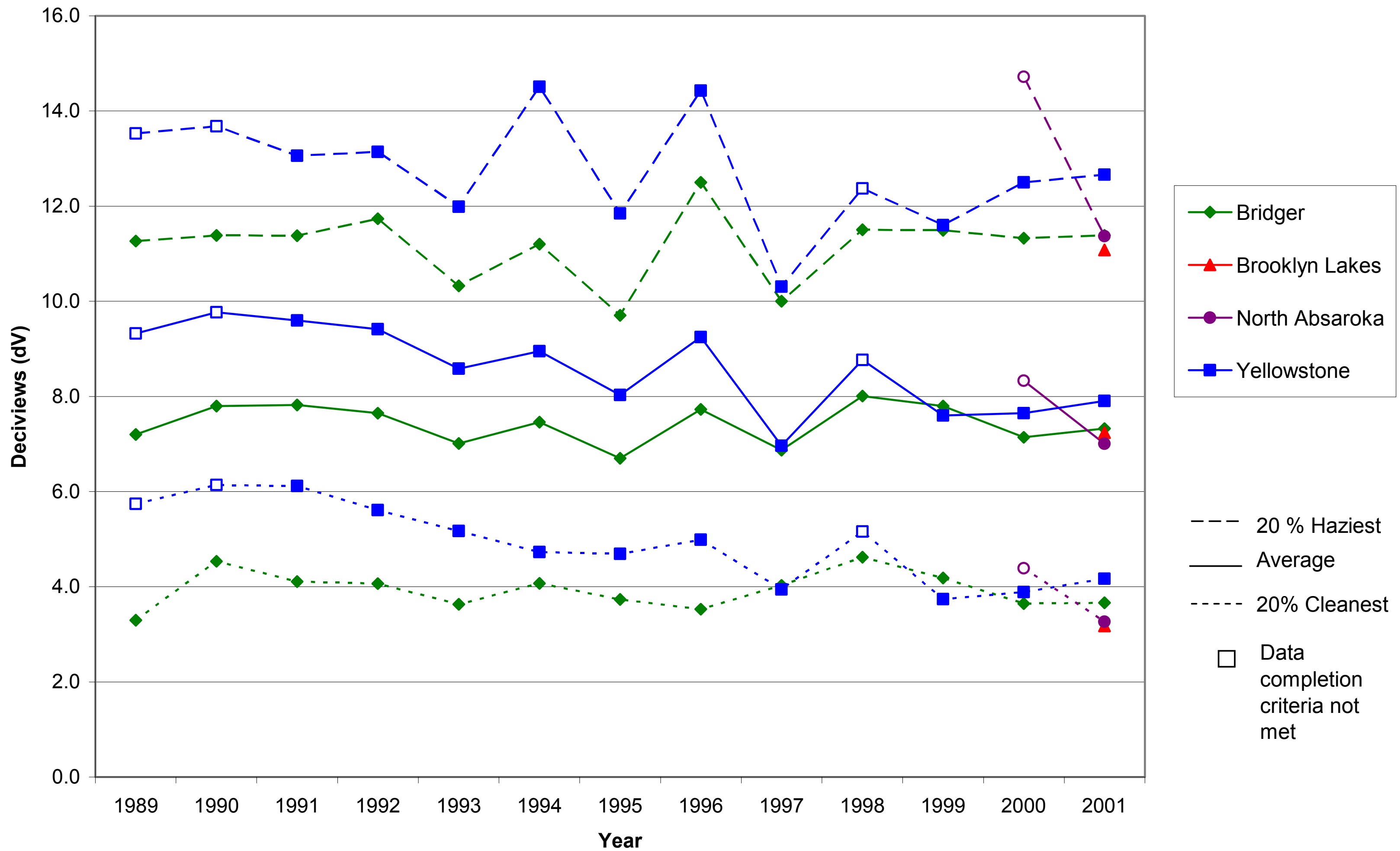


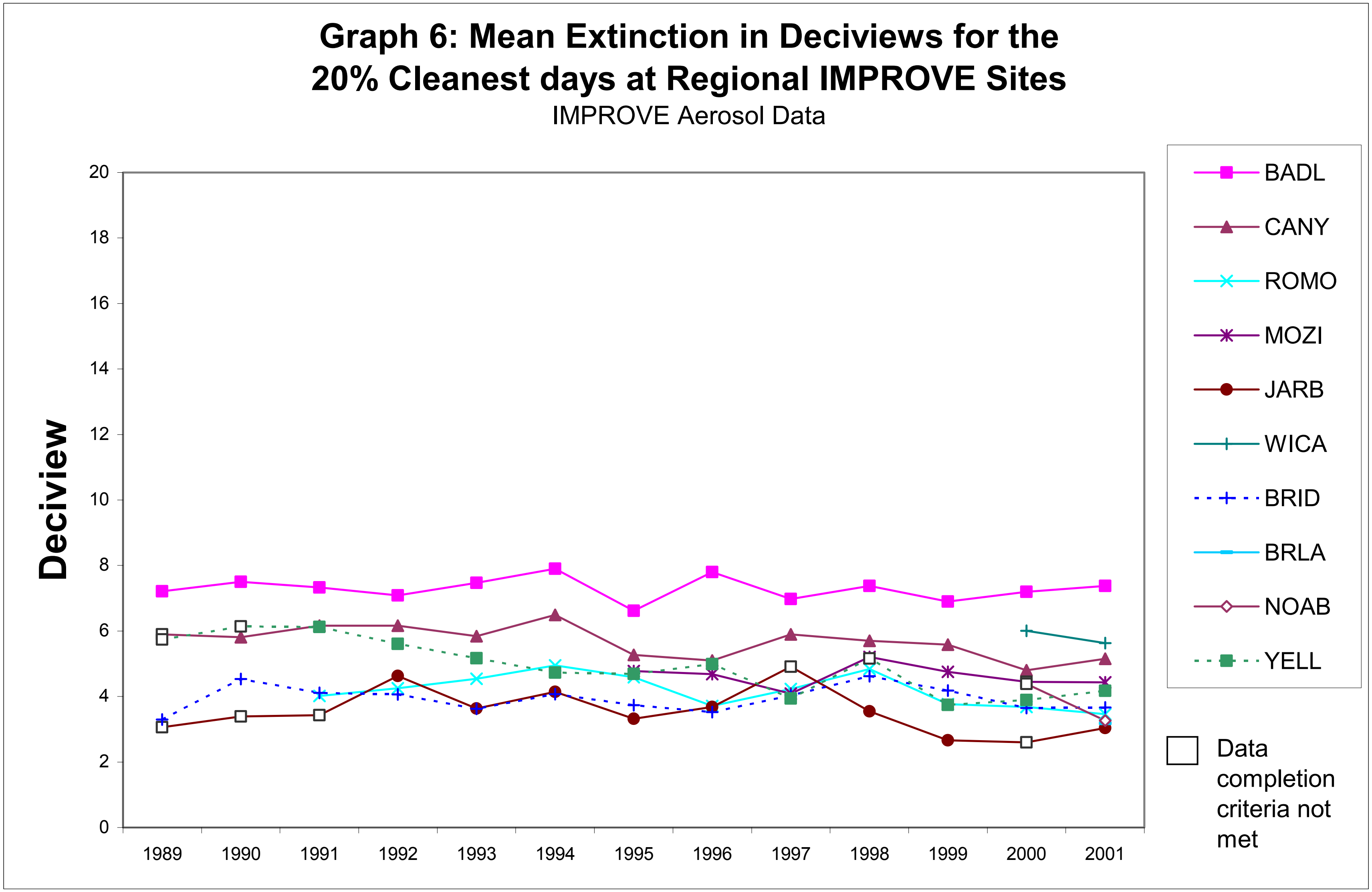
AIR QUALITY IMPACT ASSESSMENT PROTOCOL
APPENDIX B:

SOUTHWEST WYOMING VISIBILITY TRENDS

Graph 3: Reconstructed Total Extinction at IMPROVE Sites in Wyoming

IMPROVE Aerosol Data




Graph 6: Mean Extinction in Deciviews for the
20% Cleanest days at Regional IMPROVE Sites
IMPROVE Aerosol Data
Deciview
20
18
16
14
12
10
8
6
4
2
0
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
BADL
CANY
ROMO
MOZI
JARB
WICA
BRID
BRLA
NOAB
YELL
Data completion criteria not met

APPENDIX B:

PROJECT EMISSIONS INVENTORIES

APPENDIX B

The following is a list of the tables included within this appendix.

B.1.0 CONSTRUCTION EMISSION TABLES

Emissions listed in the construction emission tables are for all construction scenarios unless otherwise specified.

B.1.1 Well Pad Construction – 1 Well per Pad
B.1.2 Resource Road Construction
B.1.3 Well Pad/Resource Road Traffic
B.1.4 Well Pad/Resource Road Heavy Equipment Tailpipe
B.1.5 Rig Move and Drilling Traffic – Straight Drilling
B.1.6 Rig Move and Drilling Haul Truck Tailpipe –Straight Drilling
B.1.7 Drilling Emissions AP-42 – Straight Drilling
B.1.8 Drilling Emissions – Tier 1 – Straight Drilling
B.1.9 Drilling Emissions – Tier 2 – Straight Drilling
B.1.10 Completion/Testing Traffic
B.1.11 Completion/Testing Heavy Equipment Tailpipe
B.1.12 Completion Flaring
B.1.13 Pipeline Construction
B.1.14 Pipeline Construction Traffic
B.1.15 Pipeline Heavy Equipment Tailpipe
B.1.16 Construction Wind Erosion – 1 Well per Pad

The following tables show construction emissions for the multiple well pad scenarios. Emissions are only shown if the multiple well pad scenario varies from the single well pad scenarios.

B.1.17 Well Pad/Resource Road Construction – 2 Wells per Pad
B.1.18 Well Pad/Resource Road Construction – 5 Wells per Pad

B.1.19 Well Pad/Resource Road Construction – 10 Wells per Pad
B.1.20 Rig Move and Drilling Traffic – Directional Drilling
B.1.21 Rig Move and Drilling Haul Truck Tailpipe – Directional Drilling
B.1.22 Drilling Emission AP-42 – Directional Drilling
B.1.23 Drilling Emissions –Tier 1 – Directional Drilling
B.1.24 Drilling Emissions – Tier 2 – Directional Drilling
B.1.25 Wind Erosion – 2 Wells per Pad
B.1.26 Wind Erosion – 5 Wells per Pad
B.1.27 Wind Erosion – 10 Wells per Pad

B.2.0 PRODUCTION EMISSION TABLES

Emissions listed in the production emission tables are for all production scenarios unless otherwise specified.

B.2.1 Production Traffic – 1 Well per Pad
B.2.2 Production Heavy Equipment Tailpipe – 1 Well per Pad
B.2.3 Indirect Heater
B.2.4 Separator Heater
B.2.5 Dehydrator Reboiler Heater
B.2.6 Dehydrator Flashing
B.2.7 Fugitive HAPs and VOC
B.2.8 Condensate Storage Tank
B.2.9 Jonah Water Disposal Well
B.2.10 Bird Canyon Compressor Station
B.2.11 Falcon Compressor Station
B.2.12 Gobblers Knob Compressor Station
B.2.13 Jonah Compressor Station
B.2.14 Luman Compressor Station
B.2.15 Paradise Compressor Station
B.2.16 Wind Erosion – 1 Well per Pad

The following tables show production emissions for the multiple well pad scenarios. Emissions are only shown if the multiple well pad scenario varies from the single well pad scenarios.

B.2.17 Production Traffic – 2 Wells per Pad

B.2.18 Production Traffic – 5 Wells per Pad

B.2.19 Production Traffic – 10 Wells per Pad

B.2.20 Wind Erosion – 2 Wells per Pad

B.2.21 Wind Erosion – 5 Wells per Pad

B.2.22 Wind Erosion – 10 Wells per Pad

B.2.23 Relative Decline Curve for a Typical Jonah Field Well

B.2.24 Field-wide Emissions Summary by Year – Alternative A and Proposed Action

B.2.25 Field-wide Emissions Summary by Year – Alternative B

B.2.26 Field-wide Emissions Summary by Year – Preferred Alternative

Table B.1.1
Well Pad Construction - 1 Well per Pad

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: 1 well per pad
Activity: Well Pad Construction
Emissions: Fugitive Particulate Emissions from Well Pad Construction
Date: 3/24/2004

Well Pad Area	Construction Activity TSP Emission Factor[1]	Construction Activity Duration	Construction Activity Duration	Emission Control Efficiency	PM_{10} Emissions (controlled)[2]	$PM_{2.5}$ Emissions (controlled)[3]
(acre)	(tons/acre-month)	(days/well pad)	(hours/day)	(%)	(lb/well)	(lb/well)
3.8	1.2	4	10	50	218.88	57.76
				Well Pad Construction Emissions (lb/day/well)	54.72	14.44
				Well Pad Construction Emissions (lb/hr/well)	5.47	1.44

[1] AP-42 (EPA 2004), Section 13.2.3, "Heavy Construction Operations"; TSP = total suspended particulates.

[2] AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", Background Document. Assuming that 36% of the TSP is in the PM_{10} size range, monthly emissions converted to daily and hourly emissions based on 30-day month.

[3] AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", Background Document. Assuming that 9.5% of the TSP is in the $PM_{2.5}$ size range, monthly emissions converted to daily and hourly emissions based on 30-day month.

Table B.1.2
Resource Road Construction

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **All Scenarios**
Activity: **Resource Road Construction**
Emissions: **Fugitive Particulate Emissions from Resource Road Construction**
Date: **3/24/2004**

Resource Road Area[1]	Construction Activity TSP Emission Factor[2]	Construction Activity Duration	Construction Activity Duration	Emission Control Efficiency	PM_{10} Emissions (controlled)[3]	$PM_{2.5}$ Emissions (controlled)[4]
(acres)	(tons/acre-month)	(days/pad)	(hours/day)	(%)	(lb/pad)	(lb/pad)
1.3455	1.2	4	10	50	77.50	20.45
Resource Road Construction Emissions (lb/day/pad resource road segment)					19.38	5.11
Resource Road Construction Emissions (lb/hr/pad resource road segment)					1.94	0.51

1 Construction Area = 0.15-mi x 74-ft ROW = 1.3455 acres; TSP = total suspended particulates.

2 AP-42 (EPA 2004), Section 13.2.3, "Heavy Construction Operations".

3 AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", Background Document. Assuming that 36% of the TSP is in the PM_{10} size range, monthly emissions converted to daily and hourly emissions based on 30-day month.

4 AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", Background Document. Assuming that 9.5% of the TSP is in the $PM_{2.5}$ size range, monthly emissions converted to daily and hourly emissions based on 30-day month.

Table B.1.3
Well Pad/Resource Road Traffic

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **All Scenarios**
Activity: **Well Pad/Resource Road**
Emissions: **Fugitive Particulate Emissions from Traffic on Unpaved Roads**
Date: **3/24/2004**

Vehicle Type	Road Type	Dust Control Method	Average Vehicle Weight	Average Vehicle Speed	Silt Content[1]	Moisture Content[2]	Round Trips (RTs)	RT Distance	Vehicle Miles Traveled (VMT)[3]	Emission Control Efficiency	PM_{10} Emission Factor[4]	$PM_{2.5}$ Emission Factor[4]	PM_{10} Emissions[5] (controlled)	$PM_{2.5}$ Emissions[5] (controlled)
			(lb)	(mph)	(%)	(%)	(RT/pad)	(miles)	(VMT/pad)	(%)	(lb/VMT)	(lb/VMT)	(lb/pad)	(lb/pad)
Gravel/haul trucks	Primary Access	magnesium chloride	35,000	20	5.1	2.4	8	14	112	85	1.54	0.24	25.80	3.96
	Resource	water	35,000	15	5.1	2.4	8	5	40	50	1.54	0.24	30.71	4.71
Light trucks/pickups	Primary Access	magnesium chloride	7,000	30	5.1	2.4	12	14	168	85	0.56	0.08	14.08	2.10
	Resource	water	7,000	20	5.1	2.4	12	5	60	50	0.46	0.07	13.68	2.04
Total Unpaved Road Traffic Emissions (lb/pad)													84.27	12.81
Total Unpaved Road Traffic Emissions (lb/hr/pad)[6]													2.11	0.32

1 AP-42 (EPA 2004), Table 13.2.2-1, "Typical Silt Content Values of Surface Material on Industrial and Rural Unpaved Roads."
2 AP-42 (EPA 2004), Table 11.9-3, "Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations."
3 Calculated as Round Trips per Vehicle Type x Round Trip Distance.
4 AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", equations 1a and 1b.
5 Calculated as lb/VMT x VMT/pad x control efficiency.
6 Calculated as lb/well; 4 days/well; 10 hours/day; and represents emissions for 9.5-mile segment of road.

Table B.1.4
Well Pad/Resource Road Heavy Equipment Tailpipe

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: All Scenarios
Activity: Well Pad/Resource
Emissions: Diesel Combustion Emissions from Heavy Equipment Tailpipes
Date: 3/24/2004

Heavy Equipment	Engine Horsepower	Number Required	Operating Load Factor[1]	Pollutant Emission Factor[2] (g/hp-hr)					Construction Activity Duration (days/equipment type)	Construction Activity Duration (hours/day)	Pollutant Emissions (lb/well)					Pollutant Emissions[4] (lb/hr/well)				
	(hp)			CO	NO_x	SO_2	VOC	PM_{10}			CO	NO_x	SO_2	VOC	PM_{10}[5]	CO	NO_x	SO_2	VOC	PM_{10}[5]
Scraper	700	2	0.4	2.45	7.46	0.901	0.55	0.789	4	10	120.99	368.40	44.49	27.16	38.96	3.02	9.21	1.11	0.68	0.97
Motor Grader	250	1	0.4	1.54	7.14	0.874	0.36	0.625	4	10	13.58	62.96	7.71	3.17	5.51	0.34	1.57	0.19	0.08	0.14
D8 Dozer[3]	210	1	0.4	2.15	7.81	0.851	0.75	0.692	2	10	7.96	28.93	3.15	2.78	2.56	0.40	1.45	0.16	0.14	0.13
Total Heavy Equipment Tailpipe Emissions											142.53	460.28	55.35	33.11	47.04	3.76	12.23	1.46	0.90	1.24

[1] Taken from "Surface Mining" (Pfleider 1972) for average service duty.
[2] AP-42 (EPA 1985), Volume II Mobile Sources.
[3] Emission factor for track-type tractor.
[4] Calculated as lb/well; days/equipment type; 10 hours/day.
[5] $PM_{2.5}$ assumed equivalent to PM_{10} for combustion sources.

Table B.1.5
Rig Move and Drilling Traffic - Straight Drilling

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **Straight Drilling**
Activity: **Rig Move and Drilling**
Emissions: **Fugitive Particulate Emissions from Traffic on Unpaved Roads**
Date: **3/24/2004**

Vehicle Type	Road Type	Dust Control Method	Average Vehicle Weight	Average Vehicle Speed	Silt Content[2]	Moisture Content[3]	RTs per Well	RT Distance	VMT [4]	Emission Control Efficiency	PM_{10} Emission Factor[5]	$PM_{2.5}$ Emission Factor[5]	PM_{10} Emissions[6] (controlled)	$PM_{2.5}$ Emissions[6] (controlled)
			(lb)	(mph)	(%)	(%)		(miles)	(VMT/pad)	(%)	(lb/VMT)	(lb/VMT)	(lb/well)	(lb/well)
Semis-tractor/ trailer/mud/water/	Primary Access	magnesium chloride	44,000	20	5.1	2.4	140	14	1,960	85	1.70	0.26	500.47	76.74
fuel/cement trucks[1]	Resource	water	44,000	15	5.1	2.4	140	5	700	50	1.70	0.26	595.79	91.35
Logging/mud trucks	Primary Access	magnesium chloride	48,000	20	5.1	2.4	10	14	140	85	1.77	0.27	37.18	5.70
	Resource	water	48,000	15	5.1	2.4	10	5	50	50	1.77	0.27	44.26	6.79
Roustabouts/welders / hot-shot/contract	Primary Access	magnesium chloride	20,000	30	5.1	2.4	20	14	280	85	1.19	0.18	50.14	7.69
labor	Resource	water	20,000	20	5.1	2.4	20	5	100	50	1.19	0.18	59.69	9.15
Vendors/marketers/ various	Primary Access	magnesium chloride	7,000	30	5.1	2.4	30	14	420	85	0.56	0.083	35.19	5.26
	Resource	water	7,000	20	5.1	2.4	30	5	150	50	0.46	0.068	34.20	5.11
Total Unpaved Road Traffic Emissions (lb/well)													1,356.90	207.79
Total Unpaved Road Traffic Emissions (lb/hr/well)[7]													2.57	0.39

[1] Semi vehicle weight range is 28,000-60,000 lbs; average weight of 44,000 lbs used for calculations.

[2] AP-42 (EPA 2004), Table 13.2.2-1, "Typical Silt Content Values of Surface Material on Industrial and Rural Unpaved Roads."

[3] AP-42 (EPA 2004), Table 11.9-3, "Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations."

[4] Calculated as Round Trips per Vehicle Type x Round Trip Distance.

[5] AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", equations 1a and 1b.

[6] Calculated as lb/VMT x VMT/pad x control efficiency.

[7] Calculated as (lb/well); 22 days/well; 24 hours/day, and represents emissions for 9.5-mile segment of road. Total duration is 22 days for a vertical well, including rig move duration of 3 days per well.

Table B.1.6
Rig Move and Drilling Haul Truck Tailpipe - Straight Drilling

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **Straight Drilling**
Activity: **Rig Move and Drilling**
Emissions: **Diesel Combustion Emissions from Heavy Equipment Tailpipes**
Date: **3/24/2004**

Pollutant	Pollutant Emission Factor[1]	Total Haul Truck RTs	RT Distance	Total Haul Truck Miles Traveled	Haul Activity Duration	Haul Activity Duration	Emissions	Emissions[3]
	(g/mile)	(RTs/well)	(miles/RT)	(miles/well)	(days/well)	(hours/day)	(lb/well)	(lb/hr/well)
CO	14.74	170	19	3230	22	24	104.96	0.20
NO_x	11.44	170	19	3230	22	24	81.46	0.15
SO_2[2]	0.32	170	19	3230	22	24	2.26	0.0043
VOC	5.69	170	19	3230	22	24	40.52	0.08

[1] AP-42 (EPA 1985), Volume II Mobile Sources. Heavy duty diesel engine powered trucks, high altitude, 20 mph, "aged" with 50,000 miles, 1997+ model.

[2] The SO_2 emission factor is calculated assuming 10 mpg fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal.

[3] Calculated as lb/well; 22 days/well; 24 hours/day.

Table B.1.7
Drilling Emissions AP-42 - Straight Drilling

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: Straight Drilling
Activity: Drilling
Emissions: Diesel Combustion Emissions from Drilling Engines - EPA AP-42
Date: 3/24/2004

Pollutant	Pollutant Emission Factor[1] (lb/hp-hr)	Total Horsepower (hp) All Engines[2] (hp)	Overall Load Factor[3]	Drilling Activity Duration (days/well)	Drilling Activity Duration (hours/day)	Emissions (lb/well)	Emissions (lb/hr/well)
CO	0.00668	2,100	0.42	19	24	2,702.63	5.93
NOx	0.031	2,100	0.42	19	24	12,542.17	27.50
SO_2[4]	0.00205	2,100	0.42	19	24	829.40	1.82
VOC	0.0025	2,100	0.42	19	24	1,011.47	2.22
PM_{10}[5]	0.0022	2,100	0.42	19	24	890.09	1.95

Stack Parameters

Height	5 m
Temperature	700 Kelvin
Diameter	0.2 m
Velocity	25 m/s

5 x 5 x 5 m structure used to determine downwash parameters for the drilling rigs.

[1] AP-42 (EPA 2004), Section 3.3, "Gasoline and Diesel Industrial Engines. Table 3.3-1, "Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines"; lb/hp-hr = pounds per horsepower-hour.

[2] Drilling engine horsepower based on three engines, two at 800 hp and one at 500 hp.

[3] The overall load factor is calculated based on average throttle setting of 65% and a load factor of 65%. Therefore, the overall load factor = 0.65 * 0.65 = 0.42.

[4] The SO_2 emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate calculated from Caterpillar's specification sheet for G3412, gas petroeleum drilling engine.

[5] $PM_{2.5}$ assumed equivalent to PM_{10} for drilling engines.

Table B.1.8
Drilling Emissions - Tier 1 - Straight Drilling

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **Straight Drilling**
Activity: **Drilling**
Emissions: **Diesel Combustion Emissions from Drilling Engines - EPA Tier 1**
Date: **3/24/2004**

Pollutant	Pollutant Emission Factor[1]	Total hp All Engines[2]	Overall Load Factor[3]	Drilling Activity Duration	Drilling Activity Duration	Emissions	Emissions
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr/well)
CO	0.0187	2,100	0.42	19	24	7,581.69	16.63
NOx	0.015	2,100	0.42	19	24	6,154.55	13.50
SO_2[4]	0.00035	2,100	0.42	19	24	139.77	0.31
VOC	0.0022	2,100	0.42	19	24	891.96	1.96
PM_{10}[5]	0.00088	2,100	0.42	19	24	356.79	0.78

Stack Parameters

Height	5 m
Temperature	700 Kelvin
Diameter	0.2 m
Velocity	25 m/s

5 x 5 x 5 m structure used to determine downwash parameters for the drilling rigs.

[1] Emission factor for Tier 1 engine taken from Diesel Net, Emissions Standards: USA: Nonroad Diesel Engines, Table 1, "EPA Tier 1-3 Nonroad Diesel Engine Emission Standards, g/kWh (g/bhp-hr)." Available on-line at http://www.dieselnet.com/standards/us/offroad.html.

[2] Drilling engine horsepower based on three engines, two at 800 hp and one at 500 hp.

[3] The overall load factor is calculated based on average throttle setting of 65% and a load factor of 65%. Therefore, the overall load factor = 0.65 * 0.65 = 0.42.

[4] The SO_2 emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate calculated from Caterpillar's specification sheets for G4312, gas petroleum drilling engine.

[5] $PM_{2.5}$ assumed equivalent to PM_{10} for drilling engines.

Table B.1.9
Drilling Emissions - Tier 2 - Straight Drilling

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **Straight Drilling**
Activity: **Drilling**
Emissions: **Diesel Combustion Emissions from Drilling Engines - EPA Tier 2**
Date: **3/24/2004**

Pollutant	Pollutant Emission Factor[1] (lb/hp-hr)	Total Horsepower All Engines[2] (hp)	Overall Load Factor[3]	Drilling Activity Duration (days/well)	Drilling Activity Duration (hours/day)	Emissions (lb/well)	Emissions (lb/hr/well)
CO	0.0057	2,100	0.42	19	24	2,319.11	5.09
NOx	0.0090	2,100	0.42	19	24	3,657.05	8.02
SO_2[4]	0.00035	2,100	0.42	19	24	139.77	0.31
VOC	0.0004	2,100	0.42	19	24	148.87	0.33
PM_{10}[5]	0.00033	2,100	0.42	19	24	133.79	0.29

Stack Parameters

Height	5 m
Temperature	700 Kelvin
Diameter	0.2 m
Velocity	25 m/s

5 x 5 x 5 m structure used to determine downwash parameters for the drilling rigs.

[1] Emission factor for Tier 2 engine taken from Diesel Net, Emissions Standards: USA: Nonroad Diesel Engines, Table 1, "EPA Tier 1-3 Nonroad Diesel Engine Emission Standards, g/kWh (g/bhp-hr)." Available on-line at http://www.dieselnet.com/standards/us/offroad.html.

[2] Drilling engine horsepower based on three engines, two at 800 hp and one at 500 hp.

[3] The overall load factor is calculated based on average throttle setting of 65% and a load factor of 65%. Therefore, the overall load factor = 0.65 * 0.65 = 0.42.

[4] The SO_2 emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate calculated from Caterpillar's specification sheets for G4312, gas petroleum drilling engine.

[5] $PM_{2.5}$ assumed equivalent to PM_{10} for drilling engines.

Table B.1.10
Completion/Testing Traffic

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: All Scenarios
Activity: Completion/Testing Traffic
Emissions: Fugitive Particulate Emissions from Traffic on Unpaved Roads
Date: 3/24/2004

Vehicle Type	Road Type	Dust Control Method	Average Vehicle Weight	Average Vehicle Speed	Silt Content[2]	Moisture Content[3]	RTs per Well	RT Distance	VMT[4]	Emission Control Efficiency	PM_{10} Emissions[5]	$PM_{2.5}$ Emissions[5]	PM_{10} Emissions[6] (controlled)	$PM_{2.5}$ Emissions[6] (controlled)
			(lb)	(mph)	(%)	(%)		(miles)	(VMT/well)	(%)	(lb/VMT)	(lb/VMT)	(lb/well)	(lb/well)
Semis/transport/ water/sand/frac	Primary Access	magnesium chloride	54,000	20	5.1	2.4	350	14	4,900	85	1.87	0.29	1,371.95	210.37
trucks[1]	Resource	water	54,000	15	5.1	2.4	350	5	1,750	50	1.87	0.29	1,633.27	250.44
Large Haul Trucks	Primary Access	magnesium chloride	48,000	20	5.1	2.4	50	14	700	85	1.77	0.27	185.88	28.50
	Resource	water	48,000	15	5.1	2.4	50	5	250	50	1.77	0.27	221.28	33.93
Small Haul Trucks	Primary Access	magnesium chloride	20,000	30	5.1	2.4	30	14	420	85	1.19	0.18	75.21	11.53
	Resource	water	20,000	20	5.1	2.4	30	5	150	50	1.19	0.18	89.54	13.73
Light trucks/ pick-ups	Primary Access	magnesium chloride	7,000	30	5.1	2.4	140	14	1,960	85	0.56	0.08	164.21	24.55
	Resource	water	7,000	20	5.1	2.4	140	5	700	50	0.46	0.07	159.58	23.84
Total Unpaved Road Traffic Emissions (lb/well)													3,900.91	596.87
Total Unpaved Road Traffic Emissions (lb/hr/well)[7]													6.56	1.00

[1] Semi vehicle weight range is 28,000-80,000 lbs; average weight of 54,000 lbs used for calculations.
[2] AP-42 (EPA 2004), Table 13.2.2-1, "Typical Silt Content Values of Surface Material on Industrial and Rural Unpaved Roads."
[3] AP-42 (EPA 2004), Table 11.9-3, "Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations."
[4] Calculated as Round Trips per Vehicle Type x Round Trip Distance.
[5] AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", equations 1a and 1b.
[6] Calculated as lb/VMT x VMT/pad x control efficiency.
[7] Calculated as lb/well; 35 days/well; 17 hours/day; and represents emissions for 9.5-mile segment of road.

Table B.1.11
Completion/Testing Heavy Equipment Tailpipe

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: All Scenarios
Activity: Completion/Testing
Emissions: Diesel Combustion Emissions from Heavy Equipment Tailpipes
Date: 3/24/2004

Pollutant	Pollutant Emission Factor[1] (g/mile)	Total Haul Truck RTs (RTs/well)	RT Distance (miles/RT)	Total Haul Truck Miles Traveled (miles/well)	Haul Activity Duration (days/well)	Haul Activity Duration (hours/day)	Emissions (lb/well)	Emissions[3] (lb/hr/well)
CO	14.74	430	19	8170	35	17	265.49	0.45
NO_x	11.44	430	19	8170	35	17	206.05	0.35
SO_2[2]	0.32	430	19	8170	35	17	5.72	0.0096
VOC	5.69	430	19	8170	35	17	102.49	0.17

1 AP-42 (EPA 1985), Volume II Mobile Sources. Heavy duty diesel engine powered trucks, high altitude, 20 mph, "aged" with 50,000 miles, 1997+ model.

2 The SO_2 emission factor is calculated assuming 10 mpg fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal.

3 Calculated as lb/well; 35 days/well; 17 hours/day.

Table B.1.12
Completion Flaring

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: All Scenarios
Activity: Completion/Testing Flaring
Emissions: Gas Flaring without High Pressure Flowback Separator Units
Date: 3/24/2004

Flaring Specifications:

Total Volume of Gas Emitted	35,000	mcf
Total Volume of Condensate Emitted	250	bbls
Average Heat Content	1,093	BTU/scf
Flaring/Flowback Activity Duration	120	hrs/well
Flaring Duration	80	hrs/well
Pre-ignition Flow-back Duration	40	hrs/well
Pre-ignition Flow-back Time Involving a Gas Stream	10	%
Actual Hours Gas is Vented	4	hrs
Total Hours in which Gas is Vented or Flared[1]	84	hrs
Average Flowrate of Gas[2]	416.67	mcf/hr
Total Volume of Gas Vented[3]	1,666.67	mcf
Total Volume of Flared Gas[4]	33,333.33	mcf
Average Flowrate of Condensate	2.98	bbls/hr
Pre-flare Volume of Condensate	11.90	bbls
Volume of Condensate Flared	238.10	bbls

Stack Parameters

Height	5 m
Temperature	1,273 Kelvin
Diameter	1.0 m
Velocity	20 m/s

Activity	Volume	Volume Units	Pollutant	Emission Factor	Emission Factor Units	Emission Factor Source[6]	Total Emissions (tons)	Duration (hours)	Hourly Emissions (lb/hr)
Venting - Natural Gas [5]	1,666.67	mcf	VOC	4.70	lb / 1000 scf	Gas Constituent Analysis	3.91	4	1,956.87
			HAP (total)	0.17	lb / 1000 scf	Gas Constituent Analysis	0.14	4	71.37
			n-Hexane	0.08	lb / 1000 scf	Gas Constituent Analysis	0.070	4	35.13
			Benzene	0.026	lb / 1000 scf	Gas Constituent Analysis	0.022	4	10.75
			Toluene	0.041	lb / 1000 scf	Gas Constituent Analysis	0.034	4	17.02
			Ethylbenzene	0.0019	lb / 1000 scf	Gas Constituent Analysis	0.0016	4	0.80
			Xylenes	0.018	lb / 1000 scf	Gas Constituent Analysis	0.015	4	7.67
Flaring - Natural Gas	33,333.33	mcf	NOx	0.068	lb / 10^6 BTU	AP-42 Section 13.5	1.24	80	30.97
			CO	0.37	lb / 10^6 BTU	AP-42 Section 13.5	6.74	80	168.49
			VOC	2.35	lb / 1000 scf	Gas Constituent Analysis	39.14	80	978.43
			HAP (total)	0.09	lb / 1000 scf	Gas Constituent Analysis	1.43	80	35.69
			n-Hexane	0.042	lb / 1000 scf	Gas Constituent Analysis	0.70	80	17.57
			Benzene	0.013	lb / 1000 scf	Gas Constituent Analysis	0.22	80	5.38
			Toluene	0.020	lb / 1000 scf	Gas Constituent Analysis	0.34	80	8.51
			Ethylbenzene	0.001	lb / 1000 scf	Gas Constituent Analysis	0.016	80	0.40
			Xylenes	0.009	lb / 1000 scf	Gas Constituent Analysis	0.15	80	3.83

Table B.1.12 (Continued)

Activity	Volume	Volume Units	Pollutant	Emission Factor	Emission Factor Units	Emission Factor Source[6]	Total Emissions (tons)	Duration (hours)	Hourly Emissions (lb/hr)
Flaring - Condensate	238.10	bbls	VOC	121.98	lb/bbl	Condensate Constituent Analysis	14.52	80	363.03
			HAP (total)	25.85	lb/bbl	Condensate Constituent Analysis	3.08	80	76.93
			n-hexane	4.59	lb/bbl	Condensate Constituent Analysis	0.55	80	13.67
			Benzene	1.42	lb/bbl	Condensate Constituent Analysis	0.17	80	4.22
			Toluene	6.11	lb/bbl	Condensate Constituent Analysis	0.73	80	18.19
			Ethylbenzene	0.74	lb/bbl	Condensate Constituent Analysis	0.09	80	2.19
			Xylenes	12.99	lb/bbl	Condensate Constituent Analysis	1.55	80	38.66

1 Calculated as 10% * 40 hrs of pre-ignition flowback + 80 hrs of flaring.

2 Calculated as 3,500 mcf/84 hrs.

3 Calculated as 416.67 mcf/hr * 4 hrs.

4 Calculated as 416.67 mcf/hr * 80 hrs.

5 An estimated 11.9 bbl of condensate are captured prior to flare ignition. Flashing from this condensate is not analyzed

6 For all emission factors that used the constituent analysis, a 50% destruction rate was assumed.

Table B.1.13
Pipeline Construction

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **All Scenarios**
Activity: **Pipeline Construction**
Emissions: **Fugitive Particulate Emissions from Pipeline Construction**
Date: **3/24/2004**

Pipeline Construction Area[1] (acres)	Construction Activity TSP Emission Factor[2] (tons/acre-month)	Construction Activity Duration (days/pad)	Construction Activity Duration (hours/day)	PM_{10} Emissions[3] (lb/pad)	$PM_{2.5}$ Emissions[4] (lb/pad)
0.45	1.2	4	8	52.36	13.82
		Pipeline Construction Emissions (lb/day/pad)		13.09	3.45
		Pipeline Construction Emissions (lb/hr/pad)		1.64	0.43

[1] Pipeline construction area = 0.15-mi x 25-ft ROW = 0.45 acres.

[2] AP-42 (EPA 2004), Section 13.2.3, "Heavy Construction Operations".

[3] AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", Background Document. Assuming that 36% of the TSP is in the $PM_{2.5}$ size range, monthly emissions converted to daily and hourly emissions based on 30-day month.

[4] AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", Background Document. Assuming that 9.5% of the TSP is in the $PM_{2.5}$ size range,

Table B.1.14
Pipeline Construction Traffic

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **All Scenarios**
Activity: **Pipeline Construction**
Emissions: **Fugitive Particulate Emissions from Unpaved Road Traffic**
Date: **3/24/2004**

Vehicle Type	Road Type	Dust Control Method	Average Vehicle Weight	Average Vehicle Speed	Silt Content[2]	Moisture Content[3]	RTs per pad	RT Distance	VMT[4]	Emission Control Efficiency	PM_{10} Emission Factor[5]	$PM_{2.5}$ Emission Factor[5]	PM_{10} Emissions[6] (controlled)	$PM_{2.5}$ Emissions[6] (controlled)
			(lb)	(mph)	(%)	(%)		(miles)	(VMT/pad)	(%)	(lb/VMT)	(lb/VMT)	(lb/pad)	(lb/pad)
Semis/transport, boom, equipment, water removal, sand, and gravel trucks[1]	Primary Access	magnesium chloride	54,000	20	5.1	2.4	8	14	112	85	1.87	0.29	31.36	4.81
	Resource	water	54,000	15	5.1	2.4	8	5	40	50	1.87	0.29	37.33	5.72
Light truck/pick-ups	Primary Access	magnesium chloride	7,000	30	5.1	2.4	12	14	168	85	0.23	0.03	5.80	0.86
	Resource	water	7,000	20	5.1	2.4	12	5	60	50	0.23	0.03	6.90	1.03
Total Unpaved Road Traffic Emissions (lb/pad)													81.39	12.42
Total Unpaved Road Traffic Emissions (lb/hr/pad)[7]													2.54	0.39

[1] Semi vehicle weight range is 28,000-80,000 lbs, average weight of 54,000 lbs used for calculations.
[2] AP-42 (EPA 2004), Table 13.2.2-1, "Typical Silt Content Values of Surface Material on Industrial and Rural Unpaved Roads."
[3] AP-42 (EPA 2004), Table 11.9-3, "Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations."
[4] Calculated as Round Trips per Vehicle Type x Round Trip Distance.
[5] AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", equations 1a and 1b.
[6] Calculated as lb/VMT x VMT/pad x control efficiency.
[7] Calculated as Emissions (lb/pad); 4 (days/pad); 8 (hours/day); and represents emissions over 9.5-mile segment of road.

Table B.1.15
Pipeline Heavy Equipment Tailpipe

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843

Project: Jonah Infill Drilling Project
Scenario: All Scenarios
Activity: Pipeline Construction
Emissions: Diesel Combustion Emissions from Heavy Equipment Tailpipes
Date: 3/24/2004

Heavy Equipment	Engine Horsepower (hp)	Number Required	Operating Load Factor	Pollutant Emission Factor[1] (g/hp-hr) CO	NO_x	SO_2	VOC	PM_{10}	Construction Activity Duration (days/equip type)	Construction Activity Duration (hours/day)	Pollutant Emissions (lb/well) CO	NO_x	SO_2	VOC	PM_{10}[6]	Pollutant Emissions[3] (lb/hr/well) CO	NO_x	SO_2	VOC	PM_{10}[6]
Grader	200	1	0.4	1.54	7.14	0.874	0.36	0.625	2	8	4.35	20.15	2.47	1.02	1.76	0.27	1.26	0.15	0.06	0.11
Excavator[2]	300	1	0.4	2.15	7.81	0.851	0.75	0.692	4	8	18.20	66.12	7.20	6.35	5.86	0.57	2.07	0.23	0.20	0.18
Trencher[3]	300	1	0.4	4.6	11.01	0.932	1.01	0.902	1	8	9.74	23.30	1.97	2.14	1.91	1.22	2.91	0.25	0.27	0.24
Tractor[4]	150	1	0.4	7.34	11.91	0.851	1.76	1.27	2	8	15.53	25.21	1.80	3.72	2.69	0.97	1.58	0.11	0.23	0.17
Total Emissions from Heavy Equipment Tailpipes											47.82	134.77	13.44	13.23	12.22	3.03	7.81	0.74	0.76	0.70

[1] AP-42 (EPA 1985), Volume II Mobile Sources; g/hp-hr = grams per horsepower-hour.
[2] Emission factor for track-type tractor.
[3] Emission factor for miscellaneous.
[4] Emissions factor for wheeled tractor.
[5] Calculated as lb/well; days/equipment type; 8 hours/day.
[6] $PM_{2.5}$ assumed equivalent to PM_{10} for combustion sources.

Table B.1.16
Construction Wind Erosion - 1 Well Per Pad

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **1 well per pad**
Activity: **Well Pad, Resource Road, Pipeline Construction**
Emissions: **Wind Erosion**
Date: **3/24/2004**

Emission Factor : 0.3733 lb/hr/100m^2

Based on AP-42 Chapter 13.2.5 (EPA 2004), Industrial Wind Erosion using Jonah Field, Wyoming meteorological data.

Control Efficiency: 50 %

Disturbed Area:

Well Pad Construction:	3.8	acres	15,378.60	m^2	
Access Road Construction:	1.3455	acres	5,445.24	m^2	(based on 74-ft ROW width, 0.15-mile length)
Pipeline Construction	0.45	acres	1,821.15	m^2	(based on 25-ft ROW width, 0.15-mile length)

Source Parameters
148 1-km area sources
sigma z = 2.33 m

PM_{10} Emissions Calculations:

	PM_{10} Emission Factor (lb/hr/100 m^2)	$PM_{2.5}$ Emission Factor (lb/hr/100 m^2)	Area (100 m^2)	Control Efficiency (%)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (lb/hr)	PM_{10} Emissions (g/sec)	$PM_{2.5}$ Emissions (g/sec)
Well Pad Construction:	0.3733	0.1493	153.79	50	28.70	11.48	3.62	1.45
Resource Road Construction	0.3733	0.1493	54.45	50	10.16	4.07	1.28	0.51
Pipeline Construction	0.3733	0.1493	18.21	50	3.40	1.36	0.43	0.17

Table B.1.17
Well Pad/Resource Road Construction - 2 Wells per Pad

TRC Environmental Corporation	**Project:** **Jonah Infill Drilling Project**
605 Skyline Drive	**Scenario:** **2 wells per pad**
Laramie, WY 82070	**Activity:** **Well Pad Construction**
Phone: (307) 742-3843	**Emissions:** **Fugitive Particulate Emissions from Well Pad Construction**
Fax: (307) 745-8317	**Date:** **3/24/2004**

Well Pad Area	Construction Activity TSP Emission Factor[1]	Construction Activity Duration	Construction Activity Duration	Emission Control Efficiency	PM_{10} Emissions (controlled)[2]	$PM_{2.5}$ Emissions (controlled)[3]
(acre)	(tons/acre-month)	(days/well pad)	(hours/day)	(%)	(lb/well)	(lb/well)
7.0	1.2	4	10	50	403.20	106.40
				Well Pad Construction Emissions (lb/day/well)	100.80	26.60
				Well Pad Construction Emissions (lb/hr/well)	10.08	2.66

[1] AP-42 (EPA 2004), Section 13.2.3, "Heavy Construction Operations".

[2] AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", Background Document. Assuming that 36% of the TSP is in the PM_{10} size range, monthly emissions converted to daily and hourly emissions based on 30-day month.

[3] AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", Background Document. Assuming that 9.5% of the TSP is in the $PM_{2.5}$ size range, monthly emissions converted to daily and hourly emissions based on 30-day month.

Table B.1.18
Well Pad/Resource Road Construction - 5 Wells per Pad

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **5 wells per pad**
Activity: **Well Pad Construction**
Emissions: **Fugitive Particulate Emissions from Well Pad Construction**
Date: **3/24/2004**

Well Pad Area	Construction Activity TSP Emission Factor[1]	Construction Activity Duration	Construction Activity Duration	Emission Control Efficiency	PM_{10} Emissions (controlled)[2]	$PM_{2.5}$ Emissions (controlled)[3]
(acre)	(tons/acre-month)	(days/well pad)	(hrs/day)	(%)	(lb/well)	(lb/well)
10.0	1.2	4	10	50	576.00	152.00
				Well Pad Construction Emissions (lb/day/well)	144.00	38.00
				Well Pad Construction Emissions (lb/hr/well)	14.40	3.80

[1] AP-42 (EPA 2004), Section 13.2.3, "Heavy Construction Operations".

[2] AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", Background Document. Assuming that 36% of the TSP is in the PM_{10} size range, monthly emissions converted to daily and hourly emissions based on 30-day month.

[3] AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", Background Document. Assuming that 9.5% of the TSP is in the $PM_{2.5}$ size range, monthly emissions converted to daily and hourly emissions based on 30-day month.

Table B.1.19
Well Pad/Resource Road Construction - 10 Wells per Pad

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: 10 wells per pad
Activity: Well Pad Construction
Emissions: Fugitive Particulate Emissions from Well Pad Construction
Date: 3/24/2004

Well Pad Area	Construction Activity TSP Emission Factor[1]	Construction Activity Duration	Construction Activity Duration	Emission Control Efficiency	PM_{10} Emissions (controlled)[2]	$PM_{2.5}$ Emissions (controlled)[3]
(acre)	(tons/acre-month)	(days/well pad)	(hrs/day)	(%)	(lb/well)	(lb/well)
10.0	1.2	4	10	50	576.00	152.00
Well Pad Construction Emissions (lb/day/well)					144.00	38.00
Well Pad Construction Emissions (lb/hr/well)					14.40	3.80

[1] AP-42 (EPA 2004), Section 13.2.3, "Heavy Construction Operations".

[2] AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", Background Document. Assuming that 36% of the TSP is in the PM_{10} size range, monthly emissions converted to daily and hourly emissions based on 30-day month.

[3] AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", Background Document. Assuming that 9.5% of the TSP is in the $PM_{2.5}$ size range, monthly emissions converted to daily and hourly emissions based on 30-day month.

Table B.1.20
Rig Move and Drilling Traffic – Directional Drilling

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: Directional Drilling
Activity: Rig Move and Drilling
Emissions: Fugitive Particulate Emissions from Traffic on Unpaved Roads
Date: 3/24/2004

Vehicle Type	Road Type	Dust Control Method	Average Vehicle Weight	Average Vehicle Speed	Silt Content[2]	Moisture Content[3]	RTs per Well	RT Distance	VMT[4]	Emission Control Efficiency	PM_{10} Emission Factor[5]	$PM_{2.5}$ Emission Factor[5]	PM_{10} Emissions[6] (controlled)	$PM_{2.5}$ Emissions[6] (controlled)
			(lb)	(mph)	(%)	(%)		(miles)	(VMT/pad)	(%)	(lb/VMT)	(lb/VMT)	(lb/well)	(lb/well)
Semis-tractor/ trailer/mud/water/fuel/	Primary Access	magnesium chloride	44,000	20	5.1	2.4	168	14	2,352	85	1.70	0.26	600.56	92.09
cement trucks[1]	Resource	water	44,000	15	5.1	2.4	168	5	840	50	1.70	0.26	714.95	109.63
Logging/mud trucks	Primary Access	magnesium chloride	48,000	20	5.1	2.4	12	14	168	85	1.77	0.27	44.61	6.84
	Resource	water	48,000	15	5.1	2.4	12	5	60	50	1.77	0.27	53.11	8.14
Roustabouts/welders/ hot-shot/contract labor	Primary Access	magnesium chloride	20,000	30	5.1	2.4	24	14	336	85	1.19	0.18	60.17	9.23
	Resource	water	20,000	20	5.1	2.4	24	5	120	50	1.19	0.18	71.63	10.98
Vendors/marketers/ various	Primary Access	magnesium chloride	7,000	30	5.1	2.4	36	14	504	85	0.56	0.083	42.23	6.31
	Resource	water	7,000	20	5.1	2.4	36	5	180	50	0.46	0.068	41.04	6.13
Total Unpaved Road Traffic Emissions (lb/well)													1,628.28	249.34
Total Unpaved Road Traffic Emissions (lb/hr/well)[7]													2.61	0.40

1 Semi vehicle weight range is 28,000-60,000 lbs; average weight of 44,000 lbs used for calculations.
2 AP-42 (EPA 2004), Table 13.2.2-1, "Typical Silt Content Values of Surface Material on Industrial and Rural Unpaved Roads."
3 AP-42 (EPA 2004), Table 11.9-3, "Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations."
4 Calculated as Round Trips per Vehicle Type x Round Trip Distance.
5 AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", equations 1a and 1b.
6 Calculated as lb/VMT x VMT/pad x control efficiency.
7 Calculated as (lb/well); 26 days/well; 24 hours/day; and represents emissions for 9.5-mile segment of road. Total duration is 26 days for a directional well, including rig move duration of 3 days per well.

Table B.1.21
Rig Move and Drilling Haul Truck Tailpipe - Directional Drilling

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **Directional Drilling**
Activity: **Rig Move and Drilling**
Emissions: **Diesel Combustion Emissions from Heavy Equipment Tailpipes**
Date: **3/24/2004**

Pollutant	Pollutant Emission Factor[1]	Total Haul Truck RTs	RT Distance	Total Haul Truck Miles Traveled	Haul Activity Duration	Haul Activity Duration	Emissions	Emissions[3]
	(g/mile)	(RTs/well)	(miles/RT)	(miles/well)	(days/well)	(hrs/day)	(lb/well)	(lb/hr/well)
CO	14.74	216	19	4,104	26	24	133.36	0.21
NO_x	11.44	216	19	4,104	26	24	103.50	0.17
SO_2[2]	0.32	216	19	4,104	26	24	2.87	0.0046
VOC	5.69	216	19	4,104	26	24	51.48	0.08

[1] AP-42 (EPA 1985), Volume II Mobile Sources. Heavy duty diesel engine powered trucks, high altitude, 20 mph, "aged" with 50,000 miles, 1997+ model.

[2] The SO_2 emission factor is calculated assuming 10 mpg fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal.

[3] Calculated as lb/well; 26 days/well; 24 hours/day.

Table B.1.22
Drilling Emission AP-42 - Directional Drilling

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **Directional Drilling**
Activity: **Drilling**
Emissions: **Diesel Combustion Emissions from Drilling Engines - EPA AP-42**
Date: **3/24/2004**

Pollutant	Pollutant Emission Factor[1]	Total Horsepower All Engines[2]	Overall Load Factor[3]	Drilling Activity Duration	Drilling Activity Duration	Emissions	Emissions
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr/well)
CO	0.00668	2,600	0.42	23	24	4,050.56	7.34
NO_x	0.03100	2,600	0.42	23	24	18,797.53	34.05
SO_2[4]	0.00205	2,600	0.42	23	24	1,243.06	2.25
VOC	0.00250	2,600	0.42	23	24	1,515.93	2.75
PM_{10}[5]	0.00220	2,600	0.42	23	24	1,334.02	2.42

Stack Parameters
Height 5 m
Temperat 675 Kelvin
Diameter 0.2 m
Velocity 30 m/s
5 x 5 x 5 m structure used to determine downwash parameters for drilling rigs

[1] AP-42 (EPA 2004), Section 3.3, "Gasoline and Diesel Industrial Engines. Table 3.3-1, "Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines"; lb/hp-hr = pounds per horsepower-hour.

[2] Drilling engine horsepower based on four engines, two at 800 hp and two at 500 hp.

[3] The overall load factor is calculated based on average throttle setting of 65% and a load factor of 65%. Therefore, the overall load factor = 0.65 * 0.65 = 0.42.

[4] The SO_2 emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate calculated from Caterpillar's specification sheets for G4312, gas petroleum drilling engine.

[5] $PM_{2.5}$ assumed equivalent to PM_{10} for drilling engines.

Table B.1.23
Drilling Emissions –Tier 1- Directional Drilling

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **Directional Drilling**
Activity: **Drilling**
Emissions: **Diesel Combustion Emissions from Drilling Engines - EPA Tier 1**
Date: **3/24/2004**

Pollutant	Pollutant Emission Factor[1]	Total Horsepower All Engines[2]	Overall Load Factor[3]	Drilling Activity Duration	Drilling Activity Duration	Emissions	Emissions
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr/well)
CO	0.0187	2,600	0.42	23	24	11,363.04	20.59
NO_x	0.015	2,600	0.42	23	24	9,224.12	16.71
SO_2[4]	0.00035	2,600	0.42	23	24	209.48	0.38
VOC	0.0022	2,600	0.42	23	24	1,336.83	2.42
PM_{10}[5]	0.00088	2,600	0.42	23	24	534.73	0.97

Stack Parameters

Height	5 m
Temperature	675 Kelvin
Diameter	0.2 m
Velocity	30 m/s

5 x 5 x 5 m structure used to determine downwash parameters for drilling rigs

[1] Emission factor for Tier 1 engine taken from Diesel Net, Emissions Standards: USA: Nonroad Diesel Engines, Table 1, "EPA Tier 1-3 Nonroad Diesel Engine Emission Standards, g/kWh (g/bhp-hr)." Available on-line at http://www.dieselnet.com/standards/us/offroad.html.

[2] Drilling engine horsepower based on four engines, two at 800 hp and two at 500 hp.

[3] The overall load factor is calculated based on average throttle setting of 65% and a load factor of 65%.
Therefore, the overall load factor = 0.65 * 0.65 = 0.42.

[4] The SO_2 emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate calculated from Caterpillar's specification sheets for G4312, gas petroleum drilling engine.

[5] $PM_{2.5}$ assumed equivalent to PM_{10} for drilling engines.

Table B.1.24
Drilling Emissions - Tier 2 - Directional Drilling

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **Directional Drilling**
Activity: **Drilling**
Emissions: **Diesel Combustion Emissions from Drilling Engines - EPA Tier 2**
Date: **3/24/2004**

Pollutant	Pollutant Emission Factor[1] (lb/hp-hr)	Total Horsepower All Engines[2] (hp)	Overall Load Factor[3]	Drilling Activity Duration (days/well)	Drilling Activity Duration (hrs/day)	Emissions (lb/well)	Emissions (lb/hr/well)
CO	0.0057	2,600	0.42	23	24	3,475.75	6.30
NO_x	0.0090	2,600	0.42	23	24	5,481.00	9.93
SO_2[4]	0.00035	2,600	0.42	23	24	209.48	0.38
VOC	0.0004	2,600	0.42	23	24	223.12	0.40
PM_{10}[5]	0.00033	2,600	0.42	23	24	200.52	0.36

Stack Parameters

Height	5 m
Temperature	675 Kelvin
Diameter	0.2 m
Velocity	30 m/s

5 x 5 x 5 m structure used to determine downwash parameters for drilling rigs

[1] Emission factor for Tier 2 engine taken from Diesel Net, Emissions Standards: USA: Nonroad Diesel Engines, Table 1, "EPA Tier 1-3 Nonroad Diesel Engine Emission Standards, g/kWh (g/bhp-hr)." Available on-line at http://www.dieselnet.com/standards/us/offroad.html.

[2] Drilling engine horsepower based on four engines, two at 800 hp and two at 500 hp.

[3] The overall load factor is calculated based on average throttle setting of 65% and a load factor of 65%. Therefore, the overall load factor = 0.65 * 0.65 = 0.42.

[4] The SO_2 emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate calculated from Caterpillar's specification sheets for G4312, gas petroleum drilling engine.

[5] $PM_{2.5}$ assumed equivalent to PM_{10} for drilling engines.

Table B.1.25
Wind Erosion – 2 Wells per Pad

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: 2 wells per pad
Activity: Well Pad, Resource Road, Pipeline Construction
Emissions: Wind Erosion
Date: 3/24/2004

Emission Factor : 0.3733 lb/hr/100m^2

Based on AP-42 Chapter 13.2.5 (EPA 2004), Industrial Wind Erosion using Jonah Field, Wyoming meteorological data.

Control Efficiency: 50 %

Disturbed Area:

Well Pad Construction:	7	acres	28,329.00	m^2	
Access Road Construction:	1.3455	acres	5,445.24	m^2	(based on 74-ft ROW width, 0.15-mile length)
Pipeline Construction	0.45	acres	1,821.15	m^2	(based on 25-ft ROW width, 0.15-mile length)

PM_{10} Emissions Calculations:

	PM_{10} Emission Factor (lb/hr/100 m^2)	$PM_{2.5}$ Emission Factor (lb/hr/100 m^2)	Area (100 m^2)	Control Efficiency (%)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (lb/hr)	PM_{10} Emissions (g/sec)	$PM_{2.5}$ Emissions (g/sec)
Well Pad Construction	0.3733	0.1493	283.29	50	52.87	21.15	6.66	2.66
Resource Road Construction	0.3733	0.1493	54.45	50	10.16	4.07	1.28	0.51
Pipeline Construction	0.3733	0.1493	18.21	50	3.40	1.36	0.43	0.17

Table B.1.26
Wind Erosion – 5 Wells per Pad

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **5 wells per pad**
Activity: **Well Pad, Resource Road, Pipeline Construction**
Emissions: **Wind Erosion**
Date: **3/24/2004**

Emission Factor : 0.3733 lb/hr/100m^2

Based on AP-42 Chapter 13.2.5 (EPA 2004), Industrial Wind Erosion using Jonah Field, Wyoming meteorological data.

Control Efficiency: 50 %

Disturbed Area:

Well Pad Construction:	10	acres	40,470.00	m^2	
Access Road Construction:	1.3455	acres	5,445.24	m^2	(based on 74-ft ROW width, 0.15-mile length)
Pipeline Construction	0.45	acres	1,821.15	m^2	(based on 25-ft ROW width, 0.15-mile length)

PM_{10} Emissions Calculations:

	PM_{10} Emission Factor (lb/hr/100 m^2)	$PM_{2.5}$ Emission Factor (lb/hr/100 m^2)	Area (100 m^2)	Control Efficiency (%)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (lb/hr)	PM_{10} Emissions (g/sec)	$PM_{2.5}$ Emissions (g/sec)
Well Pad Construction	0.3733	0.1493	404.70	50	75.53	30.21	9.52	3.81
Resource Road Construction	0.3733	0.1493	54.45	50	10.16	4.07	1.28	0.51
Pipeline Construction	0.3733	0.1493	18.21	50	3.40	1.36	0.43	0.17

Table B.1.27
Wind Erosion – 10 Wells per Pad

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **10 wells per pad**
Activity: **Well Pad, Resource Road, Pipeline Construction**
Emissions: **Wind Erosion**
Date: **3/24/2004**

Emission Factor : 0.3733 lb/hr/100m^2

Based on AP-42 Chapter 13.2.5 (EPA 2004), Industrial Wind Erosion using Jonah Field, Wyoming meteorological data.

Control Efficiency: 50 %

Disturbed Area:

Well Pad Construction:	10	acres	40,470.00	m^2	
Access Road Construction:	1.3455	acres	5,445.24	m^2	(based on 74-ft ROW width, 0.15-mile length)
Pipeline Construction	0.45	acres	1,821.15	m^2	(based on 25-ft ROW width, 0.15-mile length)

PM_{10} Emissions Calculations:

	PM_{10} Emission Factor (lb/hr/100 m^2)	$PM_{2.5}$ Emission Factor (lb/hr/100 m^2)	Area (100 m^2)	Control Efficiency (%)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (lb/hr)	PM_{10} Emissions (g/sec)	$PM_{2.5}$ Emissions (g/sec)
Well Pad Construction	0.3733	0.1493	404.70	50	75.53	30.21	9.52	3.81
Resource Road Construction	0.3733	0.1493	54.45	50	10.16	4.07	1.28	0.51
Pipeline Construction	0.3733	0.1493	18.21	50	3.40	1.36	0.43	0.17

Table B.2.1
Production Traffic – 1 Well per Pad

TRC Environmental
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **1 well per pad**
Activity: **Production Traffic**
Emissions: **Fugitive Particulate Emissions from Traffic on Unpaved Roads**
Date: **3/24/2004**

Vehicle Type	Road Type	Dust Control Method	Average Vehicle Weight	Average Vehicle Speed	Silt Content[2]	Moisture Content[3]	RTs per Well[4]	RT Distance	VMT[5]	Emission Control Efficiency	PM_{10} Emission Factor[6]	$PM_{2.5}$ Emission Factor[6]	PM_{10} Emissions[7] (controlled)	$PM_{2.5}$ Emissions[7] (controlled)
			(lb)	(mph)	(%)	(%)	(RTs/yr)	(miles)	(VMT/well/yr)	(%)	(lb/VMT)	(lb/VMT)	(lb/well/yr)	(lb/well/yr)
Workover Rig	Primary Access	magnesium chloride	90,000	20	5.1	2.4	1	14	14	85	2.35	0.36	4.93	0.76
	Resource	water	90,000	15	5.1	2.4	1	5	5	50	2.35	0.36	5.87	0.90
Haul trucks (water/condensate)[1]	Primary Access	magnesium chloride	54,000	20	5.1	2.4	35	14	490	85	1.87	0.29	137.19	21.04
	Resource	water	54,000	15	5.1	2.4	35	5	175	50	1.87	0.29	163.33	25.04
Light trucks/ pickups/pumpers[8]	Primary Access	magnesium chloride	7,000	30	5.1	2.4	122	14	1,708	85	0.56	0.08	143.10	21.39
	Resource	water	7,000	20	5.1	2.4	122	5	610	50	0.46	0.07	139.07	20.77
Total Access and Unimproved Road Emissions (lb/well/yr)													593.49	89.90

[1] Haul trucks weight range is 28,000-80,000 lbs. Average weight of 54,000 lbs used for calculations.

[2] AP-42 (EPA 2004), Table 13.2.2-1, "Typical Silt Content Values of Surface Material on Industrial and Rural Unpaved Roads."

[3] AP-42 (EPA 2004), Table 11.9-3, "Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations."

[4] Includes Supervisory Control and Data Acquisitions system (SCADA). SCADA is being installed at wells to increase production efficiency by providing real-time operating data to field staff including well flow rates and pressures, processing equipment operating conditions, tank levels, and emissions control equipment status. SCADA implementation is expected to reduce well site visits by 30-40%b and reduce potential for spills.

[5] Calculated as Round Trips per Vehicle Type x Round Trip Distance

[6] AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", equations 1a and 1b.

[7] Calculated as lb/VMT x VMT/well x control efficiency.

[8] Emissions based on trip frequency and miles traveled to one well in the field. During production, 20 wells could be visited per day. This assumption will be reflected in full-field modeled emissions.

Table B.2.2
Production Heavy Equipment Tailpipe – 1 Well per Pad

TRC Environmental
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **All Scenarios**
Activity: **Production Traffic**
Emissions: **Diesel Combustion Emissions from Heavy Equipment Tailpipes**
Date: **3/24/2004**

Pollutant	Pollutant Emission Factor[1]	Annual RTs per Well	Single Well Round Trip Distance	Single Well Annual VMT	Hourly Emissions Single Well	Annual Emissions Single Well
	(g/mi)	(RTs/well/yr)	(mi/RT)	(mi/well/yr)	(lb/hr)	(tpy)
CO	14.74	35	19	665.00	0.002467	0.01080
NO_x	11.44	35	19	665.00	0.001915	0.00839
SO_2[2]	0.32	35	19	665.00	0.000054	0.00024
VOC	5.69	35	19	665.00	0.000952	0.00417

1 AP-42 (EPA 1985), Table 2.7.1 "Volume II Mobile Sources." Heavy duty diesel engine powered trucks, high altitude, 20 mph, "aged" with 50,000 miles, 1997+ model.

2 The SO_2 emission factor is calculated assuming 10 mpg fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.08 lb/gal.

Table B.2.3
Indirect Heater

TRC Environmental
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: 1 well per pad
Activity: Production
Emissions: Emissions from Indirect Heater
Date: 1/26/04

Fuel Combustion Source:

Unit Description	Indirect Heater
Design Firing Rate (MMBTU/hr)	0.75

Operating Parameters:

Operating cycle	15	min/hr September to April				
Operating hours	24	hr/day,	7	days/wk,	213	days/yr.
Annual Operating Hours	1,277.5					
Capacity (%)	100					
Annual Load (%):	Winter	43.75	Spring	12.5		
	Summer	0	Fall	43.75		

Actual Fuel Combustion for the Year per Unit:

Volume of Natural Gas Combusted	0.96	MMSCF
Heat Content	1,000.00	Btu/scf

Building Size (approximate):

Width	8.00	ft
Length	15.00	ft
Height	7	ft

Potential Emission Data:

	From Stack Testing (lb/hr)	Actual[2] (lb/hr)	Actual (tpy)	Method of Determination	Emission Factors	Units
Filterable Particulate	--	0.0034	0.002	AP-42	4.5	lb/MMscf
Condensable Particulate	--	0.0056	0.004	AP-42	7.5	lb/MMscf
Total PM	--	0.0090	0.006			
VOC	--	0.0060	0.004	AP-42	8.0	lb/MMscf
CO	0.291	0.073	0.19	Stack Testing[1]		
NO_x	0.034	0.0085	0.022	Stack Testing[1]		
SO_2	--	0.0	0.0	Fuel Analysis	0.0	lb/MMscf

[1] Stack testing data for this heater was provided by EnCana and included five separate tests of NO_x and CO emissions. NOx and CO were the only pollutants for which stack testing emission were provided. The maximum of the stack test emissions was used for calculations.

[2] Actual lb/hr calculated using stack testing lb/hr * 15 min/hr * 60 min/hr.

Table B.2.4
Separator Heater

TRC Environmental	**Project: Jonah Infill Drilling Project**
605 Skyline Drive	**Scenario: 1 well per pad**
Laramie, WY 82070	**Activity: Production**
Phone: (307) 742-3843	**Emissions: Low-pressure Separator Heater**
Fax: (307) 745-8317	**Date: 1/26/04**

Fuel Combustion Source:

Unit Description	Low-pressure Separator Burner					
Design Firing Rate (MMBTU/hr)	0.085					
Operating Parameters:						
Operating cycle	7.5	min/hr September to April				
Operating hours	24	hr/day,	7	days/wk,	213	days/yr.
Annual Operating hours	638.75					
Capacity (%)	100					
Annual Load (%):	Winter	43.75	Spring	12.5		
	Summer	0	Fall	43.75		
Actual Fuel Combustion for the Year for Unit:						
Volume of Natural Gas Combusted	0.05	MMSCF	1000			
Heat Content	1,000	Btu/scf				
Building Size:						
Width	8.00	ft				
Length	15.00	ft				
Height	7.00	ft				

Potential Emission Data:

	From Stack Testing lb/hr	Actual[2] lb/hr	Actual tpy	Method of Determination	Emission Factors	Units
Filterable Particulate		0.00038	0.00012	AP-42	4.5	lb/MMscf
Condensable Particulate		0.00064	0.00020	AP-42	7.5	lb/MMscf
Total PM		0.0010	0.00033			
SO_2		0.0	0.0	Fuel Analysis	0.0	lb/MMscf
NO_x	0.0100	0.0013	0.0032	Stack Testing[1]		
CO	0.138	0.0173	0.044	Stack Testing[1]		
VOC		0.00068	0.00022	AP-42	8.0	lb/MMscf

[1] Stack testing data for this heater was provided by EnCana and included five separate tests of NO_x and CO emissions. NOx and CO were the only pollutants for which stack testing emission were provided. The maximum of the stack test emissions was used for calculations.

[2] Actual lb/hr calculated using stack testing lb/hr * 7.5 min/hr * 60 min/hr.

Table B.2.5
Dehydrator Reboiler Heater

TRC Environmental
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **1 well per pad**
Activity: **Production**
Emissions: **Dehy Reboiler Heater**
Date: **1/26/04**

Fuel Combustion Source:

Unit Description	Reboiler Heater
Design Firing Rate (MMBTU/hr)	0.085

Operating Parameters:

Operating cycle	35	min/hr year round				
Operating hours	24	hr/day,	7	days/wk,	365	days/yr.
Annual Operating hours	5,110					
Capacity (%)	100					
Annual Load (%):	Winter	25	Spring	25		
	Summer	25	Fall	25		

Actual Fuel Combustion for the Year for Unit:

Volume of Natural Gas Combusted	0.43	MMSCF
Heat Content	1,000	Btu/scf

Building Size:

Width	8.00	ft
Length	15.00	ft
Height	7.00	ft

Potential Emission Data:

	From Stack Testing lb/hr	Actual[2] lb/hr	Actual tpy	Method of Determination	Emission Factors	Units
Filterable Particulate	--	0.00038	0.0010	AP-42	4.5	lb/MMscf
Condensable Particulate	--	0.00064	0.0016	AP-42	7.5	lb/MMscf
Total PM	--	0.00102	0.0026			
SO_2	--	0.0	0.0	Fuel Analysis	0.0	lb/MMscf
NO_x	0.0080	0.0047	0.020	Stack Testing[1]		
CO	0.080	0.047	0.20	Stack Testing[1]		
VOC	--	0.00068	0.0017	AP-42	8.0	lb/MMscf

[1] Stack testing data for this heater was provided by EnCana and included five separate tests of NO_x and CO emissions. NOx and CO were the only pollutants for which stack testing emission were provided. The maximum of the stack test emissions was used for calculations.
[2] Actual lb/hr calculated by using stack testing lb/hr * 35 min/hr * 60 min/hr.

Table B.2.6
Dehydrator Flashing

TRC Environmental	**Project: Jonah Infill Drilling Project**
605 Skyline Drive	**Scenario: All Scenarios**
Laramie, WY 82070	**Activity: Production**
Phone: (307) 742-3843	**Emissions: TEG Dehydrator Flashing**
Fax: (307) 745-8317	**Date: 10/30/2003**

Pollutant	Uncontrolled (tpy)[1]	Controlled (tpy)[1]
VOC	12.78	1.20
HAP	6.75	0.68
Benzene	1.55	0.15
Toluene	3.18	0.35
Ethylbenzene	0.15	0.01
Xylene	1.70	0.15
n-Hexane	0.16	0.02

[1] Data provided by EnCana. Assumes 75% of the wells have a pump limit and 25% of the wells have BTEX control.

Table B.2.7
Fugitive HAPs and VOC

TRC Environmental
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **All Scenarios**
Activity: **Production**
Emissions: **Fugitive VOC/HAP Emissions**
Date: **10/30/2003**

Gas Analysis Weight Fraction

VOC	0.18378
Benzene	0.00054
Toluene	0.00085
Ethlybenzene	0.00004
Xylene	0.00038
n-hexane	0.00176

Source	Quantity	Emission Factor[1] (lb/hr/component)	Non-methane Hydrocarbons[2] (lb/hr)	Non-methane Hydrocarbons (tpy)	Benzene[2] (lb/hr)	Benzene (tpy)	Toluene[2] (lb/hr)	Toluene (tpy)	Ethlybenzene[2] (lb/hr)	Ethlybenzene (tpy)	Xylene[2] (lb/hr)	Xylene (tpy)	n-Hexane[2] (lb/hr)	n-Hexane (tpy)
Valves	16	0.00992	0.0292	0.128	0.00009	0.00038	0.00014	0.00059	0.000006	0.000028	0.00006	0.00027	0.00028	0.0012
Flanges	38	0.00086	0.0060	0.026	0.00002	0.00008	0.00003	0.00012	0.000001	0.000006	0.00001	0.00006	0.00006	0.0003
Connections	94	0.00044	0.0076	0.033	0.00002	0.00010	0.00004	0.00015	0.000002	0.000007	0.00002	0.00007	0.00007	0.0003
Pump seals	8	0.00529	0.0078	0.034	0.00002	0.00010	0.00004	0.00016	0.000002	0.000007	0.00002	0.00007	0.00007	0.0003
Open ended lines	6	0.00441	0.0049	0.021	0.00001	0.00006	0.00002	0.00010	0.000001	0.000005	0.00001	0.00004	0.00005	0.0002
		Total Emissions/Well	0.0554	0.243	0.00016	0.00071	0.00026	0.00113	0.000012	0.000053	0.00012	0.00051	0.00053	0.0023

[1] Taken from the WDEQ (2001) "Oil and Gas Production Facilities Chapter 6, Section 2 Permitting Guidance".

[2] Calculated as weight fraction * emissions factor * quantity of source.

Table B.2.8
Condensate Storage Tank

TRC Environmental
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: All Scenarios
Activity: Production
Emissions: Condensate Storage Tank
Date: 10/30/2003

Storage Tank with Control (assuming 98% control)[1]

VOC and HAP Emissions

VOC	1	tpy/tank
HAP	0.1	tpy/tank
Benzene	0.0024	tpy/tank
Toluene	0.0001	tpy/tank
Ethylbenzene	0.0014	tpy/tank
Xylene	0.0018	tpy/tank
n-Hexane	0.0443	tpy/tank

These wells average 25.3 bbls of condensate per day.

NO_x and CO Emissions from Smokeless Flare Combustion

NO_x Emission Factor[2]	0.068	lb/MMBTU
CO Emission Factor[2]	0.37	lb/MMBTU
Heat Content	1,000	Btu/scf
Condensate Production	25.30	bbl/day
Gas to Oil Ratio[3]	957.37	scf/bbl
Gas Production	24,221.46	SCFD
Combustion Emissions from Storage Tanks		
NO_x	0.30	tpy/tank
CO	1.64	tpy/tank

Uncontrolled Storage Tank Emissions[1]

VOC	15.9	tpy/tank
HAP	0.8	tpy/tank
Benzene	0.0367	tpy/tank
Toluene	0.0021	tpy/tank
Ethylbenzene	0.022	tpy/tank
Xylene	0.0279	tpy/tank
n-Hexane	0.6891	tpy/tank

These wells average 7.9 bbls of condensate per day.

[1] Provided by EnCana.
[2] AP-42 (EPA 2004), Table 13.5-1, "Emission Factors for Flare Operations."
[3] Taken from Tank Oil Analysis Global Properties.

Table B.2.9
Jonah Water Disposal Well

TRC Environmental	**Project:** **Jonah Infill Drilling Project**
605 Skyline Drive	**Scenario:** **All Scenarios**
Laramie, WY 82070	**Activity:** **Production**
Phone: (307) 742-3843	**Emissions:** **Jonah Water Disposal Well**
Fax: (307) 745-8317	**Date:** **3/31/2004**

Unit Description	Jonah Water Disposal Well					
Engine Design (hp)	400					
Operating Parameters:						
Operated	24	hr/day,	7	days/wk,	365	days/yr
Operating hours	8,760					
Capacity (%)	100	(while operating)				
Annual Load (%)	Winter	25	Spring	25		
	Summer	25	Fall	25		
Stack Parameters						
Height	6.1 m					
Temperature	832 Kelvin					
Diameter	0.2 m					
Velocity	16.7 m/s					

Emissions Data:	lb/hr	tpy
NO_x	0.90	3.9
CO	0.90	3.9
VOC	0.90	3.9
Formaldehyde	0.10	0.2

Table B.2.10
Bird Canyon Compressor Station

TRC Environmental
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **All Scenarios**
Activity: **Projected Jonah Field Compression**
Emissions: **Duke Field Services Bird Canyon C.S.**
Date: **3/24/2004**

Fuel Combustion Source:

Unit Description	Bird Canyon Compressor Station
Engine design (hp)	11,004

Operating Parameters:

Operated	24	hr/day,	7	days/wk,	365	days/yr
Operating hours	8,760					
Capacity (%)	100	(while operating)				
Annual Load (%)	Winter	25	Spring	25		
	Summer	25	Fall	25		

Potential Fuel Combustion for the Year for Unit:

Volume of Natural Gas Combusted	636.30	MMSCF
Assumes gas consumed at rate of	6601	Btu/hp-hr
Heat Content	1000	Btu/scf

Emission Data:

	lb/hr	tpy	Method of Determination	Emission Factor[1]	Units
PM_{10}	0.0	0.0	AP-42	0.00008	lb/MMscf
$PM_{2.5}$	0.0	0.00	AP-43	0.00008	lb/MMscf
SO_2	0.0	0.0	Fuel Analysis	0.00	lb/MMscf
NO_x	17.0	74.4	BACT	0.7	g/hp-hr
CO	7.3	31.9	Permitted Emissions[2]	0.300	g/hp-hr
VOC	12.1	53.1	Permitted Emissions[2]	0.500	g/hp-hr
Formaldehyde	1.9	8.5	Permitted Emissions[2]	0.080	g/hp-hr

[1] Based on a 4-stroke lean burn engine, taken from AP-42 Table 3.2-3 (EPA 2004).
[2] Emission rates taken from Bird Canyon Permit for an engine with 0.7g/hp-hr NO_x.

Table B.2.11
Falcon Compressor Station

TRC Environmental
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **All Scenarios**
Activity: **Projected Pinedale Anticline Compression**
Emissions: **Duke Field Services Falcon C.S.**
Date: **3/24/2004**

Fuel Combustion Source:

Unit Description	Falcon Compressor Station					
Engine design (hp/hr)	7,336					
Operating Parameters:						
Operated	24	hr/day,	7	days/wk,	365	days/yr
Operating hours	8,760					
Capacity (%)	100	(while operating)				
Annual Load (%)	Winter	25	Spring	25		
	Summer	25	Fall	25		
Potential Fuel Combustion for the Year for Unit:						
Volume of Natural Gas Combusted	424.20	MMSCF				
Assumes gas consumed at rate of	6,601	Btu/hp-hr				
Heat Content	1,000	Btu/scf				

Emission Data:

	lb/hr	tpy	Method of Determination	Emission Factor[1]	Units
PM_{10}	0.0	0.0	AP-42	0.0000771	lb/MMscf
$PM_{2.5}$	0.0	0.00	AP-43	0.0000771	lb/MMscf
SO_2	0.0	0.0	Fuel Analysis	0.00	lb/MMscf
NO_x	11.3	49.6	BACT	0.7	g/hp-hr
CO	4.9	21.3	Permitted Emissions[2]	0.300	g/hp-hr
VOC	8.1	35.4	Permitted Emissions[2]	0.500	g/hp-hr
Formaldehyde	1.3	5.7	Permitted Emissions[2]	0.080	g/hp-hr

[1] Based on a 4-stroke lean burn engine, taken from AP-42 Table 3.2-3 (EPA 2004).
[2] Emission rates taken from a Pinedale Anticline Permit for an engine with 0.7g/hphr NO_x.

Table B.2.12
Gobblers Knob Compressor Station

TRC Environmental
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: All Scenarios
Activity: Projected Pinedale Anticline Compression
Emissions: Questar Gobblers Knob C.S.
Date: 3/24/2004

Fuel Combustion Source:

Unit Description	Gobblers Knob Compressor Station (Comprised of Pinedale, Mesa 1, and Mesa 2)					
Engine design (hp/hr)	10,000					

Operating Parameters:

Operated	24	hr/day,	7	days/wk,	365	days/yr
Operating hours	8,760					
Capacity (%)	100	(while operating)				
Annual Load (%)	Winter	25	Spring	25		
	Summer	25	Fall	25		

Potential Fuel Combustion for the Year for Unit:

Volume of Natural Gas Combusted	578.25	MMSCF
Assumes gas consumed at rate of	6,601	Btu/hp-hr
Heat Content	1,000	Btu/scf

Emission Data:

	lb/hr	tpy	Method of Determination	Emission Factor[1]	Units
PM_{10}	0.0	0.0	AP-42	0.0000771	lb/MMscf
$PM_{2.5}$	0.0	0.00	AP-43	0.0000771	lb/MMscf
SO_2	0.0	0.0	Fuel Analysis	0.00	lb/MMscf
NO_x	15.4	67.6	BACT	0.7	g/hp-hr
CO	6.6	29.0	Permitted Emissions[2]	0.300	g/hp-hr
VOC	11.0	48.3	Permitted Emissions[2]	0.500	g/hp-hr
Formaldehyde	1.8	7.7	Permitted Emissions[2]	0.080	g/hp-hr

[1] Based on a 4-stroke lean burn engine, taken from AP-42 Table 3.2-3 (EPA 2004).
[2] Emission rates taken from a Pinedale Anticline WDEQ permit for an engine with 0.7g/hp-hr NO_x.

Table B.2.13
Jonah Compressor Station

TRC Environmental	**Project: Jonah Infill Drilling Project**
605 Skyline Drive	**Scenario: All Scenarios**
Laramie, WY 82070	**Activity: Projected Jonah Field Compression**
Phone: (307) 742-3843	**Emissions: Mountain Gas Resources Jonah C.S.**
Fax: (307) 745-8317	**Date: 3/24/2004**

Fuel Combustion Source:

Unit Description	Jonah Compressor Station					
Engine design (hp/hr)	3,900					
Operating Parameters:						
Operated	24	hr/day,	7	days/wk,	365	days/yr
Operating hours	8,760					
Capacity (%)	100	(while operating)				
Annual Load (%)	Winter	25	Spring	25		
	Summer	25	Fall	25		
Potential Fuel Combustion for the Year for Unit:						
Volume of Natural Gas Combusted	225.52	MMSCF				
Assumes gas consumed at rate of	6,601	Btu/hp-hr				
Heat Content	1,000	Btu/scf				

Emission Data:

	lb/hr	tpy	Method of Determination	Emission Factor[1]	Units
PM_{10}	0.0	0.0	AP-42	0.0000771	lb/MMscf
$PM_{2.5}$	0.0	0.00	AP-43	0.0000771	lb/MMscf
SO_2	0.0	0.0	Fuel Analysis	0.00	lb/MMscf
NO_x	6.0	26.4	BACT	0.7	g/hp-hr
CO	2.6	11.3	Permitted Emissions[2]	0.300	g/hp-hr
VOC	4.3	18.8	Permitted Emissions[2]	0.500	g/hp-hr
Formaldehyde	0.7	3.0	Permitted Emissions[2]	0.080	g/hp-hr

[1] Based on a 4-stroke lean burn engine, taken from AP-42 Table 3.2-3 (EPA 2004).

[2] Emission rates taken from a Pinedale Anticline Permit for an engine with 0.7g/hp-hr NO_x.

Table B.2.14
Luman Compressor Station

TRC Environmental
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: All Scenarios
Activity: Projected Jonah Field Compression
Emissions: Duke Field Services Luman C.S.
Date: 3/24/2004

Fuel Combustion Source:

Unit Description	Luman Compressor Station					
Engine design (hp/hr)	11,604					

Operating Parameters:

Operated	24	hr/day,	7	days/wk,	365	days/yr
Operating hours	8,760					
Capacity (%)	100	(while operating)				
Annual Load (%)	Winter	25	Spring	25		
	Summer	25	Fall	25		

Potential Fuel Combustion for the Year for Unit:

Volume of Natural Gas Combusted	671.00	MMSCF
Assumes gas consumed at rate of	6,601	Btu/hp-hr
Heat Content	1,000	Btu/scf

Emission Data for 11,004 hp:

	lb/hr	TPY	Method of Determination	Emission Factor[1]	Units
PM_{10}	0.0	0.0	AP-42	0.0000771	lb/MMscf
$PM_{2.5}$	0.0	0.00	AP-43	0.0000771	lb/MMscf
SO_2	0.0	0.0	Fuel Analysis	0.00	lb/MMscf
NO_x	17.9	78.4	BACT	0.70	g/hp-hr
CO	7.7	33.6	Permitted Emissions[2]	0.30	g/hp-hr
VOC	12.8	56.0	Permitted Emissions[2]	0.50	g/hp-hr
Formaldehyde	2.0	9.0	Permitted Emissions[2]	0.08	g/hp-hr

Emission Data for 600 hp:

	lb/hr	TPY	Method of Determination	Emission Factor[1]	Units
PM_{10}	0.0	0.0	AP-42	7.71E-05	lb/MMscf
$PM_{2.5}$	0.0	0.00	AP-43	7.71E-05	lb/MMscf
SO_2	0.0	0.0	Fuel Analysis	0.00	lb/MMscf
NO_x	1.3	5.8	BACT	1.0	g/hp-hr
CO	0.7	2.9	Permitted Emissions[2]	0.50	g/hp-hr
VOC	0.7	2.9	Permitted Emissions[2]	0.50	g/hp-hr
Formaldehyde	0.1	0.4	Permitted Emissions[2]	0.07	g/hp-hr

Total Emissions:

	lb/hr	TPY
PM_{10}	0.0	0.0
$PM_{2.5}$	0.0	0.0
SO_2	0.0	0.0
NO_x	19.2	84.2
CO	8.3	36.5
VOC	13.5	58.9
Formaldehyde	2.1	9.4

[1] Based on a 4-stroke lean burn engine, taken from AP-42 Table 3.2-3 (EPA 2004).
[2] Emission rates taken from Luman Permit MD-921.

Table B.2.15
Paradise Compressor Station

TRC Environmental
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: All Scenarios
Activity: Projected Pinedale Anticline Compression
Emissions: Paradise C.S.
Date: 3/24/2004

Fuel Combustion Source:

Unit Description	Paradise Compressor Station					
Engine design (hp/hr)	7,336					

Operating Parameters:

Operated	24	hr/day,	7	days/wk,	365	days/yr
Operating hours	8,760					
Capacity (%)	100	(while operating)				
Annual Load (%)	Winter	25	Spring	25		
	Summer	25	Fall	25		

Potential Fuel Combustion for the Year for Unit:

Volume of Natural Gas Combusted	424.20	MMSCF
Assumes gas consumed at rate of	6,601	Btu/hp-hr
Heat Content	1,000	Btu/scf

Emission Data:

	lb/hr	tpy	Method of Determination	Emission Factor[1]	Units
PM_{10}	0.0	0.0	AP-42	0.0000771	lb/MMscf
$PM_{2.5}$	0.0	0.00	AP-43	0.0000771	lb/MMscf
SO_2	0.0	0.0	Fuel Analysis	0.00	lb/MMscf
NO_x	11.3	49.6	BACT	0.7	g/hp-hr
CO	4.9	21.3	Permitted Emissions[2]	0.300	g/hp-hr
VOC	8.1	35.4	Permitted Emissions[2]	0.500	g/hp-hr
Formaldehyde	1.3	5.7	Permitted Emissions[2]	0.080	g/hp-hr

[1] Based on a 4-stroke lean burn engine, taken from AP-42 Table 3.2-3 (EPA 2004).
[2] Emission rates taken from a Pinedale Anticline WDEQ permit for an engine with 0.7g/hp-hr NO_x.

Table B.2.16
Wind Erosion – 1 Well per Pad

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **1 well per pad**
Activity: **Production**
Emissions: **Wind Erosion from Well Pads**
Date: **10/30/2003**

Emission Factor : 0.3733 lb/hr/100m^2

Based on AP-42 Chapter 13.2.5 (EPA 2004), Industrial Wind Erosion using Jonah Field, Wyoming meteorological data.

Control Efficiency: 0 %

Disturbed Area:
Well Pad Production: 0.9 acres 3642.30 m^2

PM-10 Emissions Calculations:

	PM_{10} Emission Factor (lb/hr/100 m^2)	$PM_{2.5}$ Emission Factor (lb/hr/100 m^2)	Area (100 m^2)	Control Efficiency (%)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (lb/hr)	PM_{10} Emissions (g/sec)	$PM_{2.5}$ Emissions (g/sec)
Well Pad - Production:	0.3733	0.1493	36.42	0	13.60	5.438341379	1.71	0.69

Table B.2.17
Production Traffic – 2 Wells per Pad

TRC Environmental
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: 2 wells per pad
Activity: Production Traffic
Emissions: Fugitive Particulate Emissions from Traffic on Unpaved Roads
Date: 3/24/2004

Vehicle Type	Road Type	Dust Control Method	Average Vehicle Weight	Average Vehicle Speed	Silt Content[2]	Moisture Content[3]	RTs per Well[4]	RTs per Pad[4]	RT Distance	VMT[5]	Emission Control Efficiency	PM_{10} Emission Factor[6]	$PM_{2.5}$ Emission Factor[6]	PM_{10} Emissions[7] (controlled)	$PM_{2.5}$ Emissions[7] (controlled)
			(lb)	(mph)	(%)	(%)	(RTs/yr)	(RTs/year)	(miles)	(VMT/well/yr)	(%)	(lb/VMT)	(lb/VMT)	(lb/well/yr)	(lb/well/yr)
Workover Rig	Primary Access	magnesium chloride	90,000	20	5.1	2.4	1	na	14	14	85	2.35	0.36	4.93	0.76
	Resource	water	90,000	15	5.1	2.4	1	na	5	5	50	2.35	0.36	5.87	0.90
Haul trucks (water/condensate)[1]	Primary Access	magnesium chloride	54,000	20	5.1	2.4	35	na	14	490	85	1.87	0.29	137.19	21.04
	Resource	water	54,000	15	5.1	2.4	35	na	5	175	50	1.87	0.29	163.33	25.04
Total Unpaved Road Emissions (lb/well/yr)														311.33	47.74
Light trucks/ pickups/pumpers[8]	Primary Access	magnesium chloride	7,000	30	5.1	2.4	na	122	14	1,708	85	0.56	0.08	143.10	21.39
	Resource	water	7,000	20	5.1	2.4	na	122	5	610	50	0.46	0.07	139.07	20.77
Total Unpaved Road Emissions (lb/pad/yr)														282.16	42.16
Total Unpaved Road Emissions - All Traffic (lb/pad/yr)														904.8	137.6

[1] Haul trucks weight range is 28,000-80,000 lbs; average weight of 54,000 lbs used for calculations.
[2] AP-42 (EPA 2004), Table 13.2.2-1, "Typical Silt Content Values of Surface Material on Industrial and Rural Unpaved Roads."
[3] AP-42 (EPA 2004), Table 11.9-3, "Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations."
[4] Includes Supervisory Control and Data Acquisitions system (SCADA). SCADA is being installed at wells to increase production efficiency by providing real-time operating data to field staff including well flow rates and pressures, processing equipment operating conditions, tank levels, and emissions control equipment status. SCADA implementation is expected to reduce well site visits by 30-40% and reduce potential for spills.
[5] Calculated as Round Trips per Vehicle Type x Round Trip Distance
[6] AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", equations 1a and 1b.
[7] Calculated as lb/VMT x VMT/well x control efficiency.
[8] Emissions based on trip frequency and miles traveled to one well in the field. During production, 20 wells could be visited per day. This assumption will be reflected in full-field modeled emissions.

Table B.2.18
Production Traffic – 5 Wells per Pad

TRC Environmental
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **5 wells per pad**
Activity: **Production Traffic**
Emissions: **Fugitive Particulate Emissions from Traffic on Unpaved Roads**
Date: **3/24/2004**

Vehicle Type	Road Type	Dust Control Method	Average Vehicle Weight	Average Vehicle Speed	Silt Content[2]	Moisture Content[3]	RTs per Well[4]	RTs per Pad[4]	RT Distance	VMT[5]	Emission Control Efficiency	PM_{10} Emission Factor[6]	$PM_{2.5}$ Emission Factor[6]	PM_{10} Emissions[7] (controlled)	$PM_{2.5}$ Emissions[7] (controlled)
			(lb)	(mph)	(%)	(%)	(RTs/yr)	(RTs/year)	(miles)	(VMT/well/yr)	(%)	(lb/VMT)	(lb/VMT)	(lb/well/yr)	(lb/well/yr)
Workover Rig	Primary Access	magnesium chloride	90,000	20	5.1	2.4	1	na	14	14	85	2.35	0.36	4.93	0.76
	Resource	water	90,000	15	5.1	2.4	1	na	5	5	50	2.35	0.36	5.87	0.90
Haul trucks (water/condensate)[1]	Primary Access	magnesium chloride	54,000	20	5.1	2.4	35	na	14	490	85	1.87	0.29	137.19	21.04
	Resource	water	54,000	15	5.1	2.4	35	na	5	175	50	1.87	0.29	163.33	25.04
Total Unpaved Road Emissions (lb/well/yr)														311.33	47.74
Light trucks/ pickups/pumpers[8]	Primary Access	magnesium chloride	7,000	30	5.1	2.4	na	122	14	1,708	85	0.56	0.08	143.10	21.39
	Resource	water	7,000	20	5.1	2.4	na	122	5	610	50	0.46	0.07	139.07	20.77
Total Unpaved Road Emissions (lb/pad/yr)														282.16	42.16
Total Unpaved Road Emissions - All Traffic (lb/pad/yr)														1,838.8	280.8

1 Haul trucks weight range is 28,000-80,000 lbs; average weight of 54,000 lbs used for calculations.
2 AP-42 (EPA 2004), Table 13.2.2-1, "Typical Silt Content Values of Surface Material on Industrial and Rural Unpaved Roads."
3 AP-42 (EPA 2004), Table 11.9-3, "Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations."
4 Includes Supervisory Control and Data Acquisitions system (SCADA). SCADA is being installed at wells to increase production efficiency by providing real-time operating data to field staff including well flow rates and pressures, processingequipment operating conditions, tank levels, and emissions control equipment status. SCADA implementation is expected to reduce well site visits by 30-40% and reduce potential for spills.
5 Calculated as Round Trips per Vehicle Type x Round Trip Distance
6 AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", equations 1a and 1b.
7 Calculated as lb/VMT x VMT/well x control efficiency.
8 Emissions based on trip frequency and miles traveled to one well in the field. During production, 20 wells could be visited per day. This assumption will be reflected in full-field modeled emissions.

Table B.2.19
Production Traffic – 10 Wells per Pad

TRC Environmental
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: 10 wells per pad
Activity: Production Traffic
Emissions: Fugitive Particulate Emissions from Traffic on Unpaved Roads
Date: 3/24/2004

Vehicle Type	Road Type	Dust Control Method	Average Vehicle Weight	Average Vehicle Speed	Silt Content[2]	Moisture Content[3]	RTs per Well[4]	RTs per Pad[4]	RT Distance	VMT[5]	Emission Control Efficiency	PM_{10} Emission Factor[6]	$PM_{2.5}$ Emission Factor[6]	PM_{10} Emissions[7] (controlled)	$PM_{2.5}$ Emissions[7] (controlled)
			(lb)	(mph)	(%)	(%)	(RTs/yr)	(RTs/year)	(miles)	(VMT/well/yr)	(%)	(lb/VMT)	(lb/VMT)	(lb/well/yr)	(lb/well/yr)
Workover Rig	Primary Access	magnesium chloride	90,000	20	5.1	2.4	1	na	14	14	85	2.35	0.36	4.93	0.76
	Resource	water	90,000	15	5.1	2.4	1	na	5	5	50	2.35	0.36	5.87	0.90
Haul trucks (water/condensate)[1]	Primary Access	magnesium chloride	54,000	20	5.1	2.4	35	na	14	490	85	1.87	0.29	137.19	21.04
	Resource	water	54,000	15	5.1	2.4	35	na	5	175	50	1.87	0.29	163.33	25.04
Total Unpaved Road Emissions (lb/well/yr)														311.33	47.74
Light trucks/ pickups/pumpers[8]	Primary Access	magnesium chloride	7,000	30	5.1	2.4	na	122	14	1,708	85	0.56	0.08	143.10	21.39
	Resource	water	7,000	20	5.1	2.4	na	122	5	610	50	0.46	0.07	139.07	20.77
Total Unpaved Road Emissions (lb/pad/yr)														282.16	42.16
Total Unpaved Road Emissions - All Traffic (lb/pad/yr)														3,395.4	519.5

1 Haul trucks weight range is 28,000-80,000 lbs; average weight of 54,000 lbs used for calculations.
2 AP-42 (EPA 2004), Table 13.2.2-1, "Typical Silt Content Values of Surface Material on Industrial and Rural Unpaved Roads."
3 AP-42 (EPA 2004), Table 11.9-3, "Typical Values for Correction Factors Applicable to the Predictive Emission Factor Equations."
4 Includes Supervisory Control and Data Acquisitions system (SCADA). SCADA is being installed at wells to increase production efficiency by providing real-time operating data to field staff including well flow rates and pressures, processing equipment operating conditions, tank levels, and emissions control equipment status. SCADA implementation is expected to reduce well site visits by 30-40% and reduce potential for spills.
5 Calculated as Round Trips per Vehicle Type x Round Trip Distance
6 AP-42 (EPA 2004), Section 13.2.2 "Unpaved Roads", equations 1a and 1b.
7 Calculated as lb/VMT x VMT/well x control efficiency.
8 Emissions based on trip frequency and miles traveled to one well in the field. During production, 20 wells could be visited per day. This assumption will be reflected in full-field modeled emissions.

Table B.2.20
Wind Erosion – 2 Wells per Pad

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **2 wells per pad**
Activity: **Production**
Emissions: **Wind Erosion from Well Pads**
Date: **10/30/2003**

Emission Factor : 0.3733 lb/hr/100m^2

Based on AP-42 Chapter 13.2.5 (EPA 2004), Industrial Wind Erosion using Jonah Field, Wyoming meteorological data.

Control Efficiency: 0 %

Disturbed Area:
Well Pad Production: 1.2 acres 4,856.40 m^2

PM_{10} Emissions Calculations:

	PM_{10} Emission Factor (lb/hr/100 m^2)	$PM_{2.5}$ Emission Factor (lb/hr/100 m^2)	Area (100 m^2)	Control Efficiency (%)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (lb/hr)	PM_{10} Emissions (g/sec)	$PM_{2.5}$ Emissions (g/sec)
Well Pad - Production	0.3733	0.1493	48.56	0	18.13	7.251121838	2.28	0.91

Table B.2.21
Wind Erosion – 5 Wells per Pad

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: **Jonah Infill Drilling Project**
Scenario: **5 well per pad**
Activity: **Production**
Emissions: **Wind Erosion from Well Pads**
Date: **10/30/2003**

Emission Factor : 0.3733 lb/hr/100m^2

Based on AP-42 Chapter 13.2.5 (EPA 2004), Industrial Wind Erosion using Jonah Field, Wyoming meteorological data.

Control Efficiency: 0 %

Disturbed Area:
Well Pad Production: 2 acres 8,094.00 m^2

PM_{10} Emissions Calculations:

	PM_{10} Emission Factor (lb/hr/100 m^2)	$PM_{2.5}$ Emission Factor (lb/hr/100 m^2)	Area (100 m^2)	Control Efficiency (%)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (lb/hr)	PM_{10} Emissions (g/sec)	$PM_{2.5}$ Emissions (g/sec)
Well Pad - Production	0.3733	0.1493	80.94	0	30.21	12.08520306	3.81	1.52

Table B.2.22
Wind Erosion – 10 Wells per Pad

TRC Environmental Corporation
605 Skyline Drive
Laramie, WY 82070
Phone: (307) 742-3843
Fax: (307) 745-8317

Project: Jonah Infill Drilling Project
Scenario: 10 well per pad
Activity: Production
Emissions: Wind Erosion from Well Pads
Date: 10/30/2003

Emission Factor : 0.3733 lb/hr/100m^2

Based on AP-42 Chapter 13.2.5 (EPA 2004), Industrial Wind Erosion using Jonah Field, Wyoming meteorological data.

Control Efficiency: 0 %

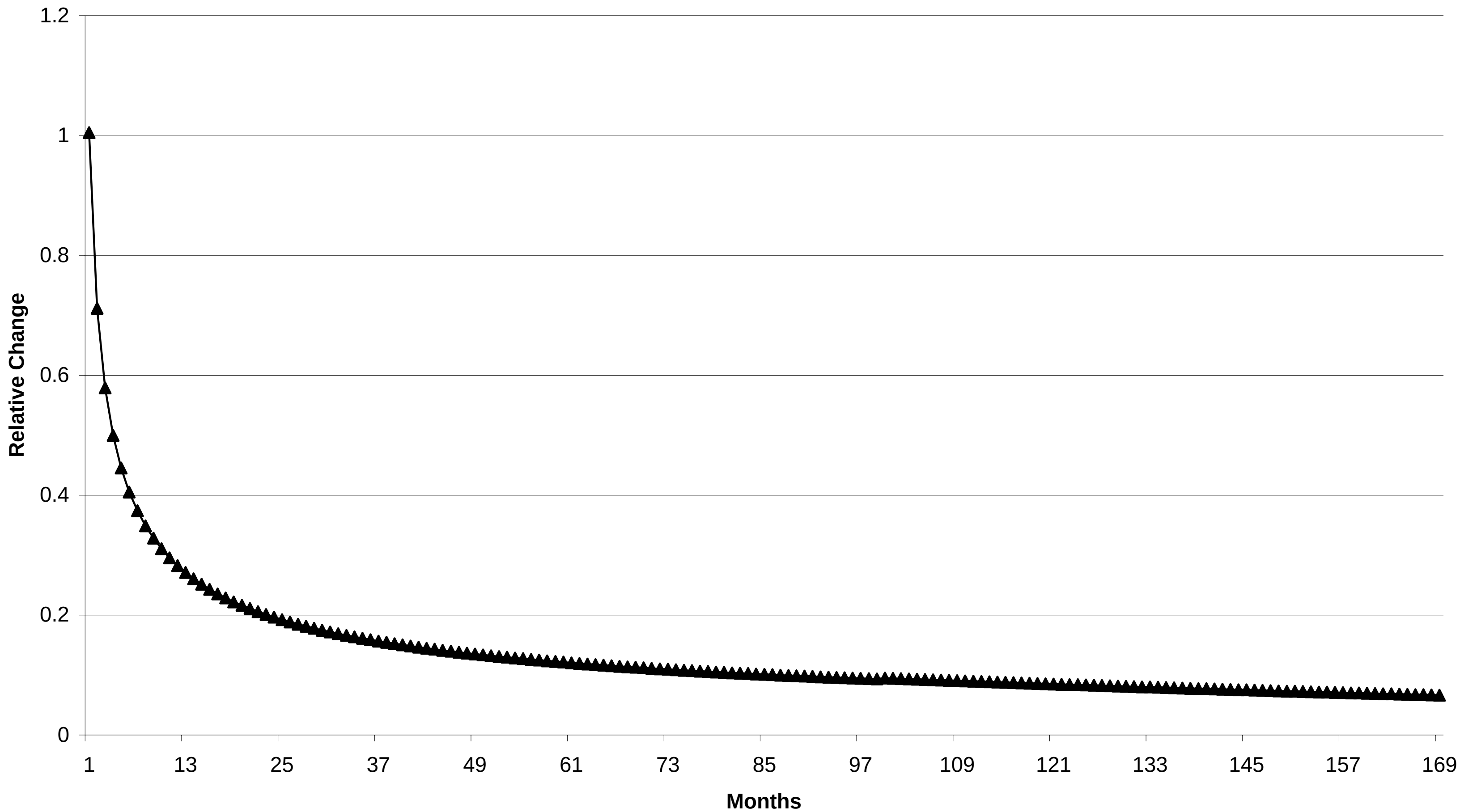
Disturbed Area:

Well Pad Production: 2 acres 8,094.00 m^2

PM_{10} Emissions Calculations:

	PM_{10} Emission Factor (lb/hr/100 m^2)	$PM_{2.5}$ Emission Factor (lb/hr/100 m^2)	Area (100 m^2)	Control Efficiency (%)	PM_{10} Emissions (lb/hr)	$PM_{2.5}$ Emissions (lb/hr)	PM_{10} Emissions (g/sec)	$PM_{2.5}$ Emissions (g/sec)
Well Pad - Production	0.3733	0.1493	80.94	0	30.21	12.08520306	3.81	1.52

Table B.2.23 Relative Decline Curve for a Typical Jonah Field Well



Note: Based on a ratio of 79% 2 BCF wells and 21% 4 BCF wells and a representative composite gas analysis.

Table B.2.24 - Field-wide Emissions Summary by Year (Tons per Year) - Alternative A and Proposed Action

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
	# of new Wells	250	250	250	250	250	250	250	250	250	250	250	250	100
	Total Wells	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3100
Construction Emissions:	NOx	701.8	701.8	701.8	701.8	701.8	701.8	701.8	701.8	701.8	701.8	701.8	701.8	280.7
	CO	396.5	396.5	396.5	396.5	396.5	396.5	396.5	396.5	396.5	396.5	396.5	396.5	158.6
	SO2	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	26.3	10.5
	PM10	368.3	368.3	368.3	368.3	368.3	368.3	368.3	368.3	368.3	368.3	368.3	368.3	147.3
	PM2.5	93.3	93.3	93.3	93.3	93.3	93.3	93.3	93.3	93.3	93.3	93.3	93.3	37.3
	VOCs	2955.7	2955.7	2955.7	2955.7	2955.7	2955.7	2955.7	2955.7	2955.7	2955.7	2955.7	2955.7	1182.3
	Benzene	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	8.2
	Toluene	55.2	55.2	55.2	55.2	55.2	55.2	55.2	55.2	55.2	55.2	55.2	55.2	22.1
	Ethylbenzene	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	2.2
	Xylene	85.8	85.8	85.8	85.8	85.8	85.8	85.8	85.8	85.8	85.8	85.8	85.8	34.3
	n-hexane	66.0	66.0	66.0	66.0	66.0	66.0	66.0	66.0	66.0	66.0	66.0	66.0	26.4
	Total HAPs	232.9	232.9	232.9	232.9	232.9	232.9	232.9	232.9	232.9	232.9	232.9	232.9	93.2
Production Emissions:	NOx	50.9	101.8	152.7	203.6	254.5	305.4	356.3	407.2	458.1	509.0	559.9	610.8	631.1
	CO	316.2	632.4	948.6	1264.8	1581.0	1897.2	2213.4	2529.6	2845.8	3162.0	3478.2	3794.4	3920.9
	SO2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PM10	76.4	152.8	229.2	305.6	382.0	458.4	534.9	611.3	687.7	764.1	840.5	916.9	947.5
	PM2.5	13.5	26.9	40.4	53.9	67.4	80.8	94.3	107.8	121.2	134.7	148.2	161.6	167.0
	VOCs	4647.0	5901.7	6784.7	7528.2	8178.8	8738.6	9248.1	9718.4	10157.1	10577.7	10973.1	11344.8	8906.0
	Benzene	305.1	387.4	445.4	494.2	536.9	573.7	607.1	638.0	666.8	694.4	720.4	744.8	584.7
	Toluene	618.7	785.7	903.3	1002.3	1088.9	1163.4	1231.2	1293.9	1352.3	1408.3	1460.9	1510.4	1185.7
	Ethylbenzene	31.7	40.2	46.3	51.3	55.8	59.6	63.1	66.3	69.3	72.1	74.8	77.4	60.7
	Xylene	332.0	421.6	484.7	537.8	584.3	624.3	660.6	694.2	725.6	755.6	783.9	810.4	636.2
	n-hexane	123.5	156.8	180.3	200.1	217.4	232.2	245.8	258.3	269.9	281.1	291.6	301.5	236.7
	Total HAPs	1410.9	1791.8	2059.9	2285.7	2483.2	2653.2	2610.3	2950.6	3083.8	3211.5	3331.6	3444.4	2704.0
Total Yearly Emissions:	**NOx**	**752.6**	**803.5**	**854.4**	**905.3**	**956.2**	**1007.1**	**1058.0**	**1108.9**	**1159.8**	**1210.7**	**1261.6**	**1312.5**	**911.8**
	CO	**712.7**	**1028.9**	**1345.1**	**1661.3**	**1977.5**	**2293.7**	**2609.9**	**2926.1**	**3242.3**	**3558.5**	**3874.7**	**4190.9**	**4079.5**
	SO2	**26.3**	**26.3**	**26.3**	**26.3**	**26.3**	**26.3**	**26.3**	**26.3**	**26.3**	**26.3**	**26.3**	**26.3**	**10.5**
	PM10	**444.7**	**521.1**	**597.5**	**673.9**	**750.3**	**826.7**	**903.1**	**979.5**	**1055.9**	**1132.3**	**1208.7**	**1285.1**	**1094.8**
	PM2.5	**106.7**	**120.2**	**133.7**	**147.1**	**160.6**	**174.1**	**187.5**	**201.0**	**214.5**	**228.0**	**241.4**	**254.9**	**204.3**
	VOCs	**7602.7**	**8857.4**	**9740.3**	**10483.9**	**11134.4**	**11694.3**	**12203.8**	**12674.0**	**13112.8**	**13533.4**	**13928.8**	**14300.5**	**10088.2**
	Benzene	**325.7**	**408.0**	**466.0**	**514.8**	**557.5**	**594.3**	**627.7**	**658.6**	**687.4**	**715.0**	**741.0**	**765.4**	**592.9**
	Toluene	**673.9**	**840.9**	**958.5**	**1057.5**	**1144.1**	**1218.6**	**1286.4**	**1349.1**	**1407.5**	**1463.5**	**1516.1**	**1565.6**	**1207.8**
	Ethylbenzene	**37.1**	**45.6**	**51.6**	**56.7**	**61.2**	**65.0**	**68.4**	**71.6**	**74.6**	**77.5**	**80.2**	**82.7**	**62.9**
	Xylene	**417.7**	**507.3**	**570.4**	**623.5**	**670.0**	**710.0**	**746.4**	**780.0**	**811.3**	**841.4**	**869.6**	**896.2**	**670.5**
	n-hexane	**189.5**	**222.8**	**246.3**	**266.1**	**283.4**	**298.2**	**311.8**	**324.3**	**335.9**	**347.1**	**357.6**	**367.5**	**263.1**
	Total HAPs	**1643.8**	**2024.8**	**2292.8**	**2518.6**	**2716.1**	**2886.1**	**2843.2**	**3183.6**	**3316.8**	**3444.5**	**3564.5**	**3677.4**	**2797.1**

Decline Curve Multipliers for Production VOCs and HAPs [1]	
# of Yrs	Multiplier
0	1.000
1	0.270
2	0.190
3	0.160
4	0.140
5	0.120
6	0.110
7	0.101
8	0.094
9	0.091
10	0.085
11	0.080
12	0.075
13	0.071

[1] Decline curve that multipliers are based on can be found as B.2.23

Table B.2.25 - Field-wide Emissions Summary by Year (Tons per Year) - Alternative B

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	…	2045
	# of new Wells	75	75	75	75	75	75	75	75	75	75	75	75	75	…	75
	Total Wells	75	150	225	300	375	450	525	600	675	750	825	900	975	…	3075
Construction Emissions:	NOx	285.9	285.9	285.9	285.9	285.9	285.9	285.9	285.9	285.9	285.9	285.9	285.9	285.9	…	285.9
	CO	167.6	167.6	167.6	167.6	167.6	167.6	167.6	167.6	167.6	167.6	167.6	167.6	167.6	…	167.6
	SO2	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	8.8	…	8.8
	PM10	109.4	109.4	109.4	109.4	109.4	109.4	109.4	109.4	109.4	109.4	109.4	109.4	109.4	…	109.4
	PM2.5	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	28.8	…	28.8
	VOCs	895.9	895.9	895.9	895.9	895.9	895.9	895.9	895.9	895.9	895.9	895.9	895.9	895.9	…	895.9
	Benzene	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	6.2	…	6.2
	Toluene	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	16.6	…	16.6
	Ethylbenzene	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.6	…	1.6
	Xylene	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	25.7	…	25.7
	n-hexane	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	19.8	…	19.8
	Total HAPs	69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.9	69.9	…	69.9
Production Emissions:	NOx	15.3	30.5	45.8	61.1	76.3	91.6	106.9	122.2	137.4	152.7	168.0	183.2	198.5	…	626.0
	CO	94.9	189.7	284.6	379.4	474.3	569.2	664.0	758.9	853.7	948.6	1043.5	1138.3	1233.2	…	3889.3
	SO2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	…	0.0
	PM10	22.9	45.8	68.8	91.7	114.6	137.5	160.5	183.4	206.3	229.2	252.1	275.1	298.0	…	939.8
	PM2.5	4.0	8.1	12.1	16.2	20.2	24.2	28.3	32.3	36.4	40.4	44.5	48.5	52.5	…	165.7
	VOCs	1394.1	1770.5	2035.4	2258.5	2453.6	2621.6	2774.4	2915.5	3047.1	3173.3	3291.9	3403.4	2671.8	…	4548.6
	Benzene	91.5	116.2	133.6	148.3	161.1	172.1	182.1	191.4	200.0	208.3	216.1	223.4	175.4	…	305.1
	Toluene	185.6	235.7	271.0	300.7	326.7	349.0	369.4	388.2	405.7	422.5	438.3	453.1	355.7	…	618.5
	Ethylbenzene	9.5	12.1	13.9	15.4	16.7	17.9	18.9	19.9	20.8	21.6	22.4	23.2	18.2	…	31.6
	Xylene	99.6	126.5	145.4	161.3	175.3	187.3	198.2	208.3	217.7	226.7	235.2	243.1	190.9	…	332.0
	n-hexane	37.1	47.1	54.1	60.0	65.2	69.7	73.7	77.5	81.0	84.3	87.5	90.5	71.0	…	123.5
	Total HAPs	423.3	537.6	618.0	685.7	745.0	795.9	842.4	885.2	925.2	963.5	999.5	1033.3	811.2	…	1410.8
Total Yearly Emissions:	**NOx**	**301.2**	**316.4**	**331.7**	**347.0**	**362.2**	**377.5**	**392.8**	**408.1**	**423.3**	**438.6**	**453.9**	**469.1**	**484.4**	…	**911.9**
	CO	**262.5**	**357.3**	**452.2**	**547.1**	**641.9**	**736.8**	**831.6**	**926.5**	**1021.4**	**1116.2**	**1211.1**	**1305.9**	**1400.8**	…	**4056.9**
	SO2	**8.8**	**9.8**	**10.8**	**11.8**	**12.8**	**13.8**	**14.8**	**15.8**	**16.8**	**17.8**	**18.8**	**19.8**	**20.8**	…	**48.8**
	PM10	**132.3**	**155.2**	**178.1**	**201.0**	**224.0**	**246.9**	**269.8**	**292.7**	**315.7**	**338.6**	**361.5**	**384.4**	**407.3**	…	**1049.2**
	PM2.5	**32.8**	**36.9**	**40.9**	**45.0**	**49.0**	**53.0**	**57.1**	**61.1**	**65.2**	**69.2**	**73.3**	**77.3**	**81.3**	…	**194.5**
	VOCs	**2290.0**	**2666.4**	**2931.3**	**3154.4**	**3349.6**	**3517.5**	**3670.4**	**3811.4**	**3943.1**	**4069.3**	**4187.9**	**4299.4**	**3567.7**	…	**5444.5**
	Benzene	**97.7**	**122.4**	**139.8**	**154.4**	**167.3**	**178.3**	**188.3**	**197.6**	**206.2**	**214.5**	**222.3**	**229.6**	**181.6**	…	**311.3**
	Toluene	**202.2**	**252.3**	**287.5**	**317.2**	**343.2**	**365.6**	**385.9**	**404.7**	**422.2**	**439.0**	**454.8**	**469.7**	**372.3**	…	**635.1**
	Ethylbenzene	**11.1**	**13.7**	**15.5**	**17.0**	**18.3**	**19.5**	**20.5**	**21.5**	**22.4**	**23.3**	**24.1**	**24.8**	**19.8**	…	**33.3**
	Xylene	**125.3**	**152.2**	**171.1**	**187.1**	**201.0**	**213.0**	**223.9**	**234.0**	**243.4**	**252.4**	**260.9**	**268.9**	**216.6**	…	**357.7**
	n-hexane	**56.9**	**66.9**	**73.9**	**79.8**	**85.0**	**89.5**	**93.5**	**97.3**	**100.8**	**104.1**	**107.3**	**110.3**	**90.8**	…	**143.3**
	Total HAPs	**493.1**	**607.4**	**687.9**	**755.6**	**814.8**	**865.8**	**912.2**	**955.1**	**995.0**	**1033.3**	**1069.4**	**1103.2**	**881.1**	…	**1480.7**

Decline Curve Multipliers for Production VOCs and HAPs[1]

# of Yrs	Multiplier
0	1.000
1	0.270
2	0.190
3	0.160
4	0.140
5	0.120
6	0.110
7	0.101
8	0.094
9	0.091
10	0.085
11	0.080
12	0.075
13	0.071

[1] Decline curve that multipliers are based on can be found as B.2.23

Table B.2.26 - Field-wide Emissions Summary by Year (Tons per Year) - Preferred Alternative

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
	# of new Wells	250	250	250	250	250	250	250	250	250	250	250	250	100
	Total Wells	250	500	750	1000	1250	1500	1750	2000	2250	2500	2750	3000	3100
Construction Emissions:	NOx	580.6	580.6	580.6	580.6	580.6	580.6	580.6	580.6	580.6	580.6	580.6	580.6	232.2
	CO	432.5	432.5	432.5	432.5	432.5	432.5	432.5	432.5	432.5	432.5	432.5	432.5	173.0
	SO2	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	34.1	13.6
	PM10	107.1	107.1	107.1	107.1	107.1	107.1	107.1	107.1	107.1	107.1	107.1	107.1	42.9
	PM2.5	97.4	97.4	97.4	97.4	97.4	97.4	97.4	97.4	97.4	97.4	97.4	97.4	39.0
	VOCs	2962.7	2962.7	2962.7	2962.7	2962.7	2962.7	2962.7	2962.7	2962.7	2962.7	2962.7	2962.7	1185.1
	Benzene	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	20.6	8.2
	Toluene	55.2	55.2	55.2	55.2	55.2	55.2	55.2	55.2	55.2	55.2	55.2	55.2	22.1
	Ethylbenzene	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	5.4	2.2
	Xylene	85.8	85.8	85.8	85.8	85.8	85.8	85.8	85.8	85.8	85.8	85.8	85.8	34.3
	n-hexane	66.0	66.0	66.0	66.0	66.0	66.0	66.0	66.0	66.0	66.0	66.0	66.0	26.4
	Total HAPs	232.9	232.9	232.9	232.9	232.9	232.9	232.9	232.9	232.9	232.9	232.9	232.9	93.2
Production Emissions:	NOx	10.2	20.4	30.5	40.7	50.9	61.1	71.3	81.4	91.6	101.8	112.0	122.2	126.2
	CO	316.2	632.4	948.6	1264.8	1581.0	1897.2	2213.4	2529.6	2845.8	3162.0	3478.2	3794.4	3920.9
	SO2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	PM10	15.3	30.6	45.8	61.1	76.4	91.7	107.0	122.3	137.5	152.8	168.1	183.4	189.5
	PM2.5	2.7	5.4	8.1	10.8	13.5	16.2	18.9	21.6	24.2	26.9	29.6	32.3	33.4
	VOCs	4647.0	5901.7	6784.7	7528.2	8178.8	8738.6	9248.1	9718.4	10157.1	10577.7	10973.1	11344.8	8906.0
	Benzene	305.1	387.4	445.4	494.2	536.9	573.7	607.1	638.0	666.8	694.4	720.4	744.8	584.7
	Toluene	618.7	785.7	903.3	1002.3	1088.9	1163.4	1231.2	1293.9	1352.3	1408.3	1460.9	1510.4	1185.7
	Ethylbenzene	31.7	40.2	46.3	51.3	55.8	59.6	63.1	66.3	69.3	72.1	74.8	77.4	60.7
	Xylene	332.0	421.6	484.7	537.8	584.3	624.3	660.6	694.2	725.6	755.6	783.9	810.4	636.2
	n-hexane	123.5	156.8	180.3	200.1	217.4	232.2	245.8	258.3	269.9	281.1	291.6	301.5	236.7
	Total HAPs	1410.9	1791.8	2059.9	2285.7	2483.2	2653.2	2610.3	2950.6	3083.8	3211.5	3331.6	3444.4	2704.0
Total Yearly Emissions:	**NOx**	**590.7**	**600.9**	**611.1**	**621.3**	**631.4**	**641.6**	**651.8**	**662.0**	**672.2**	**682.3**	**692.5**	**702.7**	**358.4**
	CO	**2956.2**	**3272.4**	**3588.6**	**3904.8**	**4221.0**	**4537.2**	**4853.4**	**5169.6**	**5485.8**	**5802.0**	**6118.2**	**6434.4**	**4976.9**
	SO2	**34.1**	**34.1**	**34.1**	**34.1**	**34.1**	**34.1**	**34.1**	**34.1**	**34.1**	**34.1**	**34.1**	**34.1**	**13.6**
	PM10	**122.4**	**137.7**	**153.0**	**168.3**	**183.5**	**198.8**	**214.1**	**229.4**	**244.7**	**259.9**	**275.2**	**290.5**	**232.3**
	PM2.5	**100.1**	**102.8**	**105.5**	**108.2**	**110.9**	**113.5**	**116.2**	**118.9**	**121.6**	**124.3**	**127.0**	**129.7**	**72.4**
	VOCs	**7609.7**	**8864.4**	**9747.3**	**10490.9**	**11141.4**	**11701.3**	**12210.8**	**12681.0**	**13119.8**	**13540.4**	**13935.8**	**14307.5**	**10091.0**
	Benzene	**325.7**	**408.0**	**466.0**	**514.8**	**557.5**	**594.3**	**627.7**	**658.6**	**687.4**	**715.0**	**741.0**	**765.4**	**592.9**
	Toluene	**673.9**	**840.9**	**958.5**	**1057.5**	**1144.1**	**1218.6**	**1286.4**	**1349.1**	**1407.5**	**1463.5**	**1516.1**	**1565.6**	**1207.8**
	Ethylbenzene	**37.1**	**45.6**	**51.6**	**56.7**	**61.2**	**65.0**	**68.4**	**71.6**	**74.6**	**77.5**	**80.2**	**82.7**	**62.9**
	Xylene	**417.7**	**507.3**	**570.4**	**623.5**	**670.0**	**710.0**	**746.4**	**780.0**	**811.3**	**841.4**	**869.6**	**896.2**	**670.5**
	n-hexane	**189.5**	**222.8**	**246.3**	**266.1**	**283.4**	**298.2**	**311.8**	**324.3**	**335.9**	**347.1**	**357.6**	**367.5**	**263.1**
	Total HAPs	**1643.8**	**2024.8**	**2292.8**	**2518.6**	**2716.1**	**2886.1**	**2843.2**	**3183.6**	**3316.8**	**3444.5**	**3564.5**	**3677.4**	**2797.1**

Decline Curve Multipliers for Production VOCs and HAPs [1]

# of Yrs	Multiplier
0	1.000
1	0.270
2	0.190
3	0.160
4	0.140
5	0.120
6	0.110
7	0.101
8	0.094
9	0.091
10	0.085
11	0.080
12	0.075
13	0.071

APPENDIX C:

CUMULATIVE EMISSIONS INVENTORIES

This appendix outlines the methodology used in the emissions inventory of industrial sources within the cumulative modeling domain.

C.1 STATE AGENCY-PERMITTED INDUSTRIAL SOURCE INVENTORY

C.1.1 State Air Quality Regulatory Authority

The determination of sources to inventory was based on the date a source was permitted and its operation start-up date. The following criteria were the basis upon which sources were included or excluded.

- Include sources permitted and operating January 1, 2001 – June 30, 2003.
- Include if permitted July 1, 1999 – June 30, 2003 but not yet operating (see RFFA).
- Include sources of NO_x, PM_{10}, or SO_2 emissions.
- Exclude sources permitted and operating prior to January 1, 2001; sources listed but with permits cancelled or rescinded; and sources with no NO_x, SO_2, or PM_{10} emissions.

A list of permitted sources within the JIDPA modeling domain was provided by state air quality agencies. The inclusion/exclusion determination was made either at the initial list stage (depending upon the detail of the information provided), or when the physical file was examined. Throughout the process, excluded facilities and reason for exclusion were documented.

For all included sources, the following information was collected.

- County
- Facility name
- Unique facility ID number
- Permit number
- Permit issuance date
- Operation start-up date
- Unique source ID numbers and SIC codes if available
- Source description
- Site location (lat/long, UTM and zone, and/or section, township, and range)
- Permitted change in NO_x, SO_2, PM_{10}, and $PM_{2.5}$ emission rate by source during inventory period
- NO_x, SO_2, PM_{10}, and $PM_{2.5}$ actual emission rate by source, if available
- Stack exit parameters: height, temperature, velocity, diameter, and flow rate for all included facilities

The change in permitted emission limits occurring during the inventory period was obtained for included sources, either through a physical file search or from the state agency. Actual emissions were obtained, if available electronically, for year 2000 and for the most recent reporting period available for that site (2001 or after) to allow a determination of change in actual emissions during the inventory period. Actual emissions were not available electronically for a majority of the sources. $PM_{2.5}$ data were not available for sources in any state. $PM_{2.5}$ emissions were calculated based on the ratio of $PM_{2.5}$ to PM_{10} using assumptions for natural gas combustion, coal combustion, or fugitive particulates.

For any modification to an included permitted source:

- the permitted increase or decrease in emissions was determined between pre-January 1, 2001 and the inventory period (January 1, 2001 – June 30, 2003);
- the permitted increase or decrease was obtained from permit documents by locating a description of the change or by recording both new and old permit limits;
- emissions decreases were tracked for major sources only (>250 tpy);
- emissions increases of less than 1 tpy were not tracked;
- fugitive PM_{10} and NO_x emissions for surface coal mine permit modifications were included. Annual emissions calculated in year 2000 or previous applications were reviewed and compared to 2003 annual emissions. The increase or decrease was modeled;
- actual emissions for all included sources were reported as the difference between 2000 reported actual emissions and 2002 reported actual emissions (or most recent year reported after 2000). If no 2000 data existed, no actuals were recorded.

For each site, multiple stacks were combined into a single representative emission point for the cumulative modeling. The following methodology was used in combining the stacks.

- Combine total change in emissions by site and pollutant.
- Select stack parameters using the following hierarchy.
  - Select stack with greatest "M" value using SCREEN method outlined in "Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised", EPA-454/R-92-019. ("M" value is a merged stack parameter which accounts for the relative influence of stack height, plume rise, and emission rate on concentrations)
  - Review "M" values and, if they are not representative of the overall facility, use stack parameters from the single point exhibiting the highest emission rate.
  - If stack parameters are still not representative, select worst-case parameters based on the potential for maximum long-range impacts (i.e., high temperature, stack height, exit velocity).
  - If no stack parameters are available, determine the SIC code for the facility and substitute the stack parameters given for that SIC code in the EPA SIC code source parameter guidance. If a single stack parameter

value is missing and the SIC code is known, the single value is substituted from SIC code stack parameter guidance when reasonable.

- If the SIC code is not known, or if no representative SIC code values are found, use generic stack parameters of 15-m height, 422° Kelvin temperature, 0.31-m exit diameter, and 10.0-m per second (m/s) exit velocity. If a single parameter is missing from any source for which no SIC code is known or available, the single generic parameter is substituted.

C.1.2 Natural Gas and Oil Well Agency-permitted Sources

Natural gas and oil well data were gathered by obtaining from state oil and gas permitting agencies total production by county for the years 2000 and 2002. Production rates for the first two quarters of 2003 were requested but not yet available for any state at the time the inventory was completed. Production rates for 2000 were subtracted from production rates from the most recent available annual period (2002). An average emission rate per unit natural gas well of 0.045 tpy NO_x was used based on Jonah Field well equipment emissions monitoring performed by EnCana in July 2003. This value was also used for CBM wells. An average emission rate for oil wells of 0.3 tpy NO_x was obtained from WDEQ-AQD. These representative emission rates were applied to calculate total NO_x emissions per county. PM_{10}, $PM_{2.5}$, and SO_2 emissions were assumed to be negligible. All states inventoried, with the exception of Idaho, had operational oil and gas wells. Colorado had no change in the number of operational oil and gas wells within the inventory period.

All Utah and Wyoming oil and gas agency-permitted well data are included in Table C.9. No table is shown for Idaho or Colorado because the net change is zero.

C.1.3 Jonah Field Well Permitted Post-inventory Start-Date

Emissions from 198 wells permitted following inventory baseline date are summarized in Table C.10.

C.1.4 State-specific Methodologies

The inventory area includes portions of Wyoming, Colorado, Idaho, and Utah. Due to the differences in the data provided by each state, some variation in inventory procedures were necessary. The following are the state-specific procedures used in the inventory.

Colorado

A list of permitted facilities within the inventory area was requested. Permitted and actual emissions for the most recent reporting year were provided in electronic format by Colorado Department of Public Health and Environment (CDPHE). A manual file search was performed to determine the change in emissions for each modification. If a facility had both an initial and a final permit and there were differences between the initial and final permit limits, the differences were documented as a permitted emissions change. Permits with ".CN" suffixes are cancelled, ".XP" indicates permit exempt, ".XA" indicates both Air Pollutant Emission Notice (APEN) and permit exempt, ".GF" indicates grandfathered and all permits with theses extensions were excluded from inventory. "F" indicates fugitive source. Because no start-up dates were included in the files, and because of Colorado's procedures for initial and final permit issuance, all permits issued through June 30, 2003 were conservatively assumed to be operational as of June 30, 2003. Colorado included state-permitted sources are shown in Table C.1 and Colorado excluded state-permitted sources are shown in Table C.2.

Idaho

A list of permitted facilities within the inventory area was requested, and Idaho Department of Environmental Quality (IDEQ) provided facility numbers, names, and locations. Permit files for all facilities listed were reviewed on-site at the IDEQ offices in Boise to obtain necessary data. No actual emissions were available in the files. All permitted facilities were assumed operational and stack exit parameters were obtained from files when available. Idaho included state-permitted sources are shown in Table C.3 and Idaho excluded state-permitted sources are shown in Table C.4.

Utah

Utah Division of Air Quality (UDAQ) supplied electronic versions of Approval Order documents and a list of available actual emissions and stack parameters in electronic format. Approval Orders were examined for changes in emissions. If no emissions change was listed in the Approval Order, change in emissions was calculated based on the difference between the current facility total emissions as reported by UDAQ and facility total emissions from the most recent permit as reported by UDAQ. Actual emissions were provided by UDAQ for 2000 and 2002, and change in actual emissions for the inventory period was assumed to be the difference between these values. No actuals reported in either 2000 or 2002 were assumed to indicate no emissions change. Because UDAQ does not track start-up dates electronically, and no physical file search was required for any other reason, all permitted sources were assumed operational. Utah included state-permitted sources are shown in Table C.5 and Utah excluded state-permitted sources are shown in Table C.6.

Wyoming

A list of permitted facilities within the state of Wyoming was requested from WDEQ-AQD. Permit files for all facilities listed were reviewed on-site at the WDEQ-AQD offices in Cheyenne to obtain necessary data. For any facilities classified as natural gas/coal bed methane (CBM) production sites with emissions increases greater than 3 tpy, the files were reviewed for any combustion equipment and were included if any single piece of combustion equipment emitted more than 2 tpy. All other production sites were assumed to be included in Wyoming Oil and Gas Conservation Commission (WOGCC) production estimates. Actual emissions were provided by WDEQ-AQD in electronic format and were limited to only large facilities for which actual emissions are tracked for fee payment purposes. Years 2000 and 2001 were available, and the change in actual emissions for the inventory period was assumed to be the difference between 2000 and 2001 values. Start-up dates were provided by WDEQ-AQD to determine the operating status of a facility. If a facility had no reported start-up date but the facility permit was issued more than 2 years previous, the facility was assumed operational. A list of facilities permitted less than 2 years prior to the inventory period and reporting no start-up date was provided to WDEQ-AQD to verify start-up date, and based on data received from WDEQ-AQD were assumed operational or RFFA. Five permit files were unable to be located by WDEQ-AQD staff after an extensive search, and therefore were excluded. Stack exit parameters were obtained from files if available. Wyoming included state-permitted sources are shown in Table C.7 and Wyoming excluded state-permitted sources are shown in Table C.8.

C.2 RFFA

State agency-permitted sources which were determined to not yet be in operation as of the inventory end-date were included as RFFA in all analyses. Included permitted RFFA sources are shown in Table C.11.

C.3 RFD INVENTORY

Wyoming RFD within the modeling domain was compiled. In accordance with definitions agreed upon by BLM, EPA, WDEQ-AQD, and USDA Forest Service 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 list of known NEPA projects was submitted to each Wyoming BLM Field Office, along with a request for feedback regarding the inclusion of listed projects or presence of any additional unlisted projects. The air quality technical documentation for projects to be inventoried and any available information on development status within each project area were requested, if not already in possession.

This information, along with project status data received from the Wyoming State BLM office, provided a basis for the RFD inventory; however, no information on the development status within each field was available from BLM. Therefore, the WOGCC and WDEQ-AQD were consulted to determine permitted wells and permitted compressor engines, respectively. WOGCC had available well development by BLM project area for the Pinedale and Rawlins Field Offices only. Well development by project area in other field offices was determined by geographically plotting well locations, counting the wells permitted after the project authorization date located within each project area, and using those well counts to determine remaining authorized wells. No compressor development or ancillary facility development data was available for any BLM field office. As a result, compressors and ancillary facilities permitted through WDEQ-AQD were geographically plotted and those associated with a specific project area that were permitted after the project authorization date were subtracted from total authorized compression to determine RFD.

Emissions of all available pollutants were summarized by project. Any excluded projects and exclusion reason were documented. A summary of NEPA RFD project emissions are shown in Table C.12.

C.4 QA/QC PROCEDURES

The QA/QC procedure followed throughout the inventory process was as follows.

- Procedures for data collection and processing were documented (see above).
- Files were obtained digitally directly from agency to eliminate transcription errors.
- When physical file searches were required, relevant documents were photocopied so input could be completed in an orderly manner, transcription errors could be minimized, and documents could be reviewed without return to agency premises if questions arose.
- All input values were checked once following initial input for numerical errors, and again following completion of input group for reasonableness.
- Exclusions and questionable data were documented. Methods used to single out incorrect data included: examine UTM zone by county, plot geographic locations, and spot-check data points to determine reasonableness.
- The issuing agency was contacted with permit questions rather than making assumptions.
- All data were entered into databases with consistent format to eliminate inconsistency between states.
- Database query results were spot-checked manually to ensure accuracy.
- Inventory was peer reviewed at several stages during development and upon completion.

Table C.1
Colorado State-Permitted Source Inventory - CDPHE APCD Permitted Sources - Table of Included Sources

Facility Name	Site ID	Permit Number	County	Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	NO_x (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Argali Exploration Company	0133	02MF0001	Moffat	2.74	422.00	53.85	0.10	43.40	0.00	0.00	0.00
Big West Oil & Gas Flying J Oil and Gas	0108	95MF004-2	Moffat	3.35	422.00	14.72	0.20	19.12	0.00	0.00	0.00
Blue Mountain Energy - Deserado Mine	0014	00RB0283	Rio Blanco	21.34	301.31	8.50	0.88	0.00	0.00	5.73	1.71
Blue Mountain Energy - Deserado Mine	0014	12RB802-2	Rio Blanco	1.00	294.00	0.10	0.10	0.00	0.00	6.30	1.89
Blue Mountain Energy - Deserado Mine	0014	12RB802-3F	Rio Blanco	1.00	294.00	0.10	0.10	0.00	0.00	16.22	4.86
Journey Operating, LLC - Sandhills Lease	0143	01MF0993	Moffat	2.43	422.00	26.54	0.10	15.90	0.00	0.00	0.00
Merit Energy - Powder Wash Station	0111	02MF0073	Moffat	3.35	422.00	40.62	0.15	18.70	0.00	0.00	0.00
Precision Excavating, INC	0079	00RO0741F	Routt	1.00	294.00	0.10	0.10	0.00	0.00	15.05	4.51
Questar Gas Mgmt. CO. W Hiawatha C.S.	0161	01MF0787	Moffat	4.57	422.00	28.37	0.30	15.70	0.00	0.00	0.00
Questar Gas Mgmt. CO. W Hiawatha C.S.	0067	01MF0039	Moffat	4.57	422.00	31.27	0.30	12.50	0.00	0.00	0.00
Rocky Mtn Nat Gas - Blue Gravel	0125	03MF0113	Moffat	9.05	509.81	12.50	0.76	8.53	0.00	0.00	0.00
Tipperary Corporation - Walker 12-5	0168	02MF0370	Moffat	2.43	422.00	11.33	0.09	14.60	0.00	2.00	2.00
Tipperary Corporation - Walker 12-5	0168	02MF0371	Moffat	2.43	422.00	11.33	0.09	3.30	0.00	0.00	0.00
Tipperary Corporation - Walker 3-1	0169	02MF0995	Moffat	9.05	509.81	12.50	0.76	14.60	2.70	0.00	0.00
Tri State Generation Craig	0018	01MF0003	Moffat	25.48	361.70	17.28	1.03	0.00	0.00	2.60	2.60
True Oil LLC - BTA Federal #12-33	0156	00MF0111	Moffat	3.04	422.00	18.98	1.82	10.70	0.00	0.00	0.00
Twin Landfill Corp. - Milner Landfill	0057	02RO0124	Routt	20.42	424.20	10.45	0.82	0.00	0.00	16.90	5.07
Total Colorado State-Permitted Source Emissions								177.05	2.70	64.80	22.64

Table C.2
Colorado State-Permitted Source Inventory - CDPHE APCD Permitted Sources - Table of Excluded Sources

State	County	Facility Name	Site ID	Permit Number	Reason for Exclusion
Colorado	Boulder	ABRA AUTO BODY AND GLASS	1231	00BO0125	No criteria pollutants.
Colorado	Weld	ADVANCED FORMING TECHNOLOGY	0495	96WE428-1	Operating prior to 1/1/2001.
Colorado	Weld	AGGREGATE INDUSTRIES - PLATTE VALLEY WCR	0378	93WE448F	Reduction at PSD minor source.
Colorado	Weld	AGGREGATE INDUSTRIES - PLATTE VALLEY WCR	0378	94WE0486	Reduction at PSD minor source.
Colorado	Larimer	AGGREGATE INDUSTRIES - WCR, INC -STEGNER	0357	02LR0077.CN	Cancelled.
Colorado	Larimer	AGGREGATE INDUSTRIES - WCR, INC -STEGNER	0357	00LR0033F	Reduction at PSD minor source.
Colorado	Boulder	AGGREGATE INDUSTRIES - WCR, INC.	0009	99BO0649.CN	Cancelled.
Colorado	Larimer	AGGREGATE INDUSTRIES - WCR, INC.	0024	10LR406	No change in emissions.
Colorado	Weld	AGGREGATE INDUSTRIES - WCR, INC.	0173	89WE087F	No change in emissions.
Colorado	Weld	AGGREGATE INDUSTRIES -WEST CENTRAL REG.	0305	92WE858F	Reduction at PSD minor source.
Colorado	Boulder	AGGREGATE INDUSTRIES-WCR, INC. - FRANCIS	0058	83BO286	No change in emissions.
Colorado	Weld	AGGREGATE INDUSTRIES-WCR,INC.-WW FARMS P	0549	99WE0033F	Reduction at PSD minor source.
Colorado	Larimer	AGILENT TECHNOLOGIES	0044	95LR474.CN	Permit exempt.
Colorado	Larimer	AGILENT TECHNOLOGIES	0044	01LR0544.XP	Permit exempt.
Colorado	Weld	AGLAND, INC. - FARMLAND FEED, LLC	0397	94WE025	Permit exempt.
Colorado	Weld	ANDESITE ROCK CO - CARR GRAVEL RESOURCE	0186	89WE068F	Reduction at PSD minor source.
Colorado	Weld	ANDESITE ROCK CO DEL CAMINO PIT	0100	84WE086-2.XA	Operating prior to 1/1/2001.
Colorado	Weld	ANDESITE ROCK CO DEL CAMINO PIT	0100	84WE086-1F	Reduction at PSD minor source.
Colorado	Larimer	ANHEUSER BUSCH INC	0060	99LR0453	Operating prior to 1/1/2001.
Colorado	Moffat	ARGALI EXPLORATION COMPANY	0133	95MF544-1.CN	Cancelled.
Colorado	Boulder	ASPHALT SPECIALIST CO - KENOSHA PONDS	0655	00BO0326F	Operating prior to 1/1/ 2001.
Colorado	Boulder	BALL AEROSPACE & TECHNOLOGIES CORP	0084	95BO405	Operating prior to 1/1/2001.
Colorado	Weld	BITTER CREEK PIPELINES - NEW RAYMER .CN	0270	92WE049.CN	Cancelled.
Colorado	Rio Blanco	BLUE MOUNTAIN ENERGY - DESERADO MINE	0014	12RB802-5	Reduction at PSD minor source.
Colorado	Rio Blanco	BLUE MOUNTAIN ENERGY - DESERADO MINE	0014	12RB802-6	Reduction at PSD minor source.
Colorado	Morgan	BRUSH COGENERATION PARTNERS/COLO POWER	0027	91MR933	Operating prior to 1/1/2001.
Colorado	Weld	CAMAS COLORADO INC/BESTWAY PAVING	0004	10WE552.CN	Cancelled.
Colorado	Boulder	CEMEX, INC. - LYONS CEMENT PLANT	0003	98BO0259	Operating prior to 1/1/2001.
Colorado	Boulder	CEMEX, INC. - LYONS CEMENT PLANT	0003	98BO0292	Operating prior to 1/1/2001.
Colorado	Larimer	CHAPPELLE ANIMAL HOSP	0077	01LR0837	Increase < 1TPY.
Colorado	Rio Blanco	CHEVRON USA - WILSON CREEK GAS PLT	0010	99RB0602.CN	Cancelled.
Colorado	Rio Blanco	CHEVRON USA PRODUCTION CO RANGELY FIELD	0034	88RB066-10	Operating prior to 1/1/2001.
Colorado	Rio Blanco	CHEVRON USA PRODUCTION CO RANGELY FIELD	0034	90RB073	Operating prior to 1/1/2001.
Colorado	Rio Blanco	CHEVRON USA PRODUCTION CO RANGELY FIELD	0034	88RB066-11	Reduction at PSD minor source.
Colorado	Boulder	CITY OF BOULDER POLICE DEPARTMENT	0642	98BO0829	Operating prior to 1/1/2001.
Colorado	Weld	CITY OF GREELEY WATER POLLUT CONTROL FAC	0322	96WE739	Permit exempt.
Colorado	Larimer	COLLINS COLLISION PRODUCTS INC	0048	90LR126-1	No change in emissions.
Colorado	Larimer	COLLINS COLLISION PRODUCTS INC	0048	12LR830	No criteria pollutants.
Colorado	Moffat	COLOWYO COAL CO	0007	95MF1040	No change in emissions.
Colorado	Boulder	COMPOSITE TEK	0458	92BO1369	Operating prior to 1/1/2001.
Colorado	Larimer	CONNELL RESOURCES-TIMNATH CONNELL PIT	0353	99LR0923F	No change in emissions.

Table C.2
Colorado State-Permitted Source Inventory - CDPHE APCD Permitted Sources - Table of Excluded Sources

State	County	Facility Name	Site ID	Permit Number	Reason for Exclusion
Colorado	Larimer	COULSON EXCAVATING COMPANY INC	0301	95LR767F.CN	Cancelled.
Colorado	Morgan	DAIRY FARMERS OF AMERICA, INC.	0076	01MR0571	No change in emissions.
Colorado	Weld	DENVER REGIONAL LANDFILL	0079	83WE412	No criteria pollutants.
Colorado	Larimer	DON KEHN CONSTRUCTION INC	0319	00LR0280	Operating prior to 1/1/2001.
Colorado	Larimer	DON KEHN CONSTRUCTION INC	0319	97LR0311F	Operating prior to 1/1/2001.
Colorado	Larimer	DON KEHN CONSTRUCTION INC	0319	97LR0312	Operating prior to 1/1/2001.
Colorado	Weld	DUKE ENERGY FIELD SERVICES - EAST LATERA	0202	95WE192	Ownership change only.
Colorado	Weld	DUKE ENERGY FIELD SERVICES - EATON	0035	97WE0349	Reduction at a synthetic minor.
Colorado	Weld	DUKE ENERGY FIELD SERVICES - FINA	0199	97WE0852	Ownership change only.
Colorado	Weld	DUKE ENERGY FIELD SERVICES - JODY	0535	98WE0263	Ownership change only.
Colorado	Weld	DUKE ENERGY FIELD SERVICES - KIRKMEYER	0221	97WE0001	No change in emissions.
Colorado	Weld	DUKE ENERGY FIELD SERVICES - MIDPOINT	0152	98WE0709	No inventoried pollutants.
Colorado	Weld	DUKE ENERGY FIELD SERVICES - PLATTEVILLE	0595	01WE0433	Increase < 1 TPY.
Colorado	Weld	DUKE ENERGY FIELD SERVICES - RIVERSIDE	0110	97WE0791	Reduction at PSD minor source.
Colorado	Weld	DUKE ENERGY FIELD SERVICES - SOUTHFIELD	0024	98WE0708	No change in emissions.
Colorado	Weld	DUKE ENERGY FIELD SERVICES - SURREY	0075	97WE0319	No change in emissions.
Colorado	Weld	DUKE ENERGY FIELD SERVICES - WEST SPINDL	0076	96WE140	No change in emissions.
Colorado	Weld	DUKE ENERGY FIELD SERVICES, LLC - TAMPA	0115	00WE0503	Name change only.
Colorado	Weld	EASTMAN KODAK CO	0003	01WE0460	No criteria pollutants.
Colorado	Rio Blanco	ELAM CONST INC DAVENPORT PIT	0050	91RB043F	Ownership change only.
Colorado	Weld	ENCANA OIL & GAS (USA) INC. - ARISTOCRAT	0127	85WE384-1	Ownership change only.
Colorado	Weld	ENCANA OIL & GAS (USA) INC. - FREDERICK	0151	98WE0453	No change in emissions.
Colorado	Weld	ENCANA OIL & GAS (USA) INC. - FREDERICK	0151	98WE0452	Ownership change only.
Colorado	Moffat	ENCANA OIL & GAS (USA), INC -SAND HILLS	0148	96MF892.CN	Cancelled.
Colorado	Moffat	ENCANA OIL & GAS (USA), INC -SAND HILLS	0148	99MF0797	No change in emissions.
Colorado	Rio Blanco	ENCANA OIL & GAS (USA), INC. - BUCKSKIN	0152	00RB0201.CN	Cancelled.
Colorado	Rio Blanco	ENCANA OIL & GAS (USA), INC. - BUCKSKIN	0152	01RB0927.CN	Cancelled.
Colorado	Rio Blanco	ENCANA OIL & GAS (USA), INC. - BUCKSKIN	0152	02RB0620.CN	Cancelled.
Colorado	Moffat	ENSIGN OPERATING COMPANY	0112	95MF025	Operating prior to 1/1/2001.
Colorado	Weld	ENVIROCYCLE, LLC.CN	0565	99WE0738.CN	Cancelled.
Colorado	Morgan	EXCEL CORP	0024	99MR0691	Operating prior to 1/1/2001.
Colorado	Larimer	GENESIS FIXTURES, INC.	0351	99LR0766	No change in emissions.
Colorado	Larimer	GOES FUNERAL CARE & CREMATORY	0387	02LR0101	Increase < 1 TPY.
Colorado	Boulder	GOLDEN CONCRETE DBA AGGREGATE INDUSTRIES	0579	00BO0084.CN	Cancelled.
Colorado	Boulder	GOLDEN CONCRETE DBA AGGREGATE INDUSTRIES	0579	00BO0085.CN	Cancelled.
Colorado	Boulder	GOLDEN CONCRETE DBA AGGREGATE INDUSTRIES	0579	00BO0086	Increase < 1 TPY.
Colorado	Boulder	GOLDEN CONCRETE DBA AGGREGATE INDUSTRIES	0579	00BO0161	Operating prior to 1/1/2001.
Colorado	Weld	GOLDEN'S ANDESITE MINING CO.CN	0244	91WE569F.CN	Cancelled.
Colorado	Routt	GRAND SUMMIT RESORT HOTEL	0076	99RO0806	Operating prior to 1/1/2001.
Colorado	Larimer	GREAT WESTERN DIAMOND COMPANY	0155	92LR307F	Operating prior to 1/1/2001.
Colorado	Routt	HAYDEN GULCH TERMINAL INC	0013	00RO0297F	Operating prior to 1/1/2001.

Table C.2
Colorado State-Permitted Source Inventory - CDPHE APCD Permitted Sources - Table of Excluded Sources

State	County	Facility Name	Site ID	Permit Number	Reason for Exclusion
Colorado	Weld	HIGHLAND FEED & BEAN, INC.	0167	88WE296	Operating prior to 1/1/2001.
Colorado	Adams	ICS - CO, LLC	0785	93AD387	No change in emissions.
Colorado	Boulder	INTERNATIONAL BUSINESS MACHINES (IBM)	0006	00BO0630	Operating prior to 1/1/2001.
Colorado	Boulder	INTERNATIONAL BUSINESS MACHINES (IBM)	0006	95BO557	Operating prior to 1/1/2001.
Colorado	Boulder	INTERNATIONAL BUSINESS MACHINES (IBM)	0006	98BO0212.XP	Permit exempt.
Colorado	Larimer	ITT INDUSTRIES	0348	99LR0640	No change in emissions.
Colorado	Larimer	JAKE KAUFFMAN & SONS, INC.-WAGNER PIT #3	0354	99LR0926F	Increase < 1 TPY.
Colorado	Moffat	JOURNEY OPERATING LLC	0152	97MF0493	Ownership change only.
Colorado	Moffat	JOURNEY OPERATING, LLC - SANDHILLS LEASE	0143	97MF0619.CN	Cancelled.
Colorado	Weld	KENNETH SCHELL & BILL KOBOBEL	0259	02WE0097 XA	Exempt from APEN.
Colorado	Weld	KERR-MCGEE ROCKY MOUNTAIN CORP. -FT. LUP	0057	00WE0581	Operating prior to 1/1/2001.
Colorado	Weld	KERR-MCGEE ROCKY MOUNTAIN CORP. -FT. LUP	0057	00WE0582	Operating prior to 1/1/2001.
Colorado	Weld	KERR-MCGEE ROCKY MOUNTAIN CORP. -FT. LUP	0057	01WE0763	Reduction at PSD minor source.
Colorado	Weld	KERR-MCGEE ROCKY MOUNTINA CORP.-PLATTEVI	0552	99WE0177.CN	Cancelled.
Colorado	Weld	KERR-MCGEE ROCKY MOUNTINA CORP.-PLATTEVI	0552	99WE0178	Increase < 1 TPY.
Colorado	Weld	KERR-MCGEE ROCKY MOUNTINA CORP.-PLATTEVI	0552	99WE0175	No change in emissions.
Colorado	Weld	KERR-MCGEE ROCKY MOUNTINA CORP.-PLATTEVI	0552	99WE0176	No change in emissions.
Colorado	Larimer	LAFARGE WEST, INC.	0320	10LR555	Increase < 1 TPY.
Colorado	Boulder	LAFARGE WEST, INC.	0004	97BO0546F	No change in emissions.
Colorado	Boulder	LAFARGE WEST, INC.	004b	12BO326	No change in emissions.
Colorado	Weld	LAFARGE WEST, INC. - 35TH AVE PLANT	0426	11WE922F	Reduction at PSD minor source.
Colorado	Weld	LAFARGE WEST, INC. - 35TH AVE PLANT	0426	97WE0029	Reduction at PSD minor source.
Colorado	Rio Blanco	LAFARGE WEST, INC. - BLAIR MESA MINE	0116	96RB890F	Name change only.
Colorado	Weld	LAFARGE WEST, INC. - COTTONWOOD/SHAW PIT	0548	01WE0264	Increase < 1 TPY.
Colorado	Weld	LAFARGE WEST, INC. - COTTONWOOD/SHAW PIT	0548	01WE0265	Increase < 1 TPY.
Colorado	Weld	LAFARGE WEST, INC. - COTTONWOOD/SHAW PIT	0548	01WE0744	Increase < 1 TPY.
Colorado	Weld	LAFARGE WEST, INC. - COTTONWOOD/SHAW PIT	0548	01WE0707	No change in emissions.
Colorado	Weld	LAFARGE WEST, INC. - COTTONWOOD/SHAW PIT	0548b	00WE0156F	No change in emissions.
Colorado	Larimer	LAFARGE WEST, INC. - EAST RIGDEN PIT	0159	12LR186F	No change in emissions.
Colorado	Larimer	LAFARGE WEST, INC. - EAST RIGDEN PIT	0159	12LR187	No change in emissions.
Colorado	Larimer	LAFARGE WEST, INC. - EAST RIGDEN PIT	0159	99LR0947F	No change in emissions.
Colorado	Weld	LAFARGE WEST, INC. - FT LUPTON PIT	0539	98WE0489F	No change in emissions.
Colorado	Weld	LAFARGE WEST, INC. - GREELEY WEST PIT	0013	97WE0138F	No change in emissions.
Colorado	Weld	LAFARGE WEST, INC. - HAMM PIT	0236	98WE0277.CN	Cancelled.
Colorado	Weld	LAFARGE WEST, INC. - HAMM PIT	0236	98WE0276	Increase < 1 TPY.
Colorado	Larimer	LAFARGE WEST, INC. - HOME OFFICE	0128	00LR0720F.CN	Cancelled.
Colorado	Larimer	LAFARGE WEST, INC. - HOME OFFICE	0128	91LR070F.CN	Cancelled.
Colorado	Larimer	LAFARGE WEST, INC. - LOVELAND PIT	0114	12LR522F	No change in emissions.
Colorado	Boulder	LAFARGE WEST, INC. - LYONS PIT	0314	87BO288F	Reduction at PSD minor source.
Colorado	Routt	LAFARGE WEST, INC. - STEAMBOAT NORTH PIT	0015	98RO0526.XP	Permit exempt.
Colorado	Routt	LAFARGE WEST, INC. - STEAMBOAT NORTH PIT	0015	02RO0576.GF	Permit grandfathered.

Table C.2
Colorado State-Permitted Source Inventory - CDPHE APCD Permitted Sources - Table of Excluded Sources

State	County	Facility Name	Site ID	Permit Number	Reason for Exclusion
Colorado	Routt	LAFARGE WEST, INC. - STEAMBOAT SOUTH PIT	0024	87RO030F	Ownership change only.
Colorado	Weld	LAFARGE WEST, INC. - STONEHAM PIT	1354	02WE0566F.XP	Permit exempt.
Colorado	Weld	LAFARGE WEST, INC. - STROMQUIST	0095	88WE045	No change in emissions.
Colorado	Larimer	LAFARGE WEST, INC. - THREE BELLS PIT	0260	97LR0632F	No change in emissions.
Colorado	Boulder	LAFARGE WEST, INC. - VALMONT PLANT	0349	12BO218	No change in emissions.
Colorado	Morgan	LEPRINO FOODS_COMPANY	0044	97MR0499	Reduction at PSD minor source.
Colorado	Boulder	LEXMARK INTL INC	0005	96BO251	Increase < 1 TPY.
Colorado	Weld	LOVELAND INDUSTRIES	0398	90WE473-1.CN	Cancelled.
Colorado	Larimer	LOVELAND READY MIX	0372	00LR0744F	Operating prior to 1/1/2001.
Colorado	Larimer	LOVELAND READY MIX CONC - SEE 1231329	0383	01WE0820F	Permitted under another permit.
Colorado	Weld	LOVELAND READY MIX CONCRETE	0566	99WE0570F.CN	Cancelled.
Colorado	Larimer	LOVELAND READY MIX CONCRETE INC	0085	01LR0374	Increase < 1 TPY.
Colorado	Morgan	MANCHIEF POWER COMPANY LLC	0072	99MR0169	No change in emissions.
Colorado	Larimer	MJR COMPANY	0366	00LR0365F.CN	Cancelled.
Colorado	Larimer	MJR COMPANY	0367	00LR0366F.CN	Cancelled.
Colorado	Weld	MONFORT FINANCE COMPANY, INC. - KUNER	0009	99WE0498	No change in emissions.
Colorado	Grand	MOUNTAIN PARK CONCRETE INC	0040	02GR0138	Increase < 1 TPY.
Colorado	Grand	MOUNTAIN PARK CONCRETE INC	0018	91GR165	Reduction at PSD minor source.
Colorado	Larimer	NATIONAL WILDLIFE RESEARCH CENTER	0242	94LR088	Operating prior to 1/1/2001.
Colorado	Weld	NORTHERN CO MEDICAL CTR	0055	96WE218	Operating prior to 1/1/2001.
Colorado	Moffat	NORTHERN LIGHTS PET CREMATORY	0165	02MF0174	Increase < 1 TPY.
Colorado	Larimer	PETE LIEN & SONS OWL CANYON COMPLEX	0003	11LR145	Increase < 1 TPY.
Colorado	Larimer	PETE LIEN & SONS OWL CANYON COMPLEX	0003	97LR0755	Increase < 1 TPY.
Colorado	Larimer	PETE LIEN & SONS OWL CANYON COMPLEX	0003	97LR0753	No change in emissions.
Colorado	Larimer	PETE LIEN & SONS DBA COLO LIEN - MONROE	0323	97LR0353F	No change in emissions.
Colorado	Larimer	PIONEER SAND CO	0368	00LR0646F.CN	Cancelled.
Colorado	Weld	PLATTE CHEMICAL CO	0036	87WE026-1.CN	Cancelled.
Colorado	Weld	PLATTE CHEMICAL CO	0036	87WE026-4.CN	Cancelled.
Colorado	Weld	PLATTE CHEMICAL CO	0036	01WE0472.XP	Permit exempt.
Colorado	Larimer	PLATTE RIVER POWER AUTHORITY - RAWHIDE	0053	01LR0115.CN	Cancelled.
Colorado	Larimer	PLATTE RIVER POWER AUTHORITY - RAWHIDE	0053	01LR0291.CN	Cancelled.
Colorado	Larimer	POUDRE VALLEY HOSP	0032	94LR191	No change in emissions.
Colorado	Larimer	PRECIOUS MEMORIES PET CEMETERY	0096	00LR0742	Increase <1 TPY.
Colorado	Larimer	PRECIOUS MEMORIES PET CEMETERY	0096	02LR0508	Increase < 1 TPY.
Colorado	Routt	PRECISION EXCAVATING, INC.	0079	02RO0354.CN	Cancelled.
Colorado	Boulder	PUBLIC SERVICE CO - VALMONT	0001	00BO0814	Increase < 1 TPY.
Colorado	Boulder	PUBLIC SERVICE CO - VALMONT	0001	00BO0815	Increase < 1 TPY.
Colorado	Boulder	PUBLIC SERVICE CO - VALMONT	0001	00BO0816	Increase < 1 TPY.
Colorado	Boulder	PUBLIC SERVICE CO - VALMONT	0001	00BO0817	Increase < 1 TPY.
Colorado	Boulder	PUBLIC SERVICE CO - VALMONT	0001	99BO0474	No change in emissions.
Colorado	Weld	PUBLIC SERVICE CO FORT SAINT VRAIN PLT	0023	99WE0762	No change in emissions.

Table C.2
Colorado State-Permitted Source Inventory - CDPHE APCD Permitted Sources - Table of Excluded Sources

State	County	Facility Name	Site ID	Permit Number	Reason for Exclusion
Colorado	Routt	PUBLIC SERVICE CO HAYDEN PLT	0001	98RO0374	Operating prior to 1/1/2001.
Colorado	Routt	PUBLIC SERVICE CO HAYDEN PLT	0001	98RO0375	Operating prior to 1/1/2001.
Colorado	Routt	PUBLIC SERVICE CO HAYDEN PLT	0001	98RO0376	Operating prior to 1/1/2001.
Colorado	Rio Blanco	PUBLIC SERVICE CO INDIAN VALLEY STA	0056	99RB0389.CN	Cancelled.
Colorado	Weld	PUBLIC SERVICE CO YOSEMITE STATION	0141	87WE006-1	Operating prior to 1/1/2001.
Colorado	Weld	PUBLIC SERVICE CO YOSEMITE STATION	0141	87WE006-2	Operating prior to 1/1/2001.
Colorado	Weld	PUBLIC SERVICE CO YOSEMITE STATION	0141	95WE461	Operating prior to 1/1/2001.
Colorado	Weld	PUBLIC SERVICE CO YOSEMITE STATION	0141	96WE379	Operating prior to 1/1/2001.
Colorado	Moffat	QUESTAR EXPLORATION & PROD-JACKS DRAW 16	0085	93MF1655-1XP	Permit rescinded.
Colorado	Moffat	QUESTAR GAS MANAGEMENT - AVALANCHE	0132	97MF0336	Operating prior to 1/1/2001.
Colorado	Moffat	QUESTAR GAS MGMT CO W HIAWATHA COMP STA	0067	01MF0040.CN	Cancelled.
Colorado	Moffat	QUESTAR GAS MGMT CO W HIAWATHA COMP STA	0067	91MF625	No change in emissions.
Colorado	Jackson	R & G OIL COMPANY, LLC - LONE PINE FIELD	0018	99JA0914.CN	Cancelled.
Colorado	Larimer	REAGER FUNERAL HOME AND CREMATORY	0068	97LR0095	No change in emissions.
Colorado	Weld	RITCHIE BROS. AUCTIONEERS (AMERICA), INC	0558	99WE0429	No change in emissions.
Colorado	Larimer	ROCKY MOUNTAIN CULTURED MARBLE INC	0286	94LR634	Increase < 1 TPY.
Colorado	Weld	ROCKY MOUNTAIN MILLING, LLC	0194	90WE022	Reduction at PSD minor source.
Colorado	Moffat	ROCKY MTN NAT GAS - BLUE GRAVEL	0125	97MF0648.CN	Cancelled.
Colorado	Moffat	ROCKY MTN NAT GAS - BLUE GRAVEL	0125	97MF0647	Ownership change only.
Colorado	Rio Blanco	ROCKY MTN NATURAL GAS CO PICEANCE	0037	88RB149	Operating prior to 1/1/2001.
Colorado	Rio Blanco	ROCKY MTN NATURAL GAS CO PICEANCE	0037	92RB1423-2	Operating prior to 1/1/2001.
Colorado	Rio Blanco	SAM F. LOVE	0144	99RB0753F.CN	Cancelled.
Colorado	Weld	SCHULTE INVESTMENTS (WAS ELSRO INC)	0150	87WE177	No change in emissions.
Colorado	Rio Blanco	SOUTH-TEX TREATERS, INC. - MEEKER PLANT	0163	01RB0220.CN	Cancelled.
Colorado	Rio Blanco	SOUTH-TEX TREATERS, INC. - MEEKER PLANT	0163	01RB0221.CN	Cancelled.
Colorado	Larimer	STAINLESS DESIGNS INC.CN	0334	98LR0133.CN	Cancelled.
Colorado	Boulder	SYNGENTA SEEDS, INC.	0582	95BO525	No change in emissions.
Colorado	Routt	TRANS COLO CONCRETE	0071	90RO192	Increase < 1 TPY.
Colorado	Moffat	TRUE OIL LLC - CADDIS FEDERAL 33-9	0157	00MF0474	No change in emissions.
Colorado	Boulder	TUSCARORA INC	1247	02BO0928	No criteria pollutants.
Colorado	Routt	TWENTYMILE COAL CO	0009	93RO1204	Operating prior to 1/1/2001.
Colorado	Weld	VARRA COMPANIES	0180	01WE0946	Increase < 1 TPY.
Colorado	Weld	VARRA COMPANIES INC	0239	12WE774-F	Operating prior to 1/1/2001.
Colorado	Weld	WALSH PRODUCTION INC - LILLI GAS PROC.	0468	98WE0310	Operating prior to 1/1/2001.
Colorado	Weld	WALSH PRODUCTION INC - LILLI GAS PROC.	0468	98WE0311	Operating prior to 1/1/2001.
Colorado	Morgan	WALSH PRODUCTION, INC.	0069	97MR0706.CN	Cancelled.
Colorado	Morgan	WALSH PRODUCTION, INC.	0069	97MR0705	Ownership change only.
Colorado	Moffat	WESTERN GAS RESOURCES INC SAND WASH STA	0153	97MF0649	Reduction at PSD minor source.
Colorado	Weld	WESTERN SUGAR CO	0002	02WE0621	Increase < 1 TPY.

Table C.3
Idaho State-Permitted Inventory - IDEQ Permitted Sources - Table of Included Sources

Facility Name	Permit	Number	County	Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	NO_x (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
ARTCO	65	12	Madison	7.62	294.00	3.04	0.91	3.90	0.02	1.41	1.41
Ash Grove Cement Company	5	4	Bannock	11.67	326.20	15.36	0.73	0.00	0.00	(53.87)	(53.87)
Basic American Foods	11	20	Bingham	14.32	455.37	8.89	1.21	60.32	0.37	4.62	4.62
Basic American Foods	11	20	Bingham	11.27	273.15	8.62	0.91	60.32	0.37	4.62	4.62
Basic American Foods	11	20	Bingham	11.27	273.15	7.76	0.76	60.32	0.37	4.62	4.62
Brigham Young University Idaho	65	11	Madison	19.50	273.15	16.01	1.06	30.22	85.85	10.12	10.12
Bush Ag Resources Inc - Malt	19	25	Booneville	15.00	422.00	10.00	0.31	116.20	95.70	57.45	57.45
General Mills Operations Inc.	11	28	Bingham	15.00	422.00	10.00	0.31	0.00	0.00	8.62	8.62
Hess Pumice Products Inc.	71	3	Oneida	19.65	273.15	12.78	0.60	18.92	4.01	8.11	8.11
Idaho Asphalt Supply Inc.	11	23	Bingham	15.24	273.15	16.03	0.59	21.50	44.00	6.90	6.90
Idaho Pacific Corp.	51	13	Jefferson	10.66	273.15	13.93	0.95	38.62	6.80	2.98	2.98
J R. Simplot Company - Don Siding	77	6	Power	53.34	273.15	11.68	1.82	4.34	0.04	4.99	4.99
J R. Simplot Company - Don Siding	77	6	Power	53.34	273.15	11.68	1.82	64.00	(345.00)	0.00	0.00
Northwest Pipeline Corp.	5	28	Bannock	4.57	427.60	29.10	0.60	24.58	(2.94)	0.09	0.09
Northwest Pipeline Corp.	5	28	Bannock	7.92	273.15	27.30	0.73	14.68	0.18	0.36	0.36
Northwest Pipeline Corp.	5	28	Bannock	7.92	273.15	33.96	0.66	24.58	(2.94)	0.09	0.09
Northwest Pipeline Corp.	7	4	Bear Lake	9.14	273.15	31.88	1.11	25.88	1.01	0.52	0.52
Total Idaho State-Permitted Source Emissions								568.38	(112.16)	61.63	61.63

Table C.4
Idaho State-Permitted Source Inventory - IDEQ Permitted Sources - Table of Excluded Sources

State	County	Permit	Number	Facility	Reason for Exclusion
Idaho	Caribou	29	32	ALEXANDER COMPANY	Operating prior to 1/1/2002.
Idaho	Bingham	11	20	BASIC AMERICAN FOODS	Reduction at PSD minor source.
Idaho	Booneville	19	28	BUSCH AG RESOURCES INC	No change in emissions.
Idaho	Booneville	19	28	BUSCH AG RESOURCES INC	Reduction at PSD minor source.
Idaho	Caribou	29	28	CHEMICAL LIME COMPANY	Operating prior to 1/1/2002.
Idaho	Power	77	23	CHEVRON PIPELINE CO/NW TERMINA	No inventoried pollutants.
Idaho	Bingham	11	22	DEPARTMENT OF ENERGY-INEEL	Administrative change.
Idaho	Bingham	11	22	DEPARTMENT OF ENERGY-INEEL	No change in emissions.
Idaho	Bingham	11	22	DEPARTMENT OF ENERGY-INEEL	Operating prior to 1/1/2002.
Idaho	Bingham	11	22	DEPARTMENT OF ENERGY-INEEL	Operating prior to 1/1/2002.
Idaho	Bingham	11	22	DEPARTMENT OF ENERGY-INEEL	Permit exempt.
Idaho	Bingham	11	28	GENERAL MILLS OPERATIONS INC	Operating prior to 1/1/2002.
Idaho	Bannock	5	29	IDAHO STATE UNIVERSITY	Operating prior to 1/1/2002.
Idaho	Booneville	19	19	IDAHO TRAVERTINE CORP	Operating prior to 1/1/2002.
Idaho	Bingham	11	29	J R SIMPLOT COMPANY FOOD GROUP	Operating prior to 1/1/2002.
Idaho	Power	77	6	J R SIMPLOT COMPANY-DON SIDING	Administrative change.
Idaho	Power	77	6	J R SIMPLOT COMPANY-DON SIDING	Operating prior to 1/1/2002.
Idaho	Power	77	6	J R SIMPLOT COMPANY-DON SIDING	Operating prior to 1/1/2002.
Idaho	Caribou	29	2	KERR-MCGEE CHEMICAL LLC	No inventoried pollutants.
Idaho	Caribou	29	2	KERR-MCGEE CHEMICAL LLC	No inventoried pollutants.
Idaho	Caribou	29	2	KERR-MCGEE CHEMICAL LLC	No inventoried pollutants.
Idaho	Caribou	29	2	KERR-MCGEE CHEMICAL LLC	Operating prior to 1/1/2002.
Idaho	Caribou	29	2	KERR-MCGEE CHEMICAL LLC	Operating prior to 1/1/2002.
Idaho	Bannock	5	36	KIMBERLY-CLARK/BALLARD MEDICAL	Operating prior to 1/1/2002.
Idaho	Bannock	5	28	NORTHWEST PIPELINE CORP	Reduction at PSD minor source.
Idaho	Caribou	29	3	NU-WEST (AGRIUM)	Operating prior to 1/1/2002.
Idaho	Caribou	29	3	NU-WEST (AGRIUM)	Operating prior to 1/1/2002.
Idaho	Caribou	29	3	NU-WEST (AGRIUM)	Operating prior to 1/1/2002.
Idaho	Caribou	29	1	P4 PRODUCTION LLC	No change in emissions.
Idaho	Caribou	29	1	P4 PRODUCTION LLC	Operating prior to 1/1/2002.
Idaho	Booneville	19	26	PENFORD PRODUCTS COMPANY	Reduction at PSD minor source.
Idaho	Bannock	5	25	PROGRESS RAIL SERVICES CORP	Facility closed.
Idaho	Jefferson	51	16	SEB'S FEED AND SUPPLY	Operating prior to 1/1/2002.
Idaho	Caribou	29	33	SILICON INTERNATIONAL ORE LLC	Increase < 1 tpy.
Idaho	Caribou	29	33	SILICON INTERNATIONAL ORE LLC	Operating prior to 1/1/2002.
Idaho	Caribou	777	247	SMITH PAVING & CONSTRUCTION	Operating prior to 1/1/2002.
Idaho	Booneville	19	41	YELLOWSTONE PLASTICS INC	Operating prior to 1/1/2002.

Table C.5
Utah State-Permitted Source Inventory - UDAQ Permitted Sources - Table of Included Sources

Company Name	Source ID	Source Name	Approval Order	Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	NO_x (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
AUTOLIV ASP, Inc./Auto Safety	10025	Ogden Generant Facility	010623	15.00	422.00	10.00	0.31	15.74	0.23	7.14	7.14
Air Liquide America	11825		020341	15.00	422.00	10.00	0.31	6.89	0.08	0.39	0.39
Allen Gravel LLC	11995	Aggregate Processing	010556	11.68	326.21	15.37	0.73	15.58	1.75	6.67	6.67
Alta Group	12321		022321002	22.13	357.48	8.81	0.85	0.49	0.01	1.38	1.38
AMCOR Precast	12670		022670001	12.41	335.21	10.21	0.85	1.48	0.02	6.68	6.68
Asphalt Materials Incorporated	10343	Stansteel Asphalt Plant SN#413	010376	12.19	422.00	24.00	1.01	1.86	0.12	1.12	1.12
Asphalt Materials Incorporated	11981	Bluffdale Sand Quarry	010196	11.68	326.21	15.37	0.73	4.88	0.42	3.41	3.41
ATK Thiokol Propulsion	10009	Promontory Plant	010456	18.29	422.00	1.77	0.76	0.00	0.00	36.57	36.57
AUTOLIV ASP	11460		021460006	15.00	422.00	10.00	0.31	0.00	0.00	1.60	1.60
AUTOLIV ASP, Inc./Auto Safety	11602	Ogden Module Facility	010340	9.75	422.00	4.85	0.61	4.01	0.07	3.08	3.08
Boeing Company (The)	10425	Aircraft and Parts Manufacturing	010916	4.57	422.00	48.15	0.15	2.80	0.01	0.00	0.00
Bountiful City Light and Power	10120	Power Plant	010249	16.76	422.00	35.74	0.99	22.10	0.28	0.42	0.42
Boyer Company (The)	12555	Gateway Shopping Plaza Blocks A&B	010693	7.01	422.00	10.00	1.22	12.90	5.10	1.03	1.03
Bredero Price	12073		020203	10.03	325.93	5.37	0.76	0.00	0.00	8.00	8.00
Brigham Sand/Gravel	10011	Brigham City Aggregate Plant	010201	11.68	326.21	15.37	0.73	18.71	1.79	6.09	6.09
Brigham Young University	10790		020179	45.72	422.00	2.40	2.74	19.75	4.27	0.26	0.26
Cache County Corporation - Road Dept.	12518	Cove Pit	010451	11.68	326.21	15.37	0.73	10.94	0.84	2.79	2.79
Chemical Lime Company	10707	Grantsville Plant	010574	22.86	422.00	24.11	0.36	0.00	0.00	1.98	1.98
Chemical Lime Company	10707	Grantsville Plant	010717	22.86	422.00	24.11	0.36	-6.30	0.01	20.17	20.17
Chevron Products	10119	SL Refinery	020119046	48.77	422.00	10.00	1.22	12.02	4.23	2.25	2.25
Circle Four Farms	11440		020030	15.00	422.00	10.00	0.31	11.03	5.42	0.17	0.17
Citation Oil and Gas Corporation	10683	Pine View Gas Plant	020683003	12.80	422.00	0.11	1.07	128.98	0.02	0.28	0.28
Clipper Publishing	10130		020128	12.65	383.15	9.94	0.73	1.19	0.01	0.00	0.00
Compeq International Corporation	11743	Printed Circuit Board Manufacturing	010996	10.97	422.00	17.08	0.15	0.00	0.00	2.22	2.22
Concrete Products of Utah	12742		022742001	14.12	350.04	10.03	0.91	0.60	0.01	4.78	4.78
Conoco Incorporated - SL Terminal	10133	Salt Lake Terminal Company	010028	15.00	422.00	10.00	0.31	7.31	0.00	0.00	0.00
Construction Products	10407		020407004	8.53	422.00	10.00	1.22	-12.52	0.00	3.05	3.05
Construction Products Company	10513	Kearns Facility	010129	7.25	422.00	0.01	0.85	-3.27	-0.86	4.74	4.74
Deseret Chemical Depot	11339	Deseret Chemical Depot (South Area)	010508	20.43	424.21	10.46	0.82	2.46	-0.45	-0.27	-0.27
Deseret Chemical Depot	11339	Deseret Chemical Depot (South Area)	010703	20.43	424.21	10.46	0.82	0.28	21.03	0.02	0.02
Deseret Chemical Depot	11339	Deseret Chemical Depot (South Area)	010826	20.43	424.21	10.46	0.82	8.53	6.67	0.66	0.66
Deseret Chemical Depot	11339	Tooele Chemical Agent Disposal Facility	021339029	20.43	424.21	10.46	0.82	142.00	0.00	0.00	0.00
El Paso Production Oil and Gas Company	12683		022683001	15.00	422.00	10.00	0.31	6.06	0.00	0.00	0.00
El Paso Production Oil and Gas Company	12685		022685001	11.77	450.54	9.51	0.82	3.25	0.00	0.00	0.00
El Paso Production Oil and Gas Company	12686		022686001	11.77	450.54	9.51	0.82	3.55	0.01	0.14	0.14
El Paso Production Oil and Gas Company	12687		022687001	11.77	450.54	9.51	0.82	4.39	0.00	0.00	0.00
El Paso Production Oil and Gas Company	12707		022707001	11.77	450.54	9.51	0.82	1.42	0.01	0.06	0.06
Fashion Cabinet Manufacturing Inc.	10482	Cabinet Manufacturing Facility	010157	7.92	422.00	10.00	0.85	0.00	0.00	2.68	2.68

Table C.5
Utah State-Permitted Source Inventory - UDAQ Permitted Sources - Table of Included Sources

Company Name	Source ID	Source Name	Approval Order	Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	NO_x (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Fetzer's Incorporated	11211		021211003	12.59	348.54	10.55	0.88	1.23	0.00	0.00	0.00
Fresenius Medical Care	10951	Ogden Dialysis Products Manufacturing	010370	10.95	422.00	14.06	0.40	34.39	2.92	2.64	2.64
Geary Construction	10695	Wanship Pit	020695002	11.68	326.21	15.37	0.73	16.91	2.82	4.96	4.96
Geary Construction Incorporated	10695	Wanship Pit	021106	15.00	422.00	10.00	0.31	16.91	2.82	4.96	4.96
Geneva Rock Products	10820		020083	3.66	422.00	18.71	1.01	9.67	7.79	1.72	1.72
G-L Industries, Inc.	11792	Laminated Wood Beam Manufacturing	010746	10.06	422.00	10.00	0.30	0.00	0.00	3.93	3.93
Global Coatings Incorporated	10880	Global Coatings Incorporated	010342	11.28	362.26	9.97	0.76	2.69	0.01	-1.52	-1.52
Gordon C. Orton Construction Co. Inc.	12242	Aggregate Processing	010200	11.68	326.21	15.37	0.73	3.18	0.33	2.22	2.22
Granite School District	10364		020066	15.00	422.00	10.00	0.31	9.60	3.70	0.83	0.83
Great Salt Lake Minerals Corporation	10917	Production Plant	010624	10.92	422.00	23.56	0.94	0.60	0.06	14.95	14.95
Great Salt Lake Minerals Corporation	12439		022439001	3.96	422.00	24.54	0.15	55.00	11.10	12.00	12.00
Halliburton Energy Services	12100		020002	14.12	350.04	10.03	0.91	0.00	0.00	12.80	12.80
Hallmark Moldings	11900		020078	12.74	345.59	10.85	0.95	0.00	0.00	4.06	4.06
Harper Contracting	10569		020569003	11.68	326.21	15.37	0.73	21.14	2.46	0.31	0.31
Harper Contracting	11481	Pit #16 Parley's Canyon	011016	14.12	350.04	10.03	0.91	7.64	0.20	0.35	0.35
Harper Contracting	11557	Pit #5 - Salt Lake County	010989	11.68	326.21	15.37	0.73	-1.19	-3.41	4.53	4.53
Harper Contracting	12432	"Aggregate Pit#24, Brown Canyon"	010564	11.68	326.21	15.37	0.73	23.79	1.53	4.47	4.47
Harper Contracting	12585	Pit#23 Near Manila	010992	11.68	326.21	15.37	0.73	55.40	3.57	8.55	8.55
Hill Air Force Base	10121	Main Base	010106	11.28	422.00	33.78	0.30	0.00	0.00	1.49	1.49
Hill Air Force Base	10121	OO-ALCM/EMC	020286	11.28	422.00	33.78	0.30	35.00	0.21	2.66	2.66
Holcim (US) Inc.	10007	Devil's Slide Plant	010303	76.20	422.00	44.73	0.19	825.00	0.00	0.00	0.00
Holcim (US) Incorporated	10007		020007013	76.20	422.00	44.73	0.19	4.10	22.40	6.30	6.30
Honeywell International Incorporated	10146	Automotive Oil & Air Filters - Clearfield	010557	11.43	422.00	29.72	0.46	9.82	0.05	1.10	1.10
Hoyt USA	12481	Archery Products Manufacturing	010536	13.56	422.00	4.04	0.86	0.00	0.00	5.17	5.17
Huish Detergents Incorporated	10463	Detergent Manufacturing	010868	11.58	422.00	47.44	0.12	0.46	0.00	4.95	4.95
Hyrum City Power	12614		020079	60.12	431.59	16.68	2.74	34.33	1.74	2.03	2.03
Indian Oil Company	10829		020829004	12.07	469.21	13.08	0.88	2.39	8.48	1.09	1.09
Intermountain Health Care	12505		020224	15.00	422.00	10.00	0.31	4.06	0.02	0.31	0.31
Intermountain Health Care	12505		022505002	15.00	422.00	10.00	0.31	4.30	1.18	0.57	0.57
Interstate Brands West Corporation	12174		022174002	12.53	381.15	6.83	0.43	3.47	0.00	0.26	0.26
Jack B. Parson Companies	10721		020721002	11.68	326.21	15.37	0.73	9.97	0.61	3.75	3.75
Jack B. Parson Company	12323		020105	11.68	326.21	15.37	0.73	16.76	2.65	4.92	4.92
Jack B. Parsons Company	10071	Smithfield Cedarapids 29.013 Asphalt Hot Pl	010880	5.49	422.00	10.00	0.91	22.53	8.55	5.14	5.14
Jack B. Parsons Company	10972	West Ogden Operations	010190	9.14	422.00	10.00	0.91	3.68	6.93	2.42	2.42
John Kuhni Sons	12208		020084	15.24	422.00	24.27	1.22	6.97	28.75	2.06	2.06
Kern River Gas Transmission	12514		020126	14.02	422.00	0.22	2.53	41.31	1.39	2.69	2.69
Kern River Gas Transmission	12514		020127	14.02	422.00	0.22	2.53	83.57	2.69	5.45	5.45
Kern River Gas Transmission	12514		020129	14.02	422.00	0.22	2.53	3.52	0.00	0.11	0.11

Table C.5
Utah State-Permitted Source Inventory - UDAQ Permitted Sources - Table of Included Sources

Company Name	Source ID	Source Name	Approval Order	Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	NO_x (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Kern River Gas Transmission	12514		020299	14.02	422.00	0.22	2.53	85.33	2.83	5.63	5.63
Kern River Gas Transmission Company	12514	Elberta Compressor Station	010603	14.02	422.00	0.22	2.53	40.96	1.40	2.72	2.72
Koch Performance Asphalt Company	12469	Hot Asphalt Storage Terminal	010288	14.12	350.04	10.03	0.91	22.40	0.12	4.70	4.70
LeGrand Johnson Construction	10055		020055	14.12	350.04	10.03	0.91	5.63	6.59	0.00	0.00
Lloyd H. Facer Trucking Inc.	12308	Wellsville Pit	010475	11.68	326.21	15.37	0.73	8.40	0.60	1.60	1.60
MacLean Quality Composites	12732		022732001	15.00	422.00	10.00	0.31	2.74	0.02	5.12	5.12
Materials Packaging Corporation	10380	Dry Mix Cement Plant	010065	4.57	422.00	10.00	0.46	0.00	0.00	2.76	2.76
McNeil Brothers	12744		022744001	14.12	350.04	10.03	0.91	17.28	1.15	4.51	4.51
Nestle USA Prepared Foods Division Inc.	10812	Prepared Foods Processing	010960	13.72	422.00	20.72	0.76	16.35	2.03	1.72	1.72
Northern Utah Manufacturing	10049		020378	20.15	422.21	13.05	1.10	26.00	0.10	19.20	19.20
Novell Incorporated	12144		020146	15.00	422.00	10.00	0.31	5.00	5.00	5.00	5.00
Nucor Steel	10008	Nucor Steel	010787	38.86	422.00	10.08	2.53	422.07	86.53	127.52	127.52
Owens Corning	10033	Western Fiberglass - Salt Lake City Plant	010987	17.86	422.00	34.51	0.09	0.03	0.08	2.14	2.14
Pacific States Cast Iron Pipe Company	10794		020794008	36.58	422.00	30.25	0.99	21.10	0.00	3.90	3.90
PacifiCorp	10355	Gadsby Power Plant	010250	76.20	422.00	21.03	3.35	197.00	0.00	14.10	14.10
PacifiCorp Environmental Services	10355		020204	76.20	422.00	21.03	3.35	81.00	6.12	29.50	29.50
PacifiCorp Power	12495	West Valley	020282	24.69	422.00	26.56	3.66	32.41	2.42	11.68	11.68
Pacificorp Power Marketing	12495	West Valley Power Plant	010440	24.69	422.00	26.56	3.66	129.65	9.67	46.73	46.73
Pepperidge Farm Incorporated	11841	Commercial Bakery	010620	11.89	422.00	43.70	0.52	23.30	0.10	2.60	2.60
Pioneer Oil	10972		020972002	9.14	422.00	10.00	0.91	0.77	21.24	0.73	0.73
Questar Pipeline Company	11532	Kastler/Marushack Compressor Station	010164	14.02	422.00	10.00	0.60	1.34	0.00	0.10	0.10
Questar Pipeline Company	11532	Kastler/Marushack Compressor Station	020089	14.02	422.00	10.00	0.60	16.20	0.00	1.10	1.10
Questar Regulated Services	11839		020005	5.33	422.00	7.61	0.41	24.05	0.00	0.71	0.71
Salt Lake Community College	12279	Jordan Campus	010119	15.00	422.00	10.00	0.31	8.27	0.40	0.93	0.93
Salt Lake County	10409	Welby Pit: Asphalt Plant/ Crusher/ Sand Plan	010308	6.10	422.00	0.46	0.91	3.23	1.50	0.00	0.00
Salt Lake Department of Public Utilities	12724	Salt Lake City Water Reclamation Facility	022724001	15.00	422.00	10.00	0.31	23.53	0.23	0.54	0.54
SF Phosphates Limited Company	10749	Vernal Phosphate Operations	030749002	26.04	337.32	14.02	1.25	-42.70	-0.20	-302.54	-302.54
Skyview Excavation & Grading	11864	Morgan Rock Pit	010872	11.68	326.21	15.37	0.73	7.84	0.66	3.13	3.13
Skywest Airlines	11674	Skywest Airlines at SLC Int'l Airport	010247	18.90	422.00	3.88	0.12	3.11	0.00	0.17	0.17
SME Industries Incorporated	11599		021599002	15.00	422.00	10.00	0.31	4.84	0.32	0.58	0.17
Snowbird Development	10406		020406004	12.44	435.43	13.05	0.79	22.25	0.76	1.67	1.67
Staker & Parson Companies	10128	Foss Lewis Pit & Aggregate Plant	010857	4.94	422.00	1.59	1.39	12.20	3.64	7.91	7.91
Staker & Parson Companies	10408	Beck Street North Pit and Hot Plant	010485	9.14	422.00	0.16	1.71	-8.28	0.00	5.43	5.43

Table C.5
Utah State-Permitted Source Inventory - UDAQ Permitted Sources - Table of Included Sources

Company Name	Source ID	Source Name	Approval Order	Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	NO_x (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Staker & Parson Companies	10408	Beck Street North Pit and Hot Plant	010569	9.14	422.00	0.16	1.71	-8.28	0.00	5.43	5.43
Staker & Parson Companies	10712	Erda Pit & Hot Plant	010032	3.05	422.00	2.36	0.20	3.75	2.80	1.74	1.74
Staker Paving and Construction	10411		020307	4.57	422.00	11.65	1.52	6.93	15.66	0.00	0.00
Temkin International	10860		020085	15.00	383.65	13.57	0.85	2.93	0.02	0.22	0.22
Tesoro West Coast	10335		020217	60.35	422.00	16.91	2.90	-40.00	-253.00	-18.00	-18.00
The Kroger Company	10163	Layton Manufacturing	020163003	15.00	422.00	10.00	0.31	9.37	0.13	1.24	1.24
Thiokol Corporation	10009	Lampo Junction	020009086	18.29	422.00	1.77	0.76	0.00	0.00	150.30	150.30
University of Utah	10354	University of Utah facilities	010128	12.19	422.00	10.00	1.22	-125.84	-0.09	-0.95	-0.95
University of Utah	10354	University of Utah facilities	010264	12.19	422.00	10.00	1.22	13.19	0.38	1.17	1.17
University of Utah	10354	University of Utah facilities	010265	12.19	422.00	10.00	1.22	22.27	0.42	2.62	2.62
Utah State University	10047		020001	12.19	422.00	8.08	1.52	31.71	5.40	4.94	4.94
Utelite Corporation	10676	Shale Processing	010027	18.29	422.00	7.42	0.91	12.62	-10.41	3.70	3.70
Utility Trailer Manufacturing Company	10156	Trailer Manufacturing Facility	010158	11.58	422.00	18.38	0.91	1.76	0.10	0.12	0.12
Vulcraft	10028		020269	16.76	422.00	6.56	0.71	0.00	0.00	2.26	2.26
W.W. Clyde and Company	12780		022780001	11.68	326.21	15.37	0.73	32.90	4.95	3.66	3.66
Wasatch Energy Systems	10129		020138	38.71	422.00	23.85	1.22	-414.37	-49.83	-10.56	-10.56
Wellsville City Corporation	12646		020172	15.00	422.00	10.00	0.31	16.34	4.58	1.20	1.20
Total Utah State-Permitted Source Emissions								2,595.89	47.07	424.47	424.06

Table C.6
Utah State-Permitted Source Inventory - UDAQ Permitted Sources - Table of Excluded Sources

State	Company Name	Source ID	Source Name	Approval Order	Reason For Exclusion
Utah	Abbott Salt Lake Operations	11644	Salt Lake Operations	020122	No change.
Utah	Alcoa Extrusions	10847		020847008	No change.
Utah	Alliant Techsystems Incorporated	10402	Bacchus Works: Plant 1/NIROP/Graphite Structures	010406	No change.
Utah	Alliant Techsystems Incorporated	10402	Bacchus Works: Plant 1/NIROP/Graphite Structures	010635	No change.
Utah	American Welding and Tank Company	11598	West Jordan Manufacturing Facility	020065	No change.
Utah	AMPAC	10279	Utah Operations	020004	No change.
Utah	Asphalt Materials Incorporated	11981	Bluffdale Sand Quarry	010759	No change.
Utah	Asphalt Materials Incorporated	11981	Bluffdale Sand Quarry	011981	No change.
Utah	ATK Thiokol Propulsion	10009	Promontory Plant	010038	No change.
Utah	Autoliv ASP Inc. OEA Initiator Facility	10026	Airbag Initiator Manufacturing Facility	010845	No change.
Utah	Ballard Petroleum LLC	12543		020147	Reduction at a PSD minor source
Utah	BDL Mill Custom Woodworking	12586		020056	Increase < 1 tpy.
Utah	Blanchard Metals Processing Company	10591	Blanchard Metals Processing Co.	010972	No change.
Utah	Boeing Company (The)	10425	Aircraft and Parts Manufacturing	020068	No change.
Utah	Bountiful City Light and Power	10120	Power Plant	020054	No change.
Utah	Bourns, Inc.	10053		020336	No change.
Utah	Brigham Sand and Gravel	10011		020011004	No change.
Utah	Broken Arrow Construction	11729	Clive Plant	011012	Increase < 1 tpy.
Utah	Broken Arrow Construction	11729		021729003	No change.
Utah	Brush Resources	10311		020267	No change.
Utah	Burdick Paving	11357		021357003	No change.
Utah	C. E. Butters Realty & Construction	11840		021840004	No change.
Utah	Canyon Fuel Company	10665	Salina Coal Yard	020665004	No change.
Utah	Canyon Gas Resources	12413		020047	No change.
Utah	Canyon Gas Resources	10253		020244	No change.
Utah	Canyon Gas Resources	12413		020247	No change.
Utah	Cargill Animal Nutrition	10949		020949003	Increase < 1 tpy.
Utah	Central Valley Water	10414		020414005	No change.
Utah	Central Valley Water	10414	Reclamation Facility	020414006	No change.
Utah	Chemical Lime Company	10707	Grantsville Plant	010856	No change.
Utah	Cherrico Furniture Company	12238		022238002	Increase < 1 tpy.
Utah	Chevron Product Company	10119		020313	No change.
Utah	Chevron Products Co - SL Refinery	10119	Salt Lake Refinery	010638	No change.
Utah	Christensen Construction & Gravel Inc.	12246	Concrete Processing Equipment	010147	No change.
Utah	Classic Cabinets Incorporated	10488	Cabinet Manufacturing Facility	010938	Increase < 1 tpy.
Utah	Classic Cabinets Incorporated	10488	Cabinet Manufacturing Facility	020130	Increase < 1 tpy.
Utah	Classic Cabinets Incorporated	10488	Cabinet Manufacturing Facility	020488006	No change.
Utah	Companion Systems Incorporated	10181	Fiberglass Manufacturing	010022	No change.
Utah	Compeq International Corporation	11743	Printed Circuit Board Manufacturing	010195	No change.
Utah	Condie Construction	12137		020012	No change.
Utah	Crown Asphalt Products	12145		020213	No change.

Table C.6
Utah State-Permitted Source Inventory - UDAQ Permitted Sources - Table of Excluded Sources

State	Company Name	Source ID	Source Name	Approval Order	Reason For Exclusion
Utah	Crusher Rental and Sales Incorporated	11621		021621003	No change.
Utah	CSI Acquisition	10181	D.B.A. Companion Systems	020198	No change.
Utah	Custom Crushing Incorporated	12142		022142002	No change.
Utah	D.Q. Holdings	12519		022519003	No change.
Utah	DAW Technologies	11567		020150	No change.
Utah	Department of the Air Force	10121		020121145	No change.
Utah	Department of the Army	11594	Tooele Army Depot	020291	Reduction at a PSD minor source
Utah	Department of the Army	11594	Tooele Army Depot	021594021	Reduction at a PSD minor source
Utah	Department of the Army	11594	Tooele Army Depot	020160	No change.
Utah	Department of the Army	11594	Tooele Army Depot	020236	No change.
Utah	Department of the Army	11594	Tooele Army Depot	021594020	No change.
Utah	Department of the Army	12236	Deseret Chemical Depot	022236003	No change.
Utah	Deseret Chemical Depot	11339	Deseret Chemical Depot (South Area)	010153	Reduction at a PSD minor source
Utah	Deseret Chemical Depot	11339	Deseret Chemical Depot (South Area)	010908	Increase < 1 tpy.
Utah	Deseret Chemical Depot	11339	SCBTO-RM	020159	Increase < 1 tpy.
Utah	Desert Power L. P.	12519		022519004	Reduction at a PSD minor source
Utah	Desert Power, L.L.C.	12519	Tooele County	011043	No change.
Utah	E.A. Miller Incorporated	10051		020051004	Increase < 1 tpy.
Utah	Easton Technical Products	10365	Tubing Manufacturing Facility	010963	No change.
Utah	Easton Technical Products	10365		020365008	No change.
Utah	El Paso Production	11186		021185007	No change.
Utah	El Paso Production Oil and Gas Company	12682		022682001	Increase < 1 tpy.
Utah	El Paso Production Oil and Gas Company	12710		022710001	Increase < 1 tpy.
Utah	FAK, LLC	12054		022054003	No change.
Utah	Firestone Building Products	10491	Foam Insulation Manufacturing Facility	010193	Increase < 1 tpy.
Utah	Firestone Building Products	10491	Foam Insulation Manufacturing Facility	030491005	No change.
Utah	Flying J Incorporated	10122		020120	No change.
Utah	Flying J Incorporated	10122		020221	No change.
Utah	Flying J Incorporated	10122	Flying J Refinery (Big West Oil Co.)	020330	No change.
Utah	Flying J Incorporated	10122		020122024	No change.
Utah	Foreland Refining	12145		020208	No change.
Utah	FUTURA Industries	10191	Freeport Center	020167	No change.
Utah	Geneva Steel	10796	Steel Manufacturing Facility	010031	No change.
Utah	Gilbert Western	11086		020211	No change.
Utah	Gilbert Western	11067		020287	No change.
Utah	Golden Eagle Refinery, Inc	10134		020134001	Increase < 1 tpy.
Utah	Gordon C. Orton Construction Co. Inc.	12242	Aggregate Processing	010808	Increase < 1 tpy.
Utah	Granite Construction	12272		022272004	No change.
Utah	Granite Construction Company	12272	West Haven Asphalt Plant	010993	No change.
Utah	Graymont Western US	10313		020140	No change.
Utah	Great Salt Lake Minerals Corporation	10917		020917018	No change.

Table C.6
Utah State-Permitted Source Inventory - UDAQ Permitted Sources - Table of Excluded Sources

State	Company Name	Source ID	Source Name	Approval Order	Reason For Exclusion
Utah	Great Salt Lake Minerals Corporation	10917		020917019	No change.
Utah	Hallmark Cabinet	10580	Hallmark Cabinet	010283	Increase < 1 tpy.
Utah	Harper Contracting	10570	Pit #14 - Point of the Mountain	010976	Increase < 1 tpy.
Utah	Harper Contracting	11051		020125	No change.
Utah	Harper Contracting	11797		021797002	No change.
Utah	Heber Light and Power	10884		020884005	No change.
Utah	Hexcel Corporation	11386	Salt Lake Operations	010079	No change.
Utah	Hill Air Force Base	10121	Main Base	010131	Increase < 1 tpy.
Utah	Hill Air Force Base	10121	Main Base	010552	Increase < 1 tpy.
Utah	Hill Air Force Base	10121	Main Base	010705	Increase < 1 tpy.
Utah	Hill Air Force Base	10121	Main Base	010822	Increase < 1 tpy.
Utah	Hill Air Force Base	10121	OO-ALCM/EMC	020209	Increase < 1 tpy.
Utah	Hill Air Force Base	10121	Main Base	000378	No change.
Utah	Hill Air Force Base	10121	Main Base	010103	No change.
Utah	Hill Air Force Base	10121	Main Base	010130	No change.
Utah	Hill Air Force Base	10121	Main Base	010261	No change.
Utah	Hill Air Force Base	10121	Main Base	010274	No change.
Utah	Hill Air Force Base	10121	Main Base	010367	No change.
Utah	Hill Air Force Base	10121	Main Base	010981	No change.
Utah	Hill Air Force Base	10121	Main Base	011036	No change.
Utah	Hill Air Force Base	10121	OO-ALCM/EMC	020210	No change.
Utah	Hill Air Force Base	11284		021284011	No change.
Utah	Holcim (US) Inc.	10007	Devil's Slide Plant	010500	No change.
Utah	Holcim (US) Incorporated	10007		020007012	No change.
Utah	Holly Refining & Marketing Company	10123	Phillips Refinery	010039	No change.
Utah	Holly Refining & Marketing Company	10123	Phillips Refinery	010089	No change.
Utah	Holly Refining & Marketing Company	10123	Phillips Refinery	010811	No change.
Utah	Holly Refining & Marketing Company	10123	Phillips Refinery	020097	No change.
Utah	Holly Refining & Marketing Company	10123	Phillips Refinery	020109	No change.
Utah	Holly Refining & Marketing Company	10123	Phillips Refinery	010763	No change.
Utah	Horizon Milling	10920		020920004	Increase < 1 tpy.
Utah	Hoyt USA	12481	Archery Products Manufacturing	010973	No change.
Utah	Hoyt USA	12481		022481002	No change.
Utah	Hudson Printing Company	10426		020009	No change.
Utah	Huish Detergents	10463		020463014	Increase < 1 tpy.
Utah	IBA S&I Incorporated	10435	Ethylene Oxide Commercial Sterilization	010980	No change.
Utah	Inland Constructors Incorporated	12741		022741001	No change.
Utah	Jack B. Parsons Company	10042		020006	No change.
Utah	Jack B. Parsons Company	11572	Bauer Pit & Batch Plant	990683	Operating prior to 1/1/01.
Utah	Johnson Matthey Refining	10367		020143	Increase < 1 tpy.
Utah	Kennecott Utah Copper	10571		020178	Increase < 1 tpy.

Table C.6
Utah State-Permitted Source Inventory - UDAQ Permitted Sources - Table of Excluded Sources

State	Company Name	Source ID	Source Name	Approval Order	Reason For Exclusion
Utah	Kennecott Utah Copper Corporation	10572	Power Plt/ Lab/ Tailings Impoundment	010816	No change.
Utah	Kennecott Utah Copper Corporation	10571	Mine & Copperton Concentrator	010862	No change.
Utah	Kern River Gas Transmission Company	12514	Elberta Compressor Station	010835	Increase < 1 tpy.
Utah	Kimberly-Clark Worldwide Incorporated	10919	Kimberly-Clark - Ogden Plant	010871	Reduction at a PSD minor source
Utah	L-3 Communications	12226		020250	No change.
Utah	Lafarge Southwest	11188		021188003	No change.
Utah	La-Z-Boy Utah	10012	Furniture Manufacturing Plant	010869	Reduction at a PSD minor source
Utah	La-Z-Boy Utah	10012	Furniture Manufacturing Plant	010015	No change.
Utah	LDS Church Printing Center	10449		020449005	No change.
Utah	Lifetime Products	11229		021229013	Increase < 1 tpy.
Utah	Lifetime Products	11229	Basketball standards & picnic table manufacturer	010197	No change.
Utah	Lifetime Products	11229	Basketball standards & picnic table manufacturer	010436	No change.
Utah	Lifetime Products	11229		020290	No change.
Utah	Litton Guidance & Control Systems	10397		020397007	No change.
Utah	Longview Fibre Company	11789		021789004	Increase < 1 tpy.
Utah	MACA Supply Company	11358		020088	No change.
Utah	MACA Supply Company	11358		021358002	No change.
Utah	Magnesium Corporation of America	10716		020048	No change.
Utah	Metz Baking Company	10369		020249	No change.
Utah	Morton International/Morton Salt Div.	10726	Morton Salt	010251	No change.
Utah	Murray City Power Department	10348	Electrical Generation Plant	010126	Reduction at a PSD minor source
Utah	Northeast Casualty Real Property	10736		020736010A	No change.
Utah	Nucor Steel	10008	Nucor Steel	010152	No change.
Utah	Owens Corning	10033	Western Fiberglass - Salt Lake City Plant	010541	No change.
Utah	Owens Corning	10033		020033008	No change.
Utah	PacifiCorp	10355	Gadsby Power Plant	010263	Reduction at a PSD minor source
Utah	PacifiCorp	10355		020067	No change.
Utah	Petersen Specialized Fabricators	12638		020020	No change.
Utah	Primary Children's Medical Center	10461		020028	No change.
Utah	Provo City Power	10319		020319002	No change.
Utah	Provo City Power	10795	Power Plant	030795???	No change.
Utah	Publishers Press	10488		020130	Increase < 1 tpy.
Utah	Questar Gas	10432		020432005	Reduction at a PSD minor source
Utah	Rail Bearing Service	11246	Rail Road Wheel Bearing Refurbishing Plant	010807	Increase < 1 tpy.
Utah	Rayloc - Division of Genuine Parts Co.	10808	Auto Parts Remanufacturing	010709	Increase < 1 tpy.
Utah	Recot, Inc. DBA FritoLay	11297	Salty Snack Plant	010743	No change.
Utah	Rees's Enterprise	11043		021043005	No change.
Utah	Rees's Enterprise	11067		021067003	No change.
Utah	Rees's Enterprise	11878		021878003	No change.
Utah	Rohm & Haas-Morton International	10726	Morton Salt Division	020726007	No change.
Utah	Rohm & Haas-Morton International	10726	Morton Salt Division	020726008	No change.

Table C.6
Utah State-Permitted Source Inventory - UDAQ Permitted Sources - Table of Excluded Sources

State	Company Name	Source ID	Source Name	Approval Order	Reason For Exclusion
Utah	RT Manufacturing Incorporated	11867	RT Manufacturing - Orem Facility	010169	No change.
Utah	Safety-Kleen	10736		020736010	Reduction at a PSD minor source
Utah	Safety-Kleen	10736	APTUS	020168	No change.
Utah	Salt Lake City Department of Airports	10450	Salt Lake City International Airport	010710	Increase < 1 tpy.
Utah	Salt Lake City Department of Airports	10450	Salt Lake City International Airport	010052	No change.
Utah	Silver Eagle Refining	10124	Woods Cross Inc	020082	Reduction at a PSD minor source
Utah	Skywest Airlines	11674	Skywest Airlines at SLC Int'l Airport	010964	No change.
Utah	Southwire Company	11262	Utah Plant	021262006	No change.
Utah	Sunnyside Cogeneration	10096		020096011A	Increase < 1 tpy.
Utah	Sunnyside Cogeneration	10096		020096010	No change.
Utah	Temkin International Incorporated	10860	Plastic Film Printing Facility	010151	No change.
Utah	The Quikrete Companies	10375		020123	No change.
Utah	Thiokol Corporation	10009	Promontory	020009088	No change.
Utah	Thiokol Propulsion	10009	Promontory Plant	020202	No change.
Utah	Thiokol Propulsion	10009	Promontory Plant	020009087	No change.
Utah	Third Rock Sand & Gravel	12437	Sand & Gravel Operation	010386	No change.
Utah	Tom Brown Incorporated	10034	Lisbon	020034008	No change.
Utah	Tooele Army Depot	11594	Tooele Army Depot	010712	Increase < 1 tpy.
Utah	Town of Eagle Mountain	12198	Planning and Utility Department	010468	Increase < 1 tpy.
Utah	Town of Eagle Mountain	12198	Planning and Utility Department	032198003	Increase < 1 tpy.
Utah	United States Gypsum Company	10654		020342	Reduction at a PSD minor source
Utah	University of Utah	10354		020081	No change.
Utah	Utah Metal Works Incorporated	10337	Utah Metal Works	010506	Increase < 1 tpy.
Utah	Utah State University	10047		020047006	No change.
Utah	Utelite Corporation	10676	Shale Processing	010170	No change.
Utah	Utility Trailer Manufacturing Company	10156	Trailer Manufacturing Facility	020003	No change.
Utah	Utility Trailer Manufacturing Company	10156	Trailer Manufacturing Facility	020212	No change.
Utah	Valtek Incorporated	10881		020137	No change.
Utah	W.W. Clyde and Company	12780		020139	No change.
Utah	Wasatch Energy Systems	10129	County Landfill & Energy Recovery Facility (DCERF)	010850	No change.
Utah	Wasatch Energy Systems	10129		020129010	No change.
Utah	Wasatch Technologies	12395		020173	Increase < 1 tpy.
Utah	Wavell-Huber Wood Products	12501		022501002	No change.
Utah	Wavell-Huber Wood Products Incorporated	12501	Architectural Woodworking Shop	010877	Increase < 1 tpy.
Utah	Weather Shield Manufacturing, Inc.	10059		020059006	No change.
Utah	Western Rock Products	11796		020280	No change.
Utah	Westinghouse Electric Company	10922		020275	No change.
Utah	Westinghouse Electric Company LLC	10922	Zirconium/Halfnium Production Plant	010088	Increase < 1 tpy.

Table C.7
Wyoming State-Permitted Source Inventory - WDEQ-AQD Permitted Sources - Table of Included Sources

Company	Facility	Permit Number	County	Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	NO_x (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
BCCK Engineering, Inc.	Pretty Water Gas Plant	CT-2969	Sweetwater	15.00	422.00	10.00	0.31	13.80	0.00	0.00	0.00
Burlington Resources Oil and Gas	MBE Compressor	CT-2735	Fremont	9.05	509.81	12.50	0.76	25.60	0.00	0.00	0.00
Carl D. Underwood Oil & Gas	Burnt Wagon Gas Processing Plant	CT-2370	Natrona	3.65	422.00	10.00	0.15	2.50	0.00	0.00	0.00
Chevron USA, Inc.	Bullfrog Compressor Station	MD-351A	Natrona	5.94	633.70	37.03	0.30	2.30	0.00	0.00	0.00
Chevron USA, Inc.	Waltman 44 Compression Facility	MD-659	Natrona	5.94	649.00	52.70	0.30	11.60	0.00	0.00	0.00
Condor Exploration LLC	Slate Creek End Facility	CT-2617	Lincoln	7.62	422.00	12.50	0.25	8.00	0.00	0.00	0.00
Devon Energy Production CO.	Worland Field Compressor Station	CT-2677	Big Horn	7.92	725.92	57.60	0.39	16.00	0.00	0.00	0.00
Duke Energy Field Services, LP	Black Butte 1-18-100 C.S.	CT-2373	Sweetwater	12.19	422.00	42.36	0.25	5.80	0.00	0.00	0.00
Duke Energy Field Services, LP	Black Butte 13-18-100 C.S.	CT-2606	Sweetwater	9.14	422.00	39.62	0.25	5.80	0.00	0.00	0.00
Duke Energy Field Services, LP	Patrick Draw Gas Plant	MD-663	Sweetwater	7.31	422.00	46.45	0.25	(48.30)	0.00	0.00	0.00
General Chemical Corporation	Green River Trona Plant	MD-567	Sweetwater	25.48	361.70	17.28	1.03	(44.00)	1.00	(1.00)	(1.00)
Jonah Gas Gathering Company	Bird Canyon/County Line C.S.	CT-2252	Sublette	12.19	726.48	29.75	0.70	63.90	0.00	0.00	0.00
Jonah Gas Gathering Company	Falcon Compressor Station	CT-2251	Sublette	9.75	725.37	26.39	0.70	83.70	0.00	0.00	0.00
Jonah Gas Gathering Company	Falcon Compressor Station	MD-815	Sublette	4.57	674.00	30.78	0.20	12.40	0.00	0.00	0.00
Jonah Gas Gathering Company	Paradise Compressor Station	CT-2250	Sublette	7.92	725.37	26.39	0.70	83.70	0.00	0.00	0.00
Kern River Gas Transmission	Coyote Creek	CT-3003	Uinta	5.39	422.00	12.50	0.40	44.00	0.00	0.00	0.00
Kern River Gas Transmission	Muddy Creek Station	MD-736	Lincoln	17.22	422.00	13.16	2.59	39.40	0.00	0.00	0.00
Kern River Gas Transmission	Muddy Creek Station	MD-783	Lincoln	17.22	736.00	12.63	2.75	92.80	0.00	0.00	0.00
Merit Energy Company	SRMGU 27-32	MD-620	Natrona	11.76	450.53	9.51	0.82	17.80	0.00	0.00	0.00
Mountain Gas Resources	Fabian Ditch Compressor Station	MD-642	Sweetwater	7.62	509.82	28.95	0.40	17.20	0.00	0.00	0.00
Mountain Gas Resources	Granger Gas Plant	MD-644	Sweetwater	4.88	833.00	24.38	0.06	4.20	0.00	0.00	0.00
Mountain Gas Resources	Jonah Compressor Station	CT-2280	Sublette	7.62	904.00	28.66	0.40	54.90	0.00	0.00	0.00
Northwest Pipeline Company	Green River Compressor Station	MD-863	Sweetwater	9.60	493.20	11.20	1.90	(31.30)	0.00	0.00	0.00
Questar Gas Management CO.	Blacks Fork Gas Plant	MD-638	Uinta	9.14	869.00	69.17	0.46	32.40	0.00	0.00	0.00
Questar Gas Management CO.	Pinedale Compressor Station	CT-2466	Sublette	15.24	714.00	72.54	0.46	75.40	0.00	0.00	0.00
Questar Gas Management CO.	Vermillion Creek C.S.	MD-549A	Sweetwater	9.05	509.81	12.50	0.76	3.60	0.00	0.00	0.00
Questar Pipeline Company	Eakin Compressor Station	MD-615	Uinta	10.52	700.00	28.01	0.61	(122.00)	0.00	0.00	0.00
Saurus Resources Incorporated	MH-1 Compressor Station	CT-2301	Sweetwater	9.05	509.81	12.50	0.76	12.30	0.00	0.00	0.00
Tom Brown Incorporated	Bravo Unit 02 Central Tank Battery	MD-617	Sweetwater	7.31	422.00	47.85	0.30	19.00	0.00	0.00	0.00
Umetco Minerals	Rattlesnake Quarry	MD-625	Natrona	11.67	326.20	15.36	0.73	0.00	0.00	9.30	9.30
Wexpro Company	Canyon Creek/Vermillion Complex	MD-605	Sweetwater	15.00	422.00	10.00	0.31	34.10	0.00	0.00	0.00
Williams Field Services	Big Piney Compressor Station	MD-677	Sublette	9.05	509.81	12.50	0.76	3.10	0.00	0.00	0.00
Williams Field Services	Echo Springs Gas Plant	MD-606	Carbon	10.67	560.93	24.43	1.72	119.90	0.00	0.00	0.00
Williams Field Services	LaBarge Compressor Station	MD-675	Lincoln	9.05	509.81	12.50	0.76	2.70	0.00	0.00	0.00
Williams Field Services	Saddle Ridge Compressor Station	MD-676	Sublette	9.05	509.81	12.50	0.76	2.20	0.00	0.00	0.00
Total Wyoming State-Permitted Source Emissions								664.50	1.00	8.30	8.30

Table C.8
Wyoming State-Permitted Source Inventory - WDEQ-AQD Permitted Sources - Table of Excluded Sources

State	County	Company	Facility	Facility Class	Permit Number	Reason for Exclusion[1]
WY	Lincoln	AEC Oil & Gas (USA) Incorporated	JGGC/OTTCO Interconnect	Miscellaneous	MD-806	Permit expired.
WY	Big Horn	American Colloid Mineral Company	Lovell Plant	Bentonite Plant	MD-289A	No change in emissions.
WY	Carbon	Amoco Production Company	Baldy Butte 17-1	Production Site	CT-2522	Production well with emissions < 3 tpy.
WY	Sublette	Amoco Production Company	Cabrito 10-30	Production Site	CT-2532	Production well with emissions < 3 tpy.
WY	Sublette	Amoco Production Company	Cabrito 13-18 Well Site	Production Site	CT-2688	Production well with emissions < 3 tpy.
WY	Sublette	Amoco Production Company	Cabrito 6-25	Production Site	CT-2652	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Champlin 263 B5 Well Site	Production Site	CT-2837	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Champlin 337 G4 Well Site	Production Site	CT-2659	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Champlin 345 B2	Production Site	CT-3007	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Champlin 345 B2	Production Site	CT-3007A	Production well with emissions < 3 tpy.
WY	Sublette	Amoco Production Company	Corona 02-11	Production Site	CT-2928	Production well with emissions < 3 tpy.
WY	Sublette	Amoco Production Company	Corona 02-19 Well Site	Production Site	CT-2965	Production well with emissions < 3 tpy.
WY	Sublette	Amoco Production Company	Corona 11-30 Well Site	Production Site	CT-2687	Production well with emissions < 3 tpy.
WY	Sublette	Amoco Production Company	Corona 8-19	Production Site	CT-2531	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Crooks Gap Road 21-02	Production Site	CT-3060	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Crooks Gap Road 24	Production Site	CT-2396	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Frewen 15	Production Site	CT-2526	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Frewen 19	Production Site	CT-2523	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Monument 19-02	Production Site	CT-2930	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Monument 29-01 Well Site	Production Site	CT-2876	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Monument Lake 33-2 Well Site	Production Site	CT-2640	Production well with emissions < 3 tpy.
WY	Sublette	Amoco Production Company	Stud Horse Butte 04-22	Production Site	CT-3004	Production well with emissions < 3 tpy.
WY	Sublette	Amoco Production Company	Stud Horse Butte 06-22	Production Site	CT-3000	Production well with emissions < 3 tpy.
WY	Sublette	Amoco Production Company	Stud Horse Butte 10-22	Production Site	CT-2943	Production well with emissions < 3 tpy.
WY	Sublette	Amoco Production Company	Stud Horse Butte 16-14 Well Site	Production Site	CT-2964	Production well with emissions < 3 tpy.
WY	Sublette	Amoco Production Company	Stud Horse Butte 16-15	Production Site	CT-2963	Production well with emissions < 3 tpy.
WY	Sublette	Amoco Production Company	Stud Horse Butte 16-22	Production Site	CT-2962	Production well with emissions < 3 tpy.
WY	Sublette	Amoco Production Company	Stud Horse Butte 4-20	Production Site	CT-2686	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Tierney II 29-5 Well Site	Production Site	CT-2741	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Tierney II 33-2 Well Site	Production Site	CT-2701	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Two Rim 03-01	Production Site	CT-2878	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Two Rim 20-2	Production Site	CT-2525	Production well with emissions < 3 tpy.
WY	Sweetwater	Amoco Production Company	Wild Rose 13-01	Production Site	CT-2925	Production well with emissions < 3 tpy.
WY	Sweetwater	Anadarko E&P Company, LP	Brady 46F	Production Site	CT-2713	Production well with emissions < 3 tpy.
WY	Sweetwater	Anadarko E&P Company, LP	Chambers Federal 3-24	Production Site	CT-2639	Production well with emissions < 3 tpy.
WY	Sweetwater	Anadarko E&P Company, LP	Chambers Federal 4-24	Production Site	CT-3135	Production well with emissions < 3 tpy.
WY	Sweetwater	Anadarko E&P Company, LP	Chambers Federal 5-24	Production Site	CT-3121	Production well with emissions < 3 tpy.
WY	Carbon	Anadarko E&P Company, LP	Echo Springs 3-30	Production Site	CT-3112	Production well with emissions < 3 tpy.
WY	Carbon	Anadarko E&P Company, LP	Echo Springs State 4-16 Well Site	Production Site	CT-2927	Production well with emissions < 3 tpy.
WY	Carbon	Anadarko E&P Company, LP	Federal BF #1	Production Site	MD-860	Production well with emissions < 3 tpy.
WY	Carbon	Anadarko E&P Company, LP	Federal BF 2-30	Production Site	CT-3043	Production well with emissions < 3 tpy.
WY	Carbon	Anadarko E&P Company, LP	Federal BH-4	Production Site	CT-2802	Production well with emissions < 3 tpy.
WY	Sweetwater	Anadarko E&P Company, LP	Red Desert 10-1	Production Site	CT-3161	Production well with emissions < 3 tpy.
WY	Sweetwater	Anadarko E&P Company, LP	Red Desert 17-1	Production Site	CT-2704	Production well with emissions < 3 tpy.
WY	Sweetwater	Anadarko E&P Company, LP	Red Desert 17-2	Production Site	CT-2982	Production well with emissions < 3 tpy.
WY	Sweetwater	Anadarko E&P Company, LP	State I-4	Production Site	CT-3068	Production well with emissions < 3 tpy.
WY	Sweetwater	Anadarko E&P Company, LP	Table Rock Gas Plant	Sour Gas Plant	MD-649	Administrative change.
WY	Sweetwater	Anadarko E&P Company, LP	Table Rock Gas Plant	Sour Gas Plant	MD-767	Increase < 1 tpy.
WY	Sweetwater	Anadarko E&P Company, LP	Table Rock Gas Plant	Sour Gas Plant	MD-879	Reduction at a PSD minor source.
WY	Sweetwater	Anadarko E&P Company, LP	Wells Bluff 13-1	Production Site	MD-869	Production well with emissions < 3 tpy.
WY	Carbon	Anadarko Gathering Company	Blue Sky	Compressor Station	CT-2168A	Administrative change.
WY	Sublette	Anschutz Exploration Corporation	Mesa 6-27D CPF	Production Site	CT-3056	Production well with emissions < 3 tpy.
WY	Sublette	Anschutz Exploration Corporation	Mesa 9-21D	Production Site	CT-3055	Production well with emissions < 3 tpy.
WY	Campbell	Bear Paw Energy Incorporated	Amos Draw Compressor Station	Compressor Station	CT-2056A	No change in emissions.
WY	Campbell	Bear Paw Energy Incorporated	Antelope Valley Compressor Station	Compressor Station	MD-588A	No change in emissions.
WY	Campbell	Bear Paw Energy Incorporated	Barker Draw Prospect B C.S.	Compressor Station	CT-2096A	Reduction at a PSD minor source.
WY	Campbell	Bear Paw Energy Incorporated	Barker Draw Prospect C.S.	Compressor Station	CT-2094A	Reduction at a PSD minor source.
WY	Campbell	Bear Paw Energy Incorporated	Barker Draw Prospect C.S.	Compressor Station	CT-2094A2	Reduction at a PSD minor source.
WY	Campbell	Bear Paw Energy Incorporated	Lone Tree Compressor Station	Compressor Station	MD-523A	No change in emissions.
WY	Campbell	Bear Paw Energy Incorporated	Pennaco Pod 1 Compressor Station	Compressor Station	CT-2333	Permit expired.

Table C.8
Wyoming State-Permitted Source Inventory - WDEQ-AQD Permitted Sources - Table of Excluded Sources

State	County	Company	Facility	Facility Class	Permit Number	Reason for Exclusion[1]
WY	Campbell	Bear Paw Energy Incorporated	Pennaco Pod 13 Compressor Station	Compressor Station	MD-732A	Reduction at a PSD minor source.
WY	Campbell	Bear Paw Energy Incorporated	Pennaco Pod 14 Compressor Station	Compressor Station	CT-2345	Permit expired.
WY	Campbell	Bear Paw Energy Incorporated	Pennaco Pod 16 Compressor Station	Compressor Station	CT-2347	Permit expired.
WY	Campbell	Bear Paw Energy Incorporated	Pennaco Pod 18 Compressor Station	Compressor Station	CT-2349	Permit expired.
WY	Campbell	Bear Paw Energy Incorporated	Pennaco Pod 24 Compressor Station	Compressor Station	MD-794	Reduction at a PSD minor source.
WY	Campbell	Bear Paw Energy Incorporated	Pennaco Pod 3 Compressor Station	Compressor Station	CT-2335	Permit expired.
WY	Sheridan	Bear Paw Energy Incorporated	Prairie Dog Gathering System - Pod A	Compressor Station	CT-2150A	No change in emissions.
WY	Sheridan	Bear Paw Energy Incorporated	Prairie Dog Gathering System - Pod B	Compressor Station	CT-2151A	No change in emissions.
WY	Sheridan	Bear Paw Energy Incorporated	Prairie Dog Gathering System - Pod C	Compressor Station	CT-2152A	No change in emissions.
WY	Sheridan	Bear Paw Energy Incorporated	Prairie Dog Gathering System - Pod D	Compressor Station	CT-2153A	No change in emissions.
WY	Sheridan	Bear Paw Energy Incorporated	Prairie Dog Gathering System - Pod E	Compressor Station	CT-2154A	No change in emissions.
WY	Sheridan	Bear Paw Energy Incorporated	Prairie Dog Pod J (Formerly Station 21)	Compressor Station	CT-2186A	Reduction at a PSD minor source.
WY	Sheridan	Bear Paw Energy Incorporated	Prairie Dog Pod K (Formerly Station 28)	Compressor Station	CT-2178A	No change in emissions.
WY	Campbell	Bear Paw Energy Incorporated	South Meserve Compressor Station	Compressor Station	CT-1902A	Permit expired.
WY	Campbell	Bear Paw Energy Incorporated	South Ostlund/Daly Compressor Station	Compressor Station	MD-521A	No change in emissions.
WY	Campbell	Bear Paw Energy Incorporated	Spotted Horse Creek #2 Prospect C.S.	Compressor Station	CT-2506A	Reduction at a PSD minor source.
WY	Campbell	Bear Paw Energy Incorporated	Tripp Compressor Station	Compressor Station	CT-2055A	No change in emissions.
WY	Campbell	Bear Paw Energy Incorporated	Twenty Mile Compressor Station	Compressor Station	MD-524A	No change in emissions.
WY	Campbell	Bear Paw Energy Incorporated	Werner 13 Compressor Station	Compressor Station	CT-2220A	Administrative change.
WY	Campbell	Bear Paw Energy, L.L.C.	Box Draw Pod 1	Compressor Station	CT-1623A	Reduction at a PSD minor source.
WY	Campbell	Bear Paw Energy, L.L.C.	Box Draw Pod 2	Compressor Station	CT-1624A	Reduction at a PSD minor source.
WY	Campbell	Bear Paw Energy, L.L.C.	Central Kitty Pod 1 Compressor Station	Compressor Station	CT-2581A	Co-emission rate modification.
WY	Campbell	Bear Paw Energy, L.L.C.	Central Kitty Pod 2 Compressor Station	Compressor Station	CT-2582A	Co-emission rate modification.
WY	Campbell	Bear Paw Energy, L.L.C.	Mustang Main Station	Compressor Station	CT-1783A	No change in emissions.
WY	Campbell	Bear Paw Energy, L.L.C.	Prima - Pod Site 1 Compressor Station	Compressor Station	CT-2299	Permit expired.
WY	Campbell	Bear Paw Energy, L.L.C.	Prima - Pod Site 2 Compressor Station	Compressor Station	CT-2300	Permit expired.
WY	Campbell	Bear Paw Energy, L.L.C.	South Kitty Pod 2	Compressor Station	MD-685A	Increase < 1 tpy.
WY	Campbell	Bear Paw Energy, L.L.C.	Wolf Pack Main Compressor Station	Compressor Station	CT-2281	Permit expired.
WY	Campbell	Bear Paw Energy, L.L.C.	Wolf Pack Pod 1 Compressor Station	Compressor Station	CT-2282	Permit expired.
WY	Campbell	Bear Paw Energy, L.L.C.	Wolf Pack Pod 2 Compressor Station	Compressor Station	CT-2283	Permit expired.
WY	Campbell	Bear Paw Energy, L.L.C.	Wolf Pack Pod 3 Compressor Station	Compressor Station	CT-2284	Permit expired.
WY	Campbell	Bear Paw Energy, L.L.C.	Wolf Pack Pod 4 Compressor Station	Compressor Station	CT-2285	Permit expired.
WY	Campbell	Bear Paw Energy, L.L.C.	Wolf Pack Pod 5 Compressor Station	Compressor Station	CT-2286	Permit expired.
WY	Campbell	Bear Paw Energy, L.L.C.	Wolf Pack Pod 6 Compressor Station	Compressor Station	CT-2287	Permit expired.
WY	Campbell	Bear Paw Energy, L.L.C.	Wolf Pack Pod 7 Compressor Station	Compressor Station	CT-2288	Permit expired.
WY	Converse	Belle Fourche Pipeline Company	Well Draw	Storage Tank Battery	MD-662	No inventoried pollutants.
WY	Crook	Bentonite Performance Minerals	Colony Plant	Bentonite Plant	MD-603A	Excluded - based on WDEQ information.
WY	Crook	Bentonite Performance Minerals	Colony Plant	Bentonite Plant	MD-603	Excluded - based on WDEQ information.
WY	Big Horn	Bentonite Performance Minerals	Lovell Plant	Bentonite Plant	MD-849	Reduction at a PSD minor source.
WY	Natrona	Bill Barrett Corporation	Cave Gulch #24	Compressor Station	MD-580	Reduction at a PSD minor source.
WY	Natrona	Bill Barrett Corporation	Cave Gulch #7	Production Site	MD-579	Production well with emissions < 3 tpy.
WY	Natrona	Bill Barrett Corporation	Cave Gulch Gas Conditioning Plant	Sweet Gas Plant	MD-626	Increase < 1 tpy.
WY	Sheridan	Bitter Creek Pipelines LLC	3149 Battery	Compressor Station	CT-2774	Permit withdrawn.
WY	Sheridan	Bitter Creek Pipelines LLC	3349 East Battery	Compressor Station	CT-2775	Permit withdrawn.
WY	Sheridan	Bitter Creek Pipelines LLC	3349 West Battery	Compressor Station	CT-2776	Permit withdrawn.
WY	Sheridan	Bitter Creek Pipelines LLC	3449 Battery	Compressor Station	CT-2777	Permit withdrawn.
WY	Sheridan	Bitter Creek Pipelines LLC	Chevron 19 Battery	Compressor Station	CT-2054A	Administrative change.
WY	Sheridan	Bitter Creek Pipelines LLC	Chevron 20 Battery	Compressor Station	CT-2051A	Administrative change.
WY	Sheridan	Bitter Creek Pipelines LLC	Chevron 30 Battery	Compressor Station	CT-2052A	Administrative change.
WY	Sheridan	Bitter Creek Pipelines LLC	Clearmont Central/2949 Battery	Compressor Station	CT-2773	Permit withdrawn.
WY	Campbell	Bitter Creek Pipelines LLC	East Hall Battery	Compressor Station	MD-422A	Reduction at a PSD minor source.
WY	Sheridan	Bitter Creek Pipelines LLC	Gladewater Central Station	Compressor Station	MD-670A	Reduction at a PSD minor source.
WY	Campbell	Bitter Creek Pipelines LLC	Landeck Central Station	Compressor Station	MD-630A	Reduction at a PSD minor source.
WY	Johnson	Bitter Creek Pipelines LLC	Piney Creek Central Station	Compressor Station	MD-654A	Reduction at a PSD minor source.
WY	Campbell	Bitter Creek Pipelines LLC	West Cook Battery	Compressor Station	MD-653A	Reduction at a PSD minor source.
WY	Sheridan	Bitter Creek Pipelines LLC	Wrench Ranch 49 Battery	Compressor Station	CT-2329A	No change in emissions.
WY	Sheridan	Bitter Creek Pipelines LLC	Wrench Ranch 49 Battery	Compressor Station	CT-2329A2	No change in emissions.
WY	Campbell	Black Hills Corporation	Neil Simpson Two	Power Plant	MD-604A	Administrative change.
WY	Campbell	Black Hills Corporation	WYGEN Unit 1	Power Plant	CT-1236A	Reduction at a PSD minor source.
WY	Uinta	BP America Production Company	Anschutz Ranch East	Sweet Gas Plant	MD-779	No change in emissions.

Table C.8
Wyoming State-Permitted Source Inventory - WDEQ-AQD Permitted Sources - Table of Excluded Sources

State	County	Company	Facility	Facility Class	Permit Number	Reason for Exclusion[1]
WY	Uinta	BP America Production Company	Anschutz Ranch East	Sweet Gas Plant	MD-779A	No change in emissions.
WY	Sublette	BP America Production Company	Antelope 3-9	Production Site	CT-3085	Production well with emissions < 3 tpy.
WY	Sublette	BP America Production Company	Cabrito 03-30 Well Site	Production Site	CT-2835	Production well with emissions < 3 tpy.
WY	Sublette	BP America Production Company	Cabrito 06-30 Well Site	Production Site	CT-2836	Production well with emissions < 3 tpy.
WY	Sublette	BP America Production Company	Cabrito 11-18	Production Site	CT-2942	Production well with emissions < 3 tpy.
WY	Sublette	BP America Production Company	Cabrito 15-13	Production Site	CT-2981	Production well with emissions < 3 tpy.
WY	Sublette	BP America Production Company	Cabrito 16-30	Production Site	CT-2941	Production well with emissions < 3 tpy.
WY	Sublette	BP America Production Company	Cabrito 4-19	Production Site	CT-3063	Production well with emissions < 3 tpy.
WY	Sublette	BP America Production Company	Cabrito 6-31 Well Site	Production Site	CT-2615	Production well with emissions < 3 tpy.
WY	Sublette	BP America Production Company	Cabrito 6-31 Well Site	Production Site	MD-795	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Champlin 221 A4	Production Site	CT-3187	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Champlin 261 A5	Production Site	CT-2974	Production well with emissions < 3 tpy.
WY	Carbon	BP America Production Company	Champlin 278 E4	Production Site	CT-3145	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Champlin 292 B3	Production Site	CT-3210	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Champlin 336 G2	Production Site	CT-2972	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Champlin 452 C5	Production Site	CT-2934	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Champlin 452 E5	Production Site	CT-2917	Production well with emissions < 3 tpy.
WY	Carbon	BP America Production Company	Coal Gulch F3	Production Site	CT-3083	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap 10 S-3	Production Site	CT-3107	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap 15-02	Production Site	CT-3170	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap 15-4	Production Site	CT-3189	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap 20-03	Production Site	CT-3127	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap 25-05	Production Site	CT-3186	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap 35-S1	Production Site	CT-3066	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap Raod 10-02	Production Site	CT-3252	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap Road 10 S-2	Production Site	CT-3105	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap Road 10-01	Production Site	CT-3128	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap Road 11-01	Production Site	CT-3110	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap Road 11-02	Production Site	CT-3242	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap Road 11-3	Production Site	CT-3250	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap Road 15-01	Production Site	CT-3103	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap Road 15-3	Production Site	CT-3240	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap Road 17-01	Production Site	CT-2970	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap Road 17-02	Production Site	CT-3008	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap Road 17-02	Production Site	CT-3008A	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap Road 17-03	Production Site	CT-2975	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap Road 21-01	Production Site	CT-3014	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Crooks Gap Road 36-5	Production Site	CT-3171	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Delaney Rim 36-02	Production Site	CT-3080	Production well with emissions < 3 tpy.
WY	Carbon	BP America Production Company	Duck Lake 1-2	Production Site	CT-3070	Production well with emissions < 3 tpy.
WY	Carbon	BP America Production Company	Duck Lake 23-2	Production Site	CT-3294	Production well with emissions < 3 tpy.
WY	Carbon	BP America Production Company	Duck Lake 25-01	Production Site	CT-2983	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Eight Mile 13-03	Production Site	CT-3185	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Eight Mile Lake 11-2	Production Site	CT-3150	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Five Mile Gulch 19-1	Production Site	CT-3211	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Five Mile Gulch 29-01	Production Site	CT-3137	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Fivemile 7-1	Production Site	CT-3140	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Frewen 07-03	Production Site	CT-2898	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Frewen 16-02	Production Site	CT-2919	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Frewen 16-03	Production Site	CT-3106	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Frewen 16-04	Production Site	CT-3095	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Frewen 16-05	Production Site	CT-3281	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Frewen 18-02	Production Site	CT-3074	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Frewen 19-04	Production Site	CT-2935	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Frewen 19-5	Production Site	CT-3287	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Frewen 9-2	Production Site	CT-3104	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Frewen 9-3	Production Site	CT-3109	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Frewen 9-4	Production Site	CT-3138	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Luman 9-1	Production Site	CT-3307	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Monument 29-3	Production Site	CT-3286	Production well with emissions < 3 tpy.

Table C.8
Wyoming State-Permitted Source Inventory - WDEQ-AQD Permitted Sources - Table of Excluded Sources

State	County	Company	Facility	Facility Class	Permit Number	Reason for Exclusion[1]
WY	Sweetwater	BP America Production Company	Monument 31-01	Production Site	CT-2971	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Monument Lake 29-02 Well Site	Production Site	CT-2827	Production well with emissions < 3 tpy.
WY	Carbon	BP America Production Company	Muddy Creek 5-5	Production Site	CT-3201	Production well with emissions < 3 tpy.
WY	Uinta	BP America Production Company	Painter Reservoir Gas Complex	Sweet Gas Plant	MD-768	No change in emissions.
WY	Sweetwater	BP America Production Company	Red Desert 15-1	Production Site	CT-3314	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Red Wash 11-1	Production Site	CT-3243	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Red Wash 3-1	Production Site	CT-3292	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Siberia Ridge 1-3	Production Site	CT-3251	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Sourdough Gulch 16-2	Production Site	CT-3293	Production well with emissions < 3 tpy.
WY	Carbon	BP America Production Company	South Rim 5-2	Production Site	CT-3087	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	South Rim 5-3	Production Site	CT-3188	Production well with emissions < 3 tpy.
WY	Sublette	BP America Production Company	Stud Horse Butte 09-15	Production Site	CT-3136	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Tierney II 22-03	Production Site	CT-3149	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Tierney II 23-2	Production Site	CT-3310	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Tierney II 23-2	Production Site	CT-3310	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Tierney II 23-2	Production Site	CT-3310	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Tierney II 23-3	Production Site	CT-3308	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Tierney II 23-4	Production Site	CT-3282	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Tierney II 27-03	Production Site	CT-3125	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Tierney II 27-2	Production Site	CT-3082	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Tierney II 28-02	Production Site	CT-3058	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Tierney II 28-03	Production Site	CT-3059	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Tierney II 28-04	Production Site	CT-3081	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Tierney II 33-03	Production Site	CT-2968	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Tierney II 33-04	Production Site	CT-2973	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Tierney II 33-5	Production Site	CT-3270	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Two Rim 20-03	Production Site	CT-2966	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Two Rim 20-04	Production Site	CT-3006	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Two Rim 21-04	Production Site	CT-2979	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Two Rim 30-03	Production Site	CT-2936	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Two Rim 3-2	Production Site	CT-3313	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Two Rim 36-02	Production Site	CT-3160	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Two Rim 36-4	Production Site	CT-3311	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Wamsutter Rim 34-2	Production Site	CT-3309	Production well with emissions < 3 tpy.
WY	Uinta	BP America Production Company	Whitney Canyon Gas Plant	Sour Gas Plant	MD-778	No change in emissions.
WY	Uinta	BP America Production Company	Whitney Canyon Gas Plant	Sour Gas Plant	MD-629	No change in emissions.
WY	Uinta	BP America Production Company	Whitney Canyon Gas Plant	Sour Gas Plant	MD-629A	No change in emissions.
WY	Sweetwater	BP America Production Company	Wild Rose 13-02	Production Site	CT-2918	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Wild Rose 13-03	Production Site	CT-2967	Production well with emissions < 3 tpy.
WY	Sweetwater	BP America Production Company	Wild Rose 13-04	Production Site	CT-2877	Production well with emissions < 3 tpy.
WY	Sweetwater	BP Amoco Production Company	Champlin 292 A2	Storage Tank Battery	CT-2521	Increase < 1 tpy.
WY	Sweetwater	Bridger Coal Company	Jim Bridger Coal Mine	Surface Coal Mine	MD-876	No change in emissions.
WY	Fremont	Burlington Resources Oil and Gas	FEO 1-35 SWD	Production Site	CT-3146	Production well with emissions < 3 tpy.
WY	Fremont	Burlington Resources Oil and Gas	Lost Cabin Gas Plant	Sour Gas Plant	CT-1946A	No change in emissions.
WY	Carbon	Cabot Oil & Gas Corporation	D.S. Federal #14-4	Production Site	CT-1817A	Production well with emissions < 3 tpy.
WY	Carbon	Cabot Oil & Gas Corporation	Lookout Wash #1	Production Site	CT-2760	Production well with emissions < 3 tpy.
WY	Carbon	Cabot Oil & Gas Corporation	Lookout Wash 10-32-15-93	Production Site	CT-2761	Production well with emissions < 3 tpy.
WY	Carbon	Cabot Oil & Gas Corporation	Lookout Wash 40-5-14-93	Production Site	CT-3099	Production well with emissions < 3 tpy.
WY	Sweetwater	Cabot Oil & Gas Corporation	Wamsutter 30-26	Production Site	CT-3241	Production well with emissions < 3 tpy.
WY	Sweetwater	Cabot Oil & Gas Corporation	Wamsutter 40-24	Production Site	CT-2978	Production well with emissions < 3 tpy.
WY	Campbell	Carbon County	CT-2443	Crushing and Screening	CT-2443	Administrative change.
WY	Lincoln	Chevron USA, Inc.	Ballerina #20-10	Production Site	CT-2716	Production well with emissions < 3 tpy.
WY	Sublette	Chevron USA, Inc.	Birch Creek 134	Production Site	CT-2997	Production well with emissions < 3 tpy.
WY	Sublette	Chevron USA, Inc.	Birch Creek 186	Production Site	CT-2997	Production well with emissions < 3 tpy.
WY	Sublette	Chevron USA, Inc.	Birch Creek C.S. @ Battery A	Compressor Station	MD-770A	Reduction at a PSD minor source.
WY	Lincoln	Chevron USA, Inc.	Ham's Fork 24-3	Production Site	CT-2718	Production well with emissions < 3 tpy.
WY	Lincoln	Chevron USA, Inc.	Mariposa Federal 3	Production Site	CT-2717	Production well with emissions < 3 tpy.
WY	Lincoln	Chevron USA, Inc.	Rim Rock 11-13	Production Site	CT-3133	Production well with emissions < 3 tpy.
WY	Sweetwater	Chevron USA, Inc.	Stagecoach Draw # 17A	Production Site	CT-2926	Production well with emissions < 3 tpy.
WY	Natrona	Chevron USA, Inc.	Waltman # 57	Production Site	CT-2897	Production well with emissions < 3 tpy.

Table C.8
Wyoming State-Permitted Source Inventory - WDEQ-AQD Permitted Sources - Table of Excluded Sources

State	County	Company	Facility	Facility Class	Permit Number	Reason for Exclusion[1]
WY	Campbell	Clear Creek Natural Gas, LLC	Skull Creek Gathering System	Compressor Station	CT-2758	DEQ could not find this permit.
WY	Uinta	Clear Creek Storage Company LLC	Clear Creek Gas Storage Facility	Production Site	MD-594	Production well with emissions < 3 tpy.
WY	Campbell	CMS Field Service	Larey Draw	Compressor Station	CT-2405A	No change in emissions.
WY	Campbell	CMS Field Service	MTG-Felix Central Compressor Station	Compressor Station	CT-2298A	No change in emissions.
WY	Sheridan	CMS Field Services	Cottonwood Creek Prospect C Station	Compressor Station	CT-2194A	No change in emissions.
WY	Campbell	CMS Field Services	Fitch Central Compressor Station	Compressor Station	MD-602A	Reduction at a PSD minor source.
WY	Campbell	CMS Field Services	Kingsbury Central Compressor Station	Compressor Station	MD-828	Increase < 1 tpy.
WY	Sheridan	CMS Field Services	Kuhn #2 Compressor Station	Compressor Station	CT-2683A	No change in emissions.
WY	Johnson	CMS Field Services	Kuhn 27 Compressor Station	Compressor Station	CT-2189A	No change in emissions.
WY	Sheridan	CMS Field Services	Meriwether Lewis A Compressor Station	Compressor Station	CT-2644	Permit withdrawn.
WY	Sheridan	CMS Field Services	Meriwether Lewis B Compressor Station	Compressor Station	CT-2645	Permit withdrawn.
WY	Sheridan	CMS Field Services	Meriwether Lewis C Compressor Station	Compressor Station	CT-2646	Permit withdrawn.
WY	Sheridan	CMS Field Services	Meriwether Lewis D Compressor Station	Compressor Station	CT-2647	Permit withdrawn.
WY	Sheridan	CMS Field Services	Meriwether Lewis E Compressor Station	Compressor Station	CT-2648	Permit withdrawn.
WY	Sheridan	CMS Field Services	Meriwether Lewis F Compressor Station	Compressor Station	CT-2649	Permit withdrawn.
WY	Sheridan	CMS Field Services	Meriwether Lewis G Compressor Station	Compressor Station	CT-2650	Permit withdrawn.
WY	Campbell	CMS Field Services	North Felix Compressor Station	Compressor Station	CT-1732A	Administrative change.
WY	Laramie	Coastal Chemical	Cheyenne Nitrogenous Fertilizer Facility	Miscellaneous	CT-1099A2	Administrative change.
WY	Laramie	Coastal Chemical	Cheyenne Nitrogenous Fertilizer Facility	Miscellaneous	CT-1099A	No change in emissions.
WY	Sweetwater	Colorado Interstate Gas	Table Rock Compressor Station	Compressor Station	MD-740	Increase < 1 tpy.
WY	Sweetwater	Colorado Interstate Gas	Table Rock Compressor Station	Compressor Station	MD-740A	No change in emissions.
WY	Johnson	Comet Energy, LLC	Lawrence 28 Compressor Station	Compressor Station	CT-2954A	Reduction at a PSD minor source.
WY	Natrona	ConocoPhillips Company	Casper Pump Station	Storage Tank Battery	MD-673	No inventoried pollutants.
WY	Platte	ConocoPhillips Company	Guernsey Crude Station	Storage Tank Battery	MD-636	No inventoried pollutants.
WY	Sweetwater	ConocoPhillips Company	Rock Springs Terminal	Storage Tank Battery	MD-635	Reduction at a PSD minor source.
WY	Sheridan	ConocoPhillips Company	Sheridan Terminal	Storage Tank Battery	MD-634	No change in emissions.
WY	Sheridan	ConocoPhillips Company	Sheridan Terminal	Storage Tank Battery	MD-634A	No change in emissions.
WY	Natrona	Defense Technology Corporation	Casper Facilities	Miscellaneous	MD-762	Increase < 1 tpy.
WY	Carbon	Devon Energy Production Company	Blue Gap No. 4-7-14-92	Production Site	CT-2830	Production well with emissions < 3 tpy.
WY	Carbon	Devon Energy Production Company	East Echo Springs 14-26-19-92	Production Site	CT-3164	Production well with emissions < 3 tpy.
WY	Carbon	Devon Energy Production Company	East Echo Springs 16-22-19-92	Production Site	CT-3166	Production well with emissions < 3 tpy.
WY	Carbon	Devon Energy Production Company	East Echo Springs 3-26-19-92	Production Site	CT-3163	Production well with emissions < 3 tpy.
WY	Carbon	Devon Energy Production Company	East Esho Springs 1-34-19-92	Production Site	CT-3305	Production well with emissions < 3 tpy.
WY	Sweetwater	Devon Energy Production Company	Five Mile Ditch 6-30-21-93	Production Site	CT-3100	Production well with emissions < 3 tpy.
WY	Sweetwater	Devon Energy Production Company	Red Lakes 13-6-18-94	Production Site	CT-3062	Production well with emissions < 3 tpy.
WY	Sweetwater	Devon Energy Production Company	Red Lakes No. 16-6-18-94	Production Site	CT-2714	Production well with emissions < 3 tpy.
WY	Carbon	Devon Energy Production Company	Standard Draw 1-18-18-93	Production Site	CT-3079	Production well with emissions < 3 tpy.
WY	Carbon	Devon Energy Production Company	Standard Draw 16-18-18-93	Production Site	CT-3165	Production well with emissions < 3 tpy.
WY	Carbon	Devon Energy Production Company	Standard Draw 16-18-18-93	Production Site	CT-3165 (Corrected)	Production well with emissions < 3 tpy.
WY	Carbon	Devon Energy Production Company	Standard Draw 16-30-18-93	Production Site	CT-3086	Production well with emissions < 3 tpy.
WY	Sweetwater	Devon Energy Production Company	Tierney 15-32-19-94	Production Site	CT-2655	Production well with emissions < 3 tpy.
WY	Sweetwater	Devon Energy Production Company	Tierney 2-32-19-94	Production Site	CT-3290	Production well with emissions < 3 tpy.
WY	Big Horn	Devon Energy Production Company	Worland Field Compressor Station	Compressor Station	ct-2677a	Increase < 1 tpy.
WY	Sublette	Devon Energy Production Company	Yellow Point No. 04-01-28-109	Production Site	CT-2643	Production well with emissions < 3 tpy.
WY	Sublette	Devon Energy Production Company	Yellow Point No. 14-14-28-109	Production Site	CT-2702	Production well with emissions < 3 tpy.
WY	Sweetwater	Duke Energy Field Services, LP	Bitter Creek 21-4	Dehydration	CT-3289	No inventoried pollutants.
WY	Sweetwater	Duke Energy Field Services, LP	Black Butte 11-19-100 C.S.	Compressor Station	CT-2605A	No change in emissions.
WY	Uinta	Duke Energy Field Services, LP	Emigrant Trail Gas Plant	Sweet Gas Plant	MD-774	Increase < 1 tpy.
WY	Campbell	El Paso Corporation	Lazy B Station	Compressor Station	CT-1847A	Reduction at a PSD minor source.
WY	Sweetwater	El Paso Corporation	Redlakes #2	Dehydration	CT-2275	Increase < 1 tpy.
WY	Fremont	El Paso Field Services	Fee 1-8	Production Site	CT-3035	Production well with emissions < 3 tpy.
WY	Sweetwater	El Paso Field Services	Forest 1-4	Dehydration	CT-3021	Increase < 1 tpy.
WY	Sweetwater	El Paso Field Services	Forest 2-32	Dehydration	CT-3142	Increase < 1 tpy.
WY	Sweetwater	El Paso Field Services	Forest 3-4	Dehydration	CT-3047	Increase < 1 tpy.
WY	Sweetwater	El Paso Field Services	Forest 4-32	Dehydration	CT-3037	Increase < 1 tpy.
WY	Sweetwater	El Paso Field Services	Forest 9-32	Dehydration	CT-3020	Increase < 1 tpy.
WY	Sweetwater	El Paso Field Services	Forest 9-4	Dehydration	CT-3023	Increase < 1 tpy.
WY	Sweetwater	El Paso Field Services	Red Lakes 12-10	Dehydration	CT-2999	Increase < 1 tpy.
WY	Sweetwater	El Paso Field Services	Red Lakes 13-6-18-94	Dehydration	CT-3096	Increase < 1 tpy.
WY	Sweetwater	El Paso Field Services	Red Lakes 8-1	Dehydration	CT-3011	Increase < 1 tpy.

Table C.8
Wyoming State-Permitted Source Inventory - WDEQ-AQD Permitted Sources - Table of Excluded Sources

State	County	Company	Facility	Facility Class	Permit Number	Reason for Exclusion[1]
WY	Carbon	El Paso Field Services	Standard Draw 1-18-18-93	Production Site	CT-3067	Production well with emissions < 3 tpy.
WY	Carbon	El Paso Field Services	Standard Draw 16-18-18-93	Dehydration	CT-3122	Increase < 1 tpy.
WY	Sweetwater	El Paso Field Services	Tierney 2-32	Dehydration	CT-3209	Increase < 1 tpy.
WY	Sweetwater	El Paso Field Services	Wamsutter Regulator	Compressor Station	MD-741A	No change in emissions.
WY	Sweetwater	El Paso Field Services	Wild Rose 11-18	Dehydration	CT-3239	Increase < 1 tpy.
WY	Sweetwater	El Paso Field Services	Wild Rose 1-26	Dehydration	CT-3048	Increase < 1 tpy.
WY	Sweetwater	El Paso Field Services	Wild Rose 2-18	Dehydration	CT-3041	Increase < 1 tpy.
WY	Sweetwater	El Paso Field Services	Wild Rose Federal 1-6	Dehydration	CT-3221	Increase < 1 tpy.
WY	Sweetwater	El Paso Field Services	Wild Rose Federal 2-10	Dehydration	CT-3126	Increase < 1 tpy.
WY	Sublette	EOG Resources	B Tank Battery	Production Site	CT-1552A	Production well with emissions < 3 tpy.
WY	Lincoln	EOG Resources	Emigrant Springs 20-21	Production Site	CT-3029	Production well with emissions < 3 tpy.
WY	Lincoln	EOG Resources	Emigrant Springs 21-22	Production Site	CT-3015	Production well with emissions < 3 tpy.
WY	Lincoln	EOG Resources	ESU 20-21 & 26-21	Production Site	MD-868	Production well with emissions < 3 tpy.
WY	Lincoln	EOG Resources	GRBU 216-12	Production Site	CT-3116	Production well with emissions < 3 tpy.
WY	Sublette	EOG Resources	GRBU 301-7d	Production Site	CT-2990	Production well with emissions < 3 tpy.
WY	Sweetwater	EOG Resources	North Ruger 35-29D	Production Site	CT-3257	Production well with emissions < 3 tpy.
WY	Sheridan	Federated Oil and Gas	Box Elder Creek Main Compressor Station	Compressor Station	CT-2289A	Reduction at a PSD minor source.
WY	Sheridan	Federated Oil and Gas	Wild Horse Creek Compressor Station	Compressor Station	CT-1942A	No change in emissions.
WY	Portable	First Energy Services Company, Inc.	Road Runner Screen Plant	Crushing and Screening	CT-3218	Increase < 1 tpy.
WY	Campbell	First Sourcenergy Wyoming Incorp.	PRFC #14 Compressor Station	Compressor Station	CT-2267	Permit expired.
WY	Campbell	First Sourcenergy Wyoming Incorp.	PRFC #21	Compressor Station	CT-2372A	No change in emissions.
WY	Campbell	First Sourcenergy Wyoming Incorp.	PRFC #21	Compressor Station	CT-2372	Permit expired.
WY	Sweetwater	FMC Wyoming Corporation	Soda Ash Facility - Green River Plant	Trona Industry	MD-608	No change in emissions.
WY	Sublette	Forest Oil Corporation	Elm Federal No. 23-12	Production Site	CT-2867	Production well with emissions < 3 tpy.
WY	Sublette	Forest Oil Corporation	Elm Federal No. 23-22	Production Site	CT-2547	Production well with emissions < 3 tpy.
WY	Sweetwater	Forest Oil Corporation	Forest 1-4-17-94	Production Site	CT-3097	Production well with emissions < 3 tpy.
WY	Sweetwater	Forest Oil Corporation	Forest 2-32-18-94	Production Site	CT-3172	Production well with emissions < 3 tpy.
WY	Sweetwater	Forest Oil Corporation	Forest 3-4-17-94	Production Site	CT-3168	Production well with emissions < 3 tpy.
WY	Sweetwater	Forest Oil Corporation	Forest 9-32-18-94	Production Site	CT-3108	Production well with emissions < 3 tpy.
WY	Sublette	Forest Oil Corporation	Wild Rose 1-26	Production Site	CT-3139	Production well with emissions < 3 tpy.
WY	Sublette	Forest Oil Corporation	Wild Rose 1-26	Production Site	CT-3139 (Corrected)	Production well with emissions < 3 tpy.
WY	Sweetwater	Forest Oil Corporation	Wild Rose Federal 11-18	Production Site	CT-3303	Production well with emissions < 3 tpy.
WY	Sweetwater	Forest Oil Corporation	Wild Rose Federal 1-6	Production Site	CT-3306	Production well with emissions < 3 tpy.
WY	Sweetwater	Forest Oil Corporation	Wild Rose Federal 2-18-17-94	Production Site	CT-3147	Production well with emissions < 3 tpy.
WY	Sweetwater	Forest Oil Corporation	Wild Rose Federal 9-18	Production Site	CT-3317	Production well with emissions < 3 tpy.
WY	Laramie	Frontier Oil and Refining Company	Frontier Refinery	Petroleum Refinery	MD-607	No change in emissions.
WY	Laramie	Frontier Oil and Refining Company	Frontier Refinery	Petroleum Refinery	MD-839	No inventoried pollutants.
WY	Washakie	Hiland Partners, L.L.C.	Hiland Gas Plant	Sour Gas Plant	MD-641	No change in emissions.
WY	Washakie	Hiland Partners, L.L.C.	Hiland Gas Plant	Sour Gas Plant	MD-641A	No change in emissions.
WY	Fremont	Howell Petroleum Corporation	Big Sand Draw Compressor Station	Compressor Station	MD-885	Reduction at a PSD minor source.
WY	Platte	Imerys Marble, Inc.	Wheatland Marble Plant	Miscellaneous	MD-695	Reduction at a PSD minor source.
WY	Campbell	Independent Production Company	Pronghorn North	Compressor Station	CT-1889A	Increase < 1 tpy.
WY	Sheridan	Intermountain Construction & Materials	CT-1216	Asphalt Plant	MD-610	No change in emissions.
WY	Campbell	JM Huber	Stones Throw North	Compressor Station	CT-2694A	No change in emissions.
WY	Campbell	JM Huber	Stones Throw Pod 1 Station	Compressor Station	CT-1964A	No change in emissions.
WY	Campbell	JM Huber	Stones Throw Pod 5 Station	Compressor Station	CT-1965A	No change in emissions.
WY	Campbell	JM Huber	Stones Throw Pod 6 Station	Compressor Station	MD-705A	No change in emissions.
WY	Sublette	Joe's Concrete & Lumber Incorp.	Portable Concrete Batch Plant	Concrete Plant	CT-2117	Increase < 1 tpy.
WY	Sublette	Jonah Gas Gathering Company	Bird Canyon/County Line C.S.	Compressor Station	CT-2252A	Location change only.
WY	Sublette	Jonah Gas Gathering Company	Luman Compressor Station	Compressor Station	MD-714	Increase < 1 tpy.
WY	Washakie	KCS Mountain Resources Incorp.	Manderson Gas Plant / Oil Battery	Sour Gas Plant	CT-1320A	Reduction at a PSD minor source.
WY	Natrona	Kinder Morgan	Cyclone Ridge (39 Mile) C.S.	Compressor Station	MD-672	No change in emissions.
WY	Campbell	Kinder Morgan Operating L.P. "A"	Amos Draw Booster	Compressor Station	MD-788	Reduction at a PSD minor source.
WY	Campbell	Kinder Morgan Operating L.P. "A"	Archibald Booster	Compressor Station	MD-792	Reduction at a PSD minor source.
WY	Campbell	Kinder Morgan Operating L.P. "A"	HA Creek Booster	Compressor Station	MD-789	Reduction at a PSD minor source.
WY	Campbell	Kinder Morgan Operating L.P. "A"	Hay Booster	Compressor Station	MD-787	Reduction at a PSD minor source.
WY	Converse	Kinder Morgan Operating L.P. "A"	Hogs Draw Booster	Compressor Station	MD-785	Reduction at a PSD minor source.
WY	Converse	Kinder Morgan Operating L.P. "A"	Irwin Ranch Station	Compressor Station	MD-786	Reduction at a PSD minor source.
WY	Weston	Kinder Morgan Operating L.P. "A"	Todd Booster	Compressor Station	MD-784	Reduction at a PSD minor source.
WY	Converse	Kinder Morgan Operating L.P. "A"	Well Draw Booster Station	Compressor Station	MD-742	Reduction at a PSD minor source.

Table C.8
Wyoming State-Permitted Source Inventory - WDEQ-AQD Permitted Sources - Table of Excluded Sources

State	County	Company	Facility	Facility Class	Permit Number	Reason for Exclusion[1]
WY	Natrona	Kinder Morgan, Inc.	Casper Extraction Plant	Sweet Gas Plant	MD-769	No change in emissions.
WY	Sweetwater	Marathon Oil Company	Wamsutter 12-32	Production Site	CT-2703	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Cabrito 12-19-29-107	Production Site	CT-3222	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Cabrito 12-25-29-108	Production Site	CT-2888	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Cabrito 14-25-29-108	Production Site	CT-2938	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Cabrito 14-30-29-107	Production Site	CT-3223	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Cabrito 7-30-29-107	Production Site	CT-3072	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Corona SHB 10-30-29-108	Production Site	CT-3277	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Corona-SHB 16-31-29-108	Production Site	CT-3246	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Corona-Stud Horse Butte 6-30-29-108	Production Site	CT-3297	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 11-7-28-108	Production Site	CT-3194	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 12-7-28-108	Production Site	CT-2914	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 1-5x-28-108	Production Site	CT-2944	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 1-6X-28-108	Production Site	CT-2937	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 1-7X-28-108	Production Site	CT-2889	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 2-7-28-108	Production Site	CT-2881	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 3-8x-28-108	Production Site	CT-2957	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 4-18-28-108	Production Site	CT-2911	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 4-4-28-108	Production Site	CT-2912	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 4-6-28-109	Production Site	CT-3026	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 5-4-28-108	Production Site	CT-3167	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 5-8-28-108	Production Site	CT-2956	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 6-5-28-108	Production Site	CT-2891	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 6-6-28-108	Production Site	CT-3022	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 6-7-28-108	Production Site	CT-2913	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 7-5-28-108	Production Site	CT-2959	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 7-6-28-108	Production Site	CT-2819	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 8-6-28-108	Production Site	CT-3078	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal 8-7-28-108	Production Site	CT-2902	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Jonah Federal No. 4-7-28-108	Production Site	CT-2907	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 10-26-29-108	Production Site	CT-3053	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 10-28-29-108	Production Site	CT-3092	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 10-33-29-108	Production Site	CT-2807	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 10-34-29-108	Production Site	CT-2906	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 10-35-29-108	Production Site	CT-2882	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 11-22-29-108	Production Site	CT-3017	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 11-33X-29-108	Production Site	CT-3144	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 12-26-29-108	Production Site	CT-2887	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 12-27-29-108	Production Site	CT-3272	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 12-28-29-108	Production Site	CT-3195	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 12-34-29-108	Production Site	CT-2904	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 1-28-29-108	Production Site	CT-3016	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 1-29-29-108	Production Site	CT-3179	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 13-20-29-108	Production Site	CT-2908	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 13-29-29-108	Production Site	CT-2909	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 1-36-29-108	Production Site	CT-2939	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 14-26-29-108	Production Site	CT-2951	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 14-27-29-108	Production Site	CT-3215	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 14-28-29-108	Production Site	CT-3213	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 14-33-29-108	Production Site	CT-3267	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 14-34-29-108	Production Site	CT-3120	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 14-35-29-108	Production Site	CT-2949	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 15-19-29-108	Production Site	CT-3025	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 16-26-29-108	Production Site	CT-3217	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 16-28-29-108	Production Site	CT-3156	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 16-33-29-108	Production Site	CT-3280	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 16-35R-29-108	Production Site	CT-3198	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 2-26-29-108	Production Site	CT-2961	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 2-27-29-108	Production Site	CT-3204	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 2-28-29-108	Production Site	CT-3200	Production well with emissions < 3 tpy.

Table C.8
Wyoming State-Permitted Source Inventory - WDEQ-AQD Permitted Sources - Table of Excluded Sources

State	County	Company	Facility	Facility Class	Permit Number	Reason for Exclusion[1]
WY	Sublette	McMurry Oil Company	Stud Horse Butte 2-29-29-108	Production Site	CT-3090	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 2-33-29-108	Production Site	CT-3214	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 2-34-29-108	Production Site	CT-2953	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 2-35-29-108	Production Site	CT-2958	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 3-29-29-108	Production Site	CT-3044	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 3-36-29-108	Production Site	CT-3057	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 4-26-29-108	Production Site	CT-2960	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 4-27-29-108	Production Site	CT-3276	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 4-28-29-108	Production Site	CT-3155	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 4-29-29-108	Production Site	CT-3091	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 4-35-29-108	Production Site	CT-2866	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 5-28-29-108	Production Site	CT-3247	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 5-36-29-108	Production Site	CT-2929	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 6-26-29-108	Production Site	CT-3113	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 6-28-29-108	Production Site	CT-3089	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 6-29-29-108	Production Site	CT-3073	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 6-33-29-108	Production Site	CT-3205	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 6-34-29-108	Production Site	CT-2910	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 7-29-29-108	Production Site	CT-3050	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 7-33-29-108	Production Site	CT-2820	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 7-36A-29-108	Production Site	CT-3230	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 8-26-29-108	Production Site	CT-3071	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 8-27M-29-108	Production Site	CT-3315	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 8-28-29-108	Production Site	CT-3296	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 8-29-29-108	Production Site	CT-3248	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 8-35-29-108	Production Site	CT-2948	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 8-36-29-108	Production Site	CT-2950	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 9-19-29-108	Production Site	CT-2905	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte 9-29-29-108	Production Site	CT-3051	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte No. 4-34-29-108	Production Site	CT-2915	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Stud Horse Butte No. 8-34-29-108	Production Site	CT-2803	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point 10-11-28-109	Production Site	CT-3193	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point 10-13-28-109	Production Site	CT-3203	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point 10-14-28-109	Production Site	CT-3197	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point 11-14-28-109	Production Site	CT-3202	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point 12-13-28-109	Production Site	CT-3052	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point 14-13-28-109	Production Site	CT-3180	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point 16-11-28-109	Production Site	CT-2808	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point 2-12-28-109	Production Site	CT-3019	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point 2-1-28-109	Production Site	CT-3249	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point 4-12-28-109	Production Site	CT-2945	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point 6-12-28-109	Production Site	CT-2952	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point 8-12-28-109	Production Site	CT-3075	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point 8-13-28-108	Production Site	CT-3119	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point 8-2-28-109	Production Site	CT-2880	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point No. 10-12-28-109	Production Site	CT-2890	Production well with emissions < 3 tpy.
WY	Sublette	McMurry Oil Company	Yellow Point No. 12-12-28-109	Production Site	CT-2903	Production well with emissions < 3 tpy.
WY	Converse	Merit Energy Company	Sage Creek Gas Plant	Sweet Gas Plant	MD-648	No change in emissions.
WY	Converse	Merit Energy Company	Sage Grouse Booster	Compressor Station	MD-743	No change in emissions.
WY	Carbon	Merit Energy Company	Savery Compressor Station	Compressor Station	MD-816	Reduction at a PSD minor source.
WY	Campbell	MIGC Incorporated	Bonepile Compressor Station	Compressor Station	MD-752A	Reduction at a PSD minor source.
WY	Lincoln	Mountain Gas Resources	Ballerina 10-10	Dehydration	CT-2991	No inventoried pollutants.
WY	Sweetwater	Mountain Gas Resources	Blue Forest	Compressor Station	MD-884	Reduction at a PSD minor source.
WY	Sweetwater	Mountain Gas Resources	Blue Forest 30-13F	Dehydration	CT-3115	No inventoried pollutants.
WY	Sweetwater	Mountain Gas Resources	Blue Forest 40-13 Well	Dehydration	CT-2924	No inventoried pollutants.
WY	Sweetwater	Mountain Gas Resources	Bruff 50-24	Dehydration	CT-2596	No inventoried pollutants.
WY	Sweetwater	Mountain Gas Resources	Fabian Ditch Compressor Station	Compressor Station	MD-642A	Reduction at a PSD minor source.
WY	Lincoln	Mountain Gas Resources	Hailstone #10	Dehydration	CT-2977	No inventoried pollutants.
WY	Lincoln	Mountain Gas Resources	Helwig 10-8	Dehydration	CT-2562	No inventoried pollutants.
WY	Sweetwater	Mountain Gas Resources	Horse Shoe Unit 10-34	Dehydration	CT-3143	No inventoried pollutants.

Table C.8
Wyoming State-Permitted Source Inventory - WDEQ-AQD Permitted Sources - Table of Excluded Sources

State	County	Company	Facility	Facility Class	Permit Number	Reason for Exclusion[1]
WY	Sweetwater	Mountain Gas Resources	Lincoln Road Compressor Station	Compressor Station	MD-650	Increase < 1 tpy.
WY	Sweetwater	Mountain Gas Resources	Lincoln Road Compressor Station	Compressor Station	MD-829	Increase < 1 tpy.
WY	Sweetwater	Mountain Gas Resources	Sevenmile Gulch Compressor Station	Compressor Station	CT-1471A	No change in emissions.
WY	Sweetwater	Mountain Gas Resources	Stagecoach Compressor Station	Compressor Station	MD-372A	No change in emissions.
WY	Sublette	Mountain Gas Resources	Stud Horse Butte 10-21	Dehydration	CT-2586	No inventoried pollutants.
WY	Sublette	Mountain Gas Resources	Stud Horse Butte 10-23A	Dehydration	CT-2414	No inventoried pollutants.
WY	Sublette	Mountain Gas Resources	Stud Horse Butte 14-21	Dehydration	CT-2614	No inventoried pollutants.
WY	Sublette	Mountain Gas Resources	Stud Horse Butte 14-24	Dehydration	CT-2413	No inventoried pollutants.
WY	Sublette	Mountain Gas Resources	Stud Horse Butte 16-21	Dehydration	CT-2588	No inventoried pollutants.
WY	Sublette	Mountain Gas Resources	Stud Horse Butte 2-23	Dehydration	CT-2425	No inventoried pollutants.
WY	Sublette	Mountain Gas Resources	Stud Horse Butte 2-24	Dehydration	CT-2616	No inventoried pollutants.
WY	Sublette	Mountain Gas Resources	Stud Horse Butte 6-24	Dehydration	CT-2587	No inventoried pollutants.
WY	Sublette	Mountain Gas Resources	Stud Hourse Butte 12-24	Dehydration	CT-3337	Increase < 1 tpy.
WY	Sublette	Mountain Gas Resources	War Bonnett 15-23	Dehydration	CT-2667	Increase < 1 tpy.
WY	Lincoln	Mountain Gas Resources	Whiskey Butte 40-30	Dehydration	CT-2563	No inventoried pollutants.
WY	Sweetwater	Nance Petroleum Corporation	Red Lakes #2-32	Production Site	CT-2374	Production well with emissions < 3 tpy.
WY	Carbon	Nearburg Producing Company	Fillmore 1-19	Production Site	CT-2885	Production well with emissions < 3 tpy.
WY	Lincoln	Northwest Pipeline Company	Muddy Creek Station	Compressor Station	MD-844	Reduction at a PSD minor source.
WY	Converse	Pacificorp	Dave Johnston	Power Plant	MD-682	No change in emissions.
WY	Campbell	Petroleum Development Corporation	LX Bar Pod 1 Station	Compressor Station	MD-494A	Reduction at a PSD minor source.
WY	Campbell	Petroleum Development Corporation	LX Bar Pod 3 Station	Compressor Station	MD-496 EXPIRED	Reduction at a PSD minor source.
WY	Campbell	Petroleum Development Corporation	LX Bar Pod 4 Station	Compressor Station	MD-497A	Reduction at a PSD minor source.
WY	Lincoln	Pittsburg and Midway Coal Company	Kemmerer Mine	Surface Coal Mine	MD-566	Reduction at a PSD minor source.
WY	Natrona	Platte Pipe Line Company	Casper Tank farm	Miscellaneous	MD-803	No inventoried pollutants.
WY	Campbell	Powder River Coal Company	North Antelope/Rochelle Coal Mine	Surface Coal Mine	MD-657A	Included in MD-657.
WY	Campbell	Powder River Coal Company	Rawhide Mine	Surface Coal Mine	MD-703	Reduction at a PSD minor source.
WY	Sweetwater	Questar Exploration & Production	Federal Well 19-1	Production Site	CT-2976	Production well with emissions < 3 tpy.
WY	Sublette	Questar Exploration & Production	Mesa 5-21	Production Site	CT-3254	Production well with emissions < 3 tpy.
WY	Sublette	Questar Exploration & Production	Mesa Well 16-16	Production Site	CT-3219	Production well with emissions < 3 tpy.
WY	Sublette	Questar Exploration & Production	Mesa Well 7-7 & Mesa 3-7	Production Site	CT-3192	Production well with emissions < 3 tpy.
WY	Sublette	Questar Exploration & Production	Mesa Well 7-7 & Mesa 3-7	Production Site	CT-3192 (Corrected)	Production well with emissions < 3 tpy.
WY	Sublette	Questar Exploration & Production	Stewart Point 15-17	Production Site	CT-3283	Production well with emissions < 3 tpy.
WY	Sweetwater	Questar Exploration & Production	Wedge Unit 8	Production Site	CT-2736	Production well with emissions < 3 tpy.
WY	Uinta	Questar Gas Management Company	Blacks Fork Gas Plant	Sweet Gas Plant	MD-873	Reduction at a PSD minor source.
WY	Big Horn	Red Butte Pipe Line Company	Byron Station	Storage Tank Battery	MD-273A	No inventoried pollutants.
WY	Washakie	Red Butte Pipe Line Company	Chatham Station	Storage Tank Battery	MD-275A	No inventoried pollutants.
WY	Natrona	Rissler and McMurry Company	Eagle Creek Ranch Quarry	Miscellaneous	CT-2874	Increase < 1 tpy.
WY	Campbell	Rocky Mountain Gas, Inc.	Bobcat Compressor Station	Compressor Station	CT-2274A	Reduction at a PSD minor source.
WY	Campbell	Rowdy Pipeline, LLC	Bucko Satellite 1 Compressor Station	Compressor Station	CT-2565	Permit expired.
WY	Campbell	Rowdy Pipeline, LLC	Bucko Satellite 10 Compressor Station	Compressor Station	CT-2567A	No change in emissions.
WY	Campbell	Rowdy Pipeline, LLC	Bucko Satellite 10 Compressor Station	Compressor Station	CT-2567	Permit expired.
WY	Campbell	Rowdy Pipeline, LLC	Bucko Satellite 9 Compressor Station	Compressor Station	CT-2566	Permit expired.
WY	Campbell	Rowdy Pipeline, LLC	Carson State Central Compressor Station	Compressor Station	MD-656A	No change in emissions.
WY	Campbell	Rowdy Pipeline, LLC	Church Central	Compressor Station	CT-2427A	No change in emissions.
WY	Campbell	Rowdy Pipeline, LLC	Clarkellen Central Compressor Station	Compressor Station	MD-825A	No change in emissions.
WY	Campbell	Rowdy Pipeline, LLC	Hanslip Central Compressor Station	Compressor Station	CT-2490A	No change in emissions.
WY	Campbell	Rowdy Pipeline, LLC	Hoe Creek Satellite #2 C.S.	Compressor Station	CT-2172A	Reduction at a PSD minor source.
WY	Campbell	Rowdy Pipeline, LLC	Horse Creek Compressor Station	Compressor Station	CT-2462A	Reduction at a PSD minor source.
WY	Campbell	Rowdy Pipeline, LLC	Kline Draw Central Compressor Station	Compressor Station	CT-2235A	Reduction at a PSD minor source.
WY	Campbell	Rowdy Pipeline, LLC	LX Bar Compressor Station	Compressor Station	CT-2240A	No change in emissions.
WY	Campbell	Rowdy Pipeline, LLC	Middle Prong Central Compressor Station	Compressor Station	MD-835	No change in emissions.
WY	Campbell	Rowdy Pipeline, LLC	Riverbend Central Compressor Station	Compressor Station	CT-2569A	No change in emissions.
WY	Campbell	Rowdy Pipeline, LLC	Riverbend Satellite 3 Compressor Station	Compressor Station	CT-2572A	No change in emissions.
WY	Campbell	Rowdy Pipeline, LLC	Spotted Horse Central C. S.	Compressor Station	CT-2173A	Reduction at a PSD minor source.
WY	Campbell	Rowdy Pipeline, LLC	Store Draw	Compressor Station	MD-753A	No change in emissions.
WY	Campbell	Rowdy Pipeline, LLC	West Kitty Compressor Station	Compressor Station	CT-2074A	Reduction at a PSD minor source.
WY	Campbell	Rowdy Pipeline, LLC	Wright Compressor Station	Compressor Station	CT-2381A	No change in emissions.
WY	Sweetwater	SF Phosphates Limited	Phosphate Fertilizer Plant	Miscellaneous	MD-384A	No change in emissions.
WY	Sublette	Shell Rocky Mountain Production	Antelope #11-4	Production Site	CT-2980	Production well with emissions < 3 tpy.
WY	Sheridan	Shell Rocky Mountain Production	Antelope 1-9 & Antelope 2-9	Production Site	MD-836	Production well with emissions < 3 tpy.

Table C.8
Wyoming State-Permitted Source Inventory - WDEQ-AQD Permitted Sources - Table of Excluded Sources

State	County	Company	Facility	Facility Class	Permit Number	Reason for Exclusion[1]
WY	Sublette	Shell Rocky Mountain Production	Falcon 1-36	Production Site	MD-864	Production well with emissions < 3 tpy.
WY	Sublette	Shell Rocky Mountain Production	Falcon 8-36	Production Site	MD-864	Production well with emissions < 3 tpy.
WY	Sublette	Shell Rocky Mountain Production	Jensen 10-11D	Dehydration	CT-3196	Increase < 1 tpy.
WY	Sublette	Shell Rocky Mountain Production	Jensen 1A	Production Site	CT-3123	Production well with emissions < 3 tpy.
WY	Sublette	Shell Rocky Mountain Production	Mesa 13-26-32-109	Production Site	CT-3285	Production well with emissions < 3 tpy.
WY	Sublette	Shell Rocky Mountain Production	Mesa 6-28D-32-109 & Mesa 11-28-32-109	Production Site	CT-3134	Production well with emissions < 3 tpy.
WY	Sublette	Shell Rocky Mountain Production	Mesa 7-27-32-109	Production Site	CT-3132	Production well with emissions < 3 tpy.
WY	Sublette	Shell Rocky Mountain Production	New Fork 7-3-31-109	Production Site	CT-3141	Production well with emissions < 3 tpy.
WY	Sublette	Shell Rocky Mountain Production	New Fork 7-3-31-109	Production Site	CT-3141 (Corrected)	Production well with emissions < 3 tpy.
WY	Sublette	Shell Rocky Mountain Production	Rainbow 11-31-30-107	Production Site	CT-3231	Production well with emissions < 3 tpy.
WY	Sublette	Shell Rocky Mountain Production	Rainbow 7-31	Production Site	CT-3124	Production well with emissions < 3 tpy.
WY	Sublette	Shell Rocky Mountain Production	Riverside 2-14-31-109	Production Site	CT-3284	Production well with emissions < 3 tpy.
WY	Natrona	Sinclair Oil Company	Casper Refinery	Petroleum Refinery	MD-697	No change in emissions.
WY	Natrona	Sinclair Oil Company	Casper Station	Storage Tank Battery	MD-700	No inventoried pollutants.
WY	Carbon	Sinclair Oil Company	Sinclair Refinery	Petroleum Refinery	MD-701	No change in emissions.
WY	Sheridan	Taylor Quarry	Quarry	Crushing and Screening	MD-775	Increase < 1 tpy.
WY	Campbell	Thunder Basin Coal Company LLC	Black Thunder Mine	Surface Coal Mine	MD-877	Administrative change.
WY	Converse	Thunder Creek Gas Services	Buckshot Treating Facility	Compressor Station	MD-855	Reduction at a PSD minor source.
WY	Campbell	Thunder Creek Gas Services	FB-1233 Compressor Station	Compressor Station	CT-2515 (Corrected)	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	FB-3525 Compressor Station	Compressor Station	CT-2553 (Corrected)	Included under FB-3525
WY	Johnson	Thunder Creek Gas Services	Juniper Draw Compressor Station	Compressor Station	CT-2507A	Reduction at a PSD minor source.
WY	Campbell	Thunder Creek Gas Services	MTG Compressor Station	Compressor Station	MD-773A	Administrative change.
WY	Campbell	Thunder Creek Gas Services	MTG Compressor Station	Compressor Station	MD-618	Reduction at a PSD minor source.
WY	Campbell	Thunder Creek Gas Services	North Kitty Booster Station	Compressor Station	MD-858	Reduction at a PSD minor source.
WY	Campbell	Thunder Creek Gas Services	SC-0113	Compressor Station	MD-481A2	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	SC-0513	Compressor Station	MD-667	DEQ could not find this permit.
WY	Campbell	Thunder Creek Gas Services	SC-0532 Compressor Station	Compressor Station	CT-2546A	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	SC-0943 Compressor Station	Compressor Station	CT-2550A	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	SC-1003	Compressor Station	CT-1844A	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	SC-1115 Compressor Station	Compressor Station	CT-2559A	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	SC-1244 Compressor Station	Compressor Station	CT-2558A	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	SC-1632 Compressor Station	Compressor Station	CT-2548A	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	SC-1643 Compressor Station	Compressor Station	CT-2557A	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	SC-2325 Compressor Station	Compressor Station	CT-2551A	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	SC-2414	Compressor Station	MD-583A	Administrative change.
WY	Campbell	Thunder Creek Gas Services	SC-2414	Compressor Station	MD-666	DEQ could not find this permit.
WY	Campbell	Thunder Creek Gas Services	SC-2414	Compressor Station	MD-583	DEQ could not find this permit.
WY	Campbell	Thunder Creek Gas Services	SC-2414	Compressor Station	MD-666A	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	SC-2613	Compressor Station	CT-1945A2	Reduction at a PSD minor source.
WY	Campbell	Thunder Creek Gas Services	SC-2932 Compressor Station	Compressor Station	CT-2543A	No change in emissions.
WY	Sheridan	Thunder Creek Gas Services	SC-2956	Compressor Station	CT-2392A	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	SC-3053 Compressor Station	Compressor Station	CT-2544A	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	SC-3225 Compressor Station	Compressor Station	CT-2552A	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	SC-3543 Compressor Station	Compressor Station	CT-2654A	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	South Kitty (Kitty South #2)	Compressor Station	MD-581A	No change in emissions.
WY	Campbell	Thunder Creek Gas Services	South Kitty (Kitty South #2)	Compressor Station	MD-859	Reduction at a PSD minor source.
WY	Campbell	Thunder Creek Gas Services	Spotted Horse (FB-2055)	Compressor Station	MD-639	DEQ could not find this permit.
WY	Sweetwater	Tom Brown Incorporated	Bravo Unit 02 Central Tank Battery	Storage Tank Battery	MD-688	Increase < 1 tpy.
WY	Fremont	Tom Brown Incorporated	Frenchie Draw Satellite Station	Compressor Station	CT-2058A	Permit expired.
WY	Sweetwater	Tom Brown Incorporated	Great Divide #14	Production Site	CT-2922	Production well with emissions < 3 tpy.
WY	Sweetwater	Tom Brown Incorporated	Haven Unit #10-4	Production Site	CT-2940	Production well with emissions < 3 tpy.
WY	Sweetwater	Tom Brown Incorporated	Hay Reservior Unit #76	Production Site	CT-2661	Production well with emissions < 3 tpy.
WY	Sweetwater	Tom Brown Incorporated	Hay Reservoir 78	Production Site	CT-2998	Production well with emissions < 3 tpy.
WY	Sweetwater	Tom Brown Incorporated	Hay Reservoir Unit #77	Production Site	CT-2660	Production well with emissions < 3 tpy.
WY	Natrona	Tom Brown Incorporated	West Cave Gulch 4-36	Compressor Station	CT-2900	Increase < 1 tpy.
WY	Fremont	Tom Brown Incorporated	West Pavillion Compressor Station	Compressor Station	MD-680	Increase < 1 tpy.
WY	Campbell	Triton Coal Company LLC	Buckskin Mine	Surface Coal Mine	MD-598	Included under MD-707.
WY	Campbell	Triton Coal Company LLC	Buckskin Mine	Surface Coal Mine	MD-707	Reduction at a PSD minor source.
WY	Campbell	Triton Coal Company LLC	North Rochelle Mine	Surface Coal Mine	MD-790	Administrative change.
WY	Campbell	Triton Coal Company LLC	North Rochelle Mine	Surface Coal Mine	MD-790A	Administrative change.

Table C.8
Wyoming State-Permitted Source Inventory - WDEQ-AQD Permitted Sources - Table of Excluded Sources

State	County	Company	Facility	Facility Class	Permit Number	Reason for Exclusion[1]
WY	Sublette	Ultra Resources Incorporated	Boulder 5-19	Production Site	CT-3175	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	Boulder 7-19	Production Site	CT-3304	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	Mesa 9-34	Production Site	CT-3288	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	Riverside 1-4	Production Site	CT-3064	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	Riverside 2-2	Production Site	CT-3046	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	Riverside 4-10	Production Site	CT-3268	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	Stud Horse Butte 10-21	Production Site	CT-2720	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	Stud Horse Butte 12-23	Production Site	CT-2698	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	Stud Horse Butte 16-21	Production Site	CT-2719	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	Stud Horse Butte 2-24	Production Site	CT-3176	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	Stud Horse Butte 6-24	Production Site	CT-2721	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	Stud Horse Butte 8-24	Production Site	CT-3173	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	War Bonnet 6-23	Production Site	CT-3162	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	Warbonnet 4-25	Production Site	CT-3181	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	Warbonnet 4-26	Production Site	CT-3169	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	Warbonnet 5-23	Production Site	CT-3178	Production well with emissions < 3 tpy.
WY	Sublette	Ultra Resources Incorporated	Warbonnet 7-4	Production Site	CT-3174	Production well with emissions < 3 tpy.
WY	Uinta	Union Tank Car Company	Evanston Facility	Miscellaneous	MD-881	No change in emissions.
WY	Campbell	Western Gas Resources	Arthur Compressor Station	Compressor Station	CT-2403A	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Belle Creek Compressor Station	Compressor Station	CT-1898 corrected	Administrative change.
WY	Campbell	Western Gas Resources	Black Thunder Compressor Station	Compressor Station	MD-492A3	No change in emissions.
WY	Campbell	Western Gas Resources	Black Thunder Compressor Station	Compressor Station	MD-492A2	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Black Thunder Compressor Station	Compressor Station	MD-492A	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Black Thunder Compressor Station	Compressor Station	MD-862	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Bud Station	Compressor Station	MD-843	Increase < 1 tpy.
WY	Campbell	Western Gas Resources	Bud Station	Compressor Station	MD-577	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Butte Compressor Station	Compressor Station	CT-2461A	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Charles/Henry C.S. (formerly Charles)	Compressor Station	CT-2371A	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Comet Station	Compressor Station	MD-571	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Comet Station	Compressor Station	MD-832	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Dopplebach Compressor Station	Compressor Station	MD-468 EXPIRED	Permit expired.
WY	Campbell	Western Gas Resources	Dopplebach Compressor Station	Compressor Station	MD-402A2	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Echeta/Croton	Compressor Station	CT-2868A	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Hilight Gas Plant	Sweet Gas Plant	MD-664	No change in emissions.
WY	Campbell	Western Gas Resources	Horse Creek/Gas Draw C.S.	Compressor Station	MD-587	Permit withdrawn.
WY	Campbell	Western Gas Resources	Kestrel Station	Compressor Station	MD-574	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Lane Station	Compressor Station	MD-572	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Little Thunder Compressor Station	Compressor Station	MD-691 (corrected)	Included in MD-691.
WY	Campbell	Western Gas Resources	Malibu/Surfer Compressor Station	Compressor Station	CT-2110A	No change in emissions.
WY	Campbell	Western Gas Resources	Malibu/Surfer Compressor Station	Compressor Station	CT-2110A2	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Meteor Station	Compressor Station	MD-568	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Meteor Station	Compressor Station	MD-831	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Metropolis Compressor Station	Compressor Station	CT-2468A	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Montgomery/Tabatha C.S.	Compressor Station	CT-2131A	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Moon Station	Compressor Station	MD-569	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Porcupine Compressor Station	Compressor Station	MD-353A	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Porter Station	Compressor Station	MD-564 Expired	Permit expired.
WY	Campbell	Western Gas Resources	Pronghorn/Oryx	Compressor Station	CT-2700A	No change in emissions.
WY	Johnson	Western Gas Resources	Pumpkin/Bruno	Compressor Station	CT-2472A	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Rainbow Pod Screw Compressor	Compressor Station	MD-599	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Rocky Station	Compressor Station	MD-578	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Sioux/Jr. Reno Compressor Station	Compressor Station	CT-2618A	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Spring Creek C.S. (formerly PRFC #15)	Compressor Station	MD-776	Increase < 1 tpy.
WY	Campbell	Western Gas Resources	Spring Creek C.S. (formerly PRFC #15)	Compressor Station	CT-2265A	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Spring Creek C.S. (formerly PRFC #15)	Compressor Station	CT-2265A2	Reduction at a PSD minor source.
WY	Carbon	Western Gas Resources	Standard Draw 16-30-18-93	Production Site	CT-3069	Production well with emissions < 3 tpy.
WY	Campbell	Western Gas Resources	Star Station	Compressor Station	MD-570	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Star Station	Compressor Station	MD-830	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Stout Compressor Station	Compressor Station	MD-551A	Reduction at a PSD minor source.
WY	Campbell	Western Gas Resources	Werner Compressor Station	Compressor Station	MD-596	No change in emissions.

Table C.8
Wyoming State-Permitted Source Inventory - WDEQ-AQD Permitted Sources - Table of Excluded Sources

State	County	Company	Facility	Facility Class	Permit Number	Reason for Exclusion[1]
WY	Campbell	Western Gas Resources	West Fork Compressor Station	Compressor Station	CT-2682A	No change in emissions.
WY	Johnson	Western Gas Resources	Whiskey Draw/Jack Daniels C.S.	Compressor Station	CT-3266A	No change in emissions.
WY	Sweetwater	Western Gas Resources	Wild Rose 9-18	Dehydration	CT-3291	Increase < 1 tpy.
WY	Lincoln	Westport Oil and Gas Company, L.P.	Champlin 288 C-4	Production Site	CT-2401	Production well with emissions < 3 tpy.
WY	Lincoln	Westport Oil and Gas Company, L.P.	Grynberg Fed 1-31 #4	Production Site	CT-2394	Production well with emissions < 3 tpy.
WY	Lincoln	Westport Oil and Gas Company, L.P.	Rocky Crossing 1-24	Production Site	CT-3018	Production well with emissions < 3 tpy.
WY	Carbon	Westport Oil and Gas Company, L.P.	Standard Draw 4-6-18-93	Production Site	CT-3001	Production well with emissions < 3 tpy.
WY	Uinta	Wexpro Company	Church Buttes Gas Plant	Sweet Gas Plant	MD-866	Reduction at a PSD minor source.
WY	Sweetwater	Wexpro Company	Church Buttes Unit 40	Production Site	CT-2743	Production well with emissions < 3 tpy.
WY	Uinta	Wexpro Company	Church Buttes Unit Well 154	Production Site	CT-3013	Production well with emissions < 3 tpy.
WY	Sweetwater	Wexpro Company	Church Buttes Unit Well 155	Production Site	CT-3012	Production well with emissions < 3 tpy.
WY	Carbon	Wexpro Company	Creston Federal Well 22-4	Production Site	CT-2996	Production well with emissions < 3 tpy.
WY	Sublette	Wexpro Company	Mesa 14-16	Production Site	CT-3245	Production well with emissions < 3 tpy.
WY	Sublette	Wexpro Company	Mesa 15-16	Production Site	CT-3253	Production well with emissions < 3 tpy.
WY	Sublette	Wexpro Company	Mesa 9-16 pad	Production Site	CT-3220	Production well with emissions < 3 tpy.
WY	Sublette	Wexpro Company	Mesa Well 11-16	Production Site	CT-2901	Production well with emissions < 3 tpy.
WY	Sweetwater	Wexpro Company	Trail Unit Well 15	Production Site	CT-3258	Production well with emissions < 3 tpy.
WY	Carbon	Williams Field Services	Eight Mile Lake Station	Compressor Station	MD-810	No change in emissions.
WY	Carbon	Williams Field Services Company	Duck Lake 23-1	Dehydration	CT-3002	Increase < 1 tpy.
WY	Carbon	Williams Field Services Company	Echo Springs Federal 4-6	Dehydration	CT-2811	Increase < 1 tpy.
WY	Sweetwater	Williams Field Services Company	Janet Federal 10-34	Dehydration	CT-2812	Increase < 1 tpy.
WY	Sweetwater	Williams Field Services Company	Wamsutter 12-32	Dehydration	CT-2813	Increase < 1 tpy.
WY	Sublette	Williams Production Company	Riley Ridge 14-33F	Production Site	CT-3232	Production well with emissions < 3 tpy.
WY	Johnson	Woodrow Barstad	Barstad Pit	Crushing and Screening	CT-2699	Permit expired.
WY	Campbell	Wyodak Resources Development Corp.	Wyodak Mine	Surface Coal Mine	MD-593	No inventoried pollutants.
WY	Sweetwater	Wyoming Department of Transportation	MP 28 Pit	Crushing and Screening	CT-2410	Increase < 1 tpy.
WY	Natrona	Wyoming Medical Center	Hospital Waste Incinerator	Incineration	MD-645	Began operation in 1992.
WY	Weston	Wyoming Refining Company	Newcastle Refinery	Petroleum Refinery	MD-433A	Administrative change.
WY	Lincoln	XTO Energy Inc	Fontenelle West Compressor Station	Compressor Station	MD-852	No change in emissions.
WY	Sublette	Yates Petroleum Corporation	Blue Rim State #1	Compressor Station	CT-3114A	Reduction at a PSD minor source.
WY	Sublette	Yates Petroleum Corporation	Highway Federal 4-Y Production Facility	Production Site	CT-3061	Production well with emissions < 3 tpy.
WY	Sweetwater	Yates Petroleum Corporation	Steamboat Station Pipeline	Production Site	CT-2810	Production well with emissions < 3 tpy.
WY	Sweetwater	Yates Petroleum Corporation	Trestle Federal #1 Production Facility	Production Site	CT-2862	Production well with emissions < 3 tpy.

[1]Production wells excluded due to emissions < 3 tpy are assumed to be permitted with WOGCC and included in the permitted well inventory compiled throuhg WOGCC.

Table C.9 State-Permitted Source Inventory - WOGCC and Utah Oil and Gas, Division of Oil - Table of Wells by State Permitted after January 1, 2001

State	County	Total Number of Wells per County			Total NO_x Emissions per County	Percent of County within the Jonah Modeling Domain	Total NO_x Emissions Modeled per County
		Oil	Gas	CBM	(tpy)		(tpy)
Wyoming[1]	Big Horn	15	8	0	4.86	22.6%	1.10
	Carbon	1	36	0	2.19	48.7%	1.06
	Fremont	25	183	0	15.77	100.0%	15.77
	Hot Springs	12	1	2	3.73	100.0%	3.73
	Johnson	--	--	--	0.00	--	0.00
	Lincoln	0	15	0	0.67	100.0%	0.67
	Natrona	69	20	0	21.60	43.0%	9.27
	Park	70	16	0	21.72	30.4%	6.59
	Sublette	0	37	0	1.66	100.0%	1.66
	Sweetwater	47	139	75	23.72	100.0%	23.72
	Teton	--	--	--	0.00	--	0.00
	Uinta	4	19	7	2.37	100.0%	2.37
	Washakie	10	1	0	3.04	100.0%	3.04
	Total Emissions Modeled for Wyoming Counties						68.99
Utah[1]	Box Elder	--	--	--	0.00	--	0.00
	Cache	--	--	--	0.00	--	0.00
	Daggett[2]	0	1	0	0.05	100.0%	0.05
	Davis	--	--	--	0.00	--	0.00
	Duchesne	38	1	0	11.45	100.0%	11.45
	Morgan	--	--	--	0.00	--	0.00
	Rich	--	--	--	0.00	--	0.00
	Salt Lake	--	--	--	0.00	--	0.00
	Summit[2]	2	-4	0	0.42	100.0%	0.42
	Tooele	--	--	--	0.00	--	0.00
	Uintah	-26	442	0	12.09	100.0%	12.09
	Utah	--	--	--	0.00	--	0.00
	Wasatch	--	--	--	0.00	--	0.00
	Weber	--	--	--	0.00	--	0.00
	Total Emissions Modeled for Utah Counties						24.00
	Total Emissions Modeled for all counties						92.99

[1] Counties shown only if they are within Jonah modeling domain.

[2] Emissions from these counties added into Duchesne and Uintah County area sources for modeling.

Table C.10 Jonah Field Wells Permitted Post-Inventory End Date
Includes Emissions from 198 Wells

Pollutant	Production Emissions (tpy)	Traffic Emissions (tpy)	Total Emissions (tpy)
NO_x	9.0	1.7	10.6
SO_2	0.0	0.0	0.0
PM_{10}	1.7	45.3	47.0
$PM_{2.5}$	1.7	6.9	8.6

Note: Includes emissions from 198 wells not elsewhere accounted for in the WOGCC permitted well inventory.

Table C.11
Wyoming RFFA - Table of Included Sources

Company	Facility Name	Permit Number	County	Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	NO_x (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Ames Construction Company	CT-2469	CT-2469	Carbon	11.67	326.20	15.36	0.73	64.90	8.90	6.10	6.10
Ames Construction Company	CT-2470	CT-2470	Carbon	11.67	326.20	15.36	0.73	35.00	4.60	2.70	2.70
Ames Construction Company	Big Robbie Compressor Station	CT-3326	Sweetwater	9.05	509.81	12.50	0.76	17.70	0.00	0.00	0.00
Bill Barrett Corporation	Cave Gulch Gas Conditioning Plant	MD-874	Natrona	14.40	734.80	41.15	0.30	40.20	0.00	0.00	0.00
Bill Barrett Corporation	Cooper Reservoir Unit	CT-2467	Natrona	9.05	509.81	12.50	0.76	11.80	0.00	0.00	0.00
BP America Production Company	Anschutz Ranch East	MD-878	Uinta	15.00	422.00	10.00	0.31	(300.70)	0.00	0.00	0.00
Chevron USA, Inc.	Waltman #23	MD-668	Natrona	11.76	450.53	9.51	0.82	11.60	0.00	0.00	0.00
Duke Energy Field Services, LP	Black Butte 11-19-100 C. S.	CT-2605	Sweetwater	9.14	422.00	39.62	0.25	7.70	0.00	0.00	0.00
El Paso Field Services	Wamsutter Regulator	MD-741	Sweetwater	9.05	509.81	12.50	0.76	2.50	0.00	0.00	0.00
Enterprise NGL Pipelines, LLC	Granger Station	MD-811	Sweetwater	9.05	509.81	12.50	0.76	7.90	0.00	0.00	0.00
EOG Resources	North LaBarge Shallow Unit Tract 16	MD-696	Sublette	9.05	509.81	12.50	0.76	1.70	0.00	0.00	0.00
Evans Construction	Asphalt Plant	MD-813	Teton	14.11	350.03	10.03	0.91	6.90	7.30	3.70	3.70
Exxon Mobil Corporation	Shute Creek Treating Facility	MD-771	Lincoln	60.66	608.00	19.34	2.10	141.30	(1,566.00)	71.60	71.60
Hiland Partners, L.L.C.	Cottonwood Compressor Station	MD-886	Washakie	9.05	509.81	12.50	0.76	(0.20)	60.80	0.00	0.00
Infinity Oil & Gas of Wyoming	Riley Ridge Compressor Facility #1	MD-808	Sublette	7.32	797.20	45.20	0.30	20.60	0.00	0.00	0.00
Infinity Oil & Gas of Wyoming	Thompson Compressor Station	CT-3300	Sublette	7.32	403.00	33.90	0.20	12.60	0.00	0.00	0.00
Jonah Gas Gathering Company	Bird Canyon/County Line C. S.	MD-856	Sublette	12.19	691.48	23.11	0.10	2.40	0.00	0.00	0.00
Jonah Gas Gathering Company	Pioneer Dew Point Depression Plant	CT-3117	Lincoln	15.00	422.00	10.00	0.31	19.60	0.00	0.00	0.00
Kiewit Western Company	Portable Hot Mix Asphalt Plant	CT-3301	Teton	7.08	422.00	30.05	0.10	33.80	5.70	12.90	12.90
LeGrand Johnson	Asphalt Plant CT-1310	CT-1310A	Lincoln	14.11	350.03	10.03	0.91	0.00	39.00	0.00	0.00
LeGrand Johnson	Asphalt Plant CT-771	CT-771A	Sublette	14.11	350.03	10.03	0.91	0.00	29.60	0.00	0.00
Lincoln County Wyoming	Municipal Solid Waste Combustor	MD-809	Lincoln	9.10	422.00	8.19	0.97	(3.80)	2.30	5.70	5.70
Mountain Gas Resources	Hay Reservoir Central C. S.	CT-3101	Sweetwater	6.09	422.00	42.03	0.30	29.00	0.00	0.00	0.00
Mountain Gas Resources	Red Desert Gas Plant	MD-669	Sweetwater	7.62	422.00	28.95	0.40	16.00	0.00	0.00	0.00
Nearburg Producing Company	Fillmore 3-19	CT-2884	Carbon	11.76	450.53	9.51	0.82	6.40	0.00	0.00	0.00
Nearburg Producing Company	Fillmore 3-29	CT-3191	Carbon	11.76	450.53	9.51	0.82	3.70	0.00	0.00	0.00
Nearburg Producing Company	Fillmore Federal 2-19	CT-3190	Carbon	11.76	450.53	9.51	0.82	3.30	0.00	0.00	0.00
Nearburg Producing Company	Fillmore Federal 2-20	CT-3265	Carbon	11.76	450.53	9.51	0.82	3.40	0.00	0.00	0.00
Nearburg Producing Company	Fillmore Federal 4-19	CT-3263	Carbon	11.76	450.53	9.51	0.82	4.80	0.00	0.00	0.00
Nearburg Producing Company	Fillmore Federal 4-20	CT-3264	Carbon	11.76	450.53	9.51	0.82	3.40	0.00	0.00	0.00
NERD Gas Company, LLC	Mesa Road Mine	CT-3274	Sublette	11.67	326.20	15.36	0.73	0.00	0.00	4.80	4.80
Northwest Pipeline Company	Kemmerer	MD-702	Lincoln	9.14	422.00	31.21	1.11	14.90	0.40	0.90	0.90
Pacificorp	Jim Bridger Plant	MD-883	Sweetwater	60.21	431.59	16.67	2.74	0.00	0.00	(59.50)	(29.75)
Pacificorp	Naughton Plant	MD-867	Lincoln	60.21	431.59	16.67	2.74	0.00	0.00	(1,338.10)	(669.05)
Pittsburg and Midway Coal Co.	Kemmerer Mine	MD-845	Lincoln	1.00	294.00	0.10	0.10	0.00	0.00	3.70	1.11
Questar Exploration Production Co.	Stewart Pt Wells 9-29 &16-29 Pad	CT-3321	Sublette	11.76	450.53	9.51	0.82	3.60	0.00	0.00	0.00
Questar Gas Management Co.	JL 84 Compressor Station	CT-2501	Lincoln	9.05	509.81	12.50	0.76	12.50	0.00	0.00	0.00
Questar Gas Management Co.	Mesa 1 Compressor Station	CT-2464	Sublette	15.24	711.00	53.95	0.46	62.90	0.00	0.00	0.00
Questar Gas Management Co.	Mesa 2 Compressor Station	CT-2465	Sublette	15.24	711.00	53.95	0.46	31.50	0.00	0.00	0.00
RST Excavation	Temporary Jackson Gravel Operation	MD-647	Teton	11.67	326.20	15.36	0.73	9.20	0.40	0.20	0.20
Saga Petroleum LLC	YU Bench Compressor Station	MD-651	Park	7.62	849.81	0.14	3.04	5.40	0.00	0.00	0.00
Saurus Resources Incorporated	MH-1 Compressor Station	MD-660	Sweetwater	9.05	509.81	12.50	0.76	20.00	0.00	0.00	0.00
Shell Rocky Mountain Production	Rainbow 11-32-30-107D	CT-3269	Sublette	11.76	450.53	9.51	0.82	3.20	0.00	0.00	0.00
WDOT	Rabbit Pit	CT-3036	Hot Springs	11.67	326.20	15.36	0.73	0.00	0.00	2.50	2.50
Yates Petroleum Corporation	Blue Rim State #1	CT-3114	Sublette	9.05	509.81	12.50	0.76	2.40	0.00	0.00	0.00
Questar	Gobblers Knob C.S.		Sublette					67.60	0.00	0.00	0.00
Duke Energy Field Services, LP	Paradise		Sublette					49.60	0.00	0.00	0.00
							Total Wyoming RFFA Source Emissions	486.30	(1,407.00)	(1,282.80)	(586.59)

[1] Analyzed as part of Jonah Infill Project.

Table C.12 RFD - Table of Sources
Includes NEPA Projects Through June 2003.

EA/EIS Listed by Field Office	Jonah Infill Include/Exclude	Total NO_x Remaining per Project Area (tpy)	Total SO_2 Remaining per Project Area (tpy)	Total PM_{10} Remaining per Project Area (tpy)	Total $PM_{2.5}$ Remaining per Project Area (tpy)
Bridger-Teton National Forest					
Cliff Creek - MA 22	Include.	0.45			
Cottonwood Creek - MA 25	Include.	0.45			
Horse Creek - MA 24	Include.	0.45			
LaBarge Creek - MA 12	Include.	0.45			
Little Greys River - MA 31	Include.	0.45			
Lower Greys River - MA 32	Include.	0.45			
Piney Creeks - MA 26	Include.	0.45			
Upper Hoback - MA 23	Include.	0.45			
Willow Creek - MA 49	Include.	0.45			
Buffalo Field Office					
Drainage POD-Torch E&P Corp.	Included as part of PRB.	--			
Other POD projects	Included as part of PRB.	--			
Powder River Basin	Include.	465.82			
Burnt Hollow Management Plan EA	Exclude - RMP Revision.	--			
Casper Field Office					
Cave Gulch	Include.	61.00			
Cooper Reservoir	Include.	2.31			
Cody Field Office					
See Worland Office.					
Kemmerer Field Office					
Cutthroat Gas Processing Plant	Include.	1.00			
Eighth Granger Gas Plant Expansion	Include.	1.60			
Ham's Fork Pipeline	Include.	18.25			
Hickey Mountain-Table Mountain	Include.	14.10			
Horse Trap	Include.	19.85			
Moxa Arch	Include.	235.92			
Pioneer Gas Plant	Include.	9.80		0.02	0.02
Riley Ridge	Include.	0.68			
Road Hollow Gas Plant	Include.	83.90	54.80	1.59	1.59
Lander Field Office					
Wind River	Include.	486.06		0.12	0.12

Table C.12 RFD - Table of Sources
Includes NEPA Projects Through June 2003.

EA/EIS Listed by Field Office	Jonah Infill Include/Exclude	Total NO_x Remaining per Project Area (tpy)	Total SO_2 Remaining per Project Area (tpy)	Total PM_{10} Remaining per Project Area (tpy)	Total $PM_{2.5}$ Remaining per Project Area (tpy)
Newcastle Field Office					
CBM POD	Included as part of PRB.	--			
Thundercloud approval CBM	Included as part of PRB.	--			
Pinedale Field Office					
Yellow Point, road, Pipeline- MOC	Included in Jonah or Jonah II.	--			
Tank Battery #5 - Enron	Included Big Piney/LaBarge CAP.	--			
Big Piney-LaBarge	Include.	2.36			
Williams - Compressor Station and Pipeline	Include.	17.19			
Pinedale Anticline Project	Include.	16.01			
Soda Unit	Include.	0.54			
South Piney	Include.	736.70	1.31	82.29	80.20
Burley	Include	5.10			
Castle Creek	Exclude - Not given by FO as project area to include in RFD analysis.	--			
Merna Pipeline	Exclude - developed.	--			
Jonah II EIS	Exclude - developed.	--			
Jonah Infill	Exclude.	--			
Fogarty Creek Unit 2524 Pipeline Production Facilities	Exclude - Carol Kruse 9/16/03.	--			
Hoback Basin	Exclude - Carol Kruse 9/16/03.	--			
Moccasin Basin	Exclude - Carol Kruse 9/16/03.	--			
Union Pass	Exclude - Carol Kruse 9/16/03.	--			
Upper Green River	Exclude - Carol Kruse 9/16/03.	--			
Rawlins Field Office					
Continental Divide/Wamsutter II	Include.	132.18			
Creston-Blue Gap	Include.	4.49			
Desolation Flats	Include.	295.57			
Mulligan Draw	Include.	1.04			
Sierra Madre	Include.	6.90			
South Baggs	Include.	56.06			
Atlantic Rim EIS	Exclude - no emissions quantified.	--			
Seminoe Road	Exclude - no emissions quantified.	--			
Dripping Rock/Cedar Breaks	Exclude - John Spehar Rawlins FO.	--			
Hay Reservoir	Exclude - developed.	--			
Wind Dancer Natural Gas Development EA	Exclude - no emissions quantified.	--			

Table C.12 RFD - Table of Sources
Includes NEPA Projects Through June 2003.

EA/EIS Listed by Field Office	Jonah Infill Include/Exclude	Total NO_x Remaining per Project Area (tpy)	Total SO_2 Remaining per Project Area (tpy)	Total PM_{10} Remaining per Project Area (tpy)	Total $PM_{2.5}$ Remaining per Project Area (tpy)
Hanna Draw CBNG Pilot Project EA and Development EIS	Exclude - no emissions quantified.	--			
Scotty Lake CBNG Pilot Project EA	Exclude - no emissions quantified.	--			
Rock Springs Field Office					
Bird Canyon	Exclude - included in Bird Opal Loop Pipeline.	--			
BTA Bravo	Include.	47.68			
Burlington Little Monument	Include.	13.57			
Copper Ridge Shallow Gas Proj.	Include.	245.78			
Fontenelle Natural Gas Infill Drilling	Include.	54.40			
Jack Morrow Hills	Include.	41.28			
Lower Bush Creek CBM	Include.	0.45			
Stage Coach	Include.	82.66			
Vermillion Basin	Include.	2.18			
Bitter Creek Shallow Gas Development Project	Exclude- no emissions quantified.	--			
Pacific Rim Shallow Gas Project	Exclude- no emissions quantified.	--			
East LaBarge	Exclude - Renee Dana 9/16/03.	--			
Essex Mountain	Exclude - Renee Dana 9/16/03.	--			
Monell CO2 Pipeline	Exclude - pipeline construction only.	--			
Bird-Opal Loop Pipeline	Exclude - developed.	--			
Opal-Loop Pipeline	Exclude - developed.	--			
Worland Field Office					
No projects or project areas within FO district.					
Utah					
Salt Creek	Exclude - Outside RFD inventory area.	--			
	Total Emissions Remaining	**3,166.5**	**56.1**	**84.0**	**81.9**

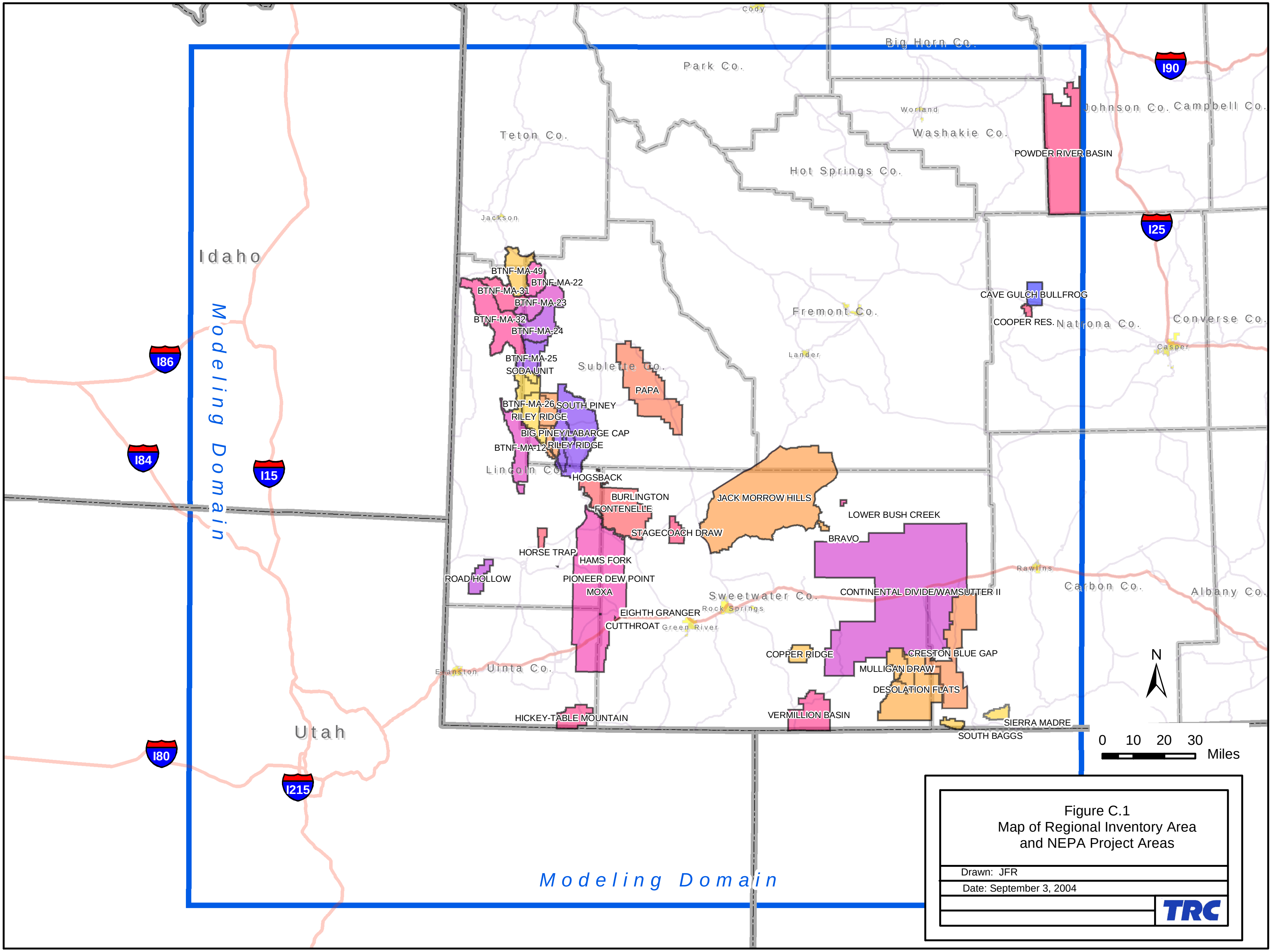


Figure C.1 Regional Inventory Area with NEPA Project Areas.

APPENDIX D:

REGIONAL COMPRESSION
EXISTING AND PROPOSED

Table D.1 Jonah Regional Compressor Stations
Modeled Stack Data

			Stack Parameters					Permitted / Projected				Modeled		
Facility	**Horsepower**	**Stack ID**	Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	**Stack Parameter Source**	**NOx** (lb/hr)	**CO** (lb/hr)	**Formaldehyde** (lb/hr)	**Emissions Source**	**NO_x** (g/s)	**CO** (g/s)	**Formaldehyde** (g/s)
Existing Permitted Sources														
Bird Canyon C.S.	2003	BC1	12.19	637.04	42.66	0.50	Updated Stack Data Provided by Duke 7/03.	3.1	0.9	0.3	AP-0189	0.391	0.113	0.038
	2003	BC2	12.19	637.04	42.66	0.50	Updated Stack Data Provided by Duke 7/03.	3.1	0.9	0.3	Permitted	0.391	0.113	0.038
	2935	BC3	12.19	726.48	29.75	0.70	Updated Stack Data Provided by Duke 7/03.	4.5	1.9	0.5	3/20/2003	0.567	0.239	0.063
	2935	BC4	12.19	726.48	29.75	0.70	Updated Stack Data Provided by Duke 7/03.	4.5	1.9	0.5		0.567	0.239	0.063
	2935	BC5	12.19	726.48	29.75	0.70	Updated Stack Data Provided by Duke 7/03.	4.5	1.9	0.5		0.567	0.239	0.063
	2935	BC6	12.19	726.48	29.75	0.70	Updated Stack Data Provided by Duke 7/03.	4.5	1.9	0.5		0.567	0.239	0.063
	600	BG1	12.19	691.48	23.11	0.10	Updated Stack Data Provided by Duke 7/03.	1.3	1.3	0.1		0.164	0.164	0.008
	600	BG2	12.19	691.48	23.11	0.10	Updated Stack Data Provided by Duke 7/03.	1.3	1.3	0.1		0.164	0.164	0.010
	--	BF1	10.67	1144.26	1.00	1.30	Updated Stack Data Provided by Duke 7/03.	0.6	2.8	0.0		0.076	0.353	0.000
Jonah C.S.	1663	J1	7.62	904.00	28.66	0.41	CT-2280	3.7	7.3	0.2	CT-2280	0.466	0.920	0.025
	1663	J2	7.62	904.00	28.66	0.41	CT-2280	3.7	7.3	0.2		0.466	0.920	0.025
	1663	J3	7.62	904.00	28.66	0.41	CT-2280	3.7	7.3	0.2		0.466	0.920	0.025
	85	J4	5.00	1061.00	45.72	0.10	CT-2280	0.4	0.4	0.0		0.050	0.050	0.003
	85	J5	5.00	1061.00	45.72	0.10	CT-2280	0.4	0.4	0.0		0.050	0.050	0.003
	63	J6	4.00	1061.00	45.72	0.10	CT-2280	0.3	0.3	0.0		0.038	0.038	0.001
	63	J7	4.00	1061.00	45.72	0.10	CT-2280	0.3	0.3	0.0		0.038	0.038	0.001
Luman C.S.	3668	LC1	13.70	726.48	28.65	0.71	Updated Stack Data Provided by Duke 12/03.	5.7	2.0	0.7	MD-921	0.718	0.252	0.082
	3668	LC2	13.70	726.48	28.65	0.71	Updated Stack Data Provided by Duke 12/03.	5.7	2.0	0.7		0.718	0.252	0.082
	3668	LC3	13.70	726.48	28.65	0.71	Updated Stack Data Provided by Duke 12/03.	5.7	2.0	0.7		0.718	0.252	0.082
	3668	LC4	13.70	726.48	28.65	0.71	Updated Stack Data Provided by Duke 12/03.	5.7	2.0	0.7		0.718	0.252	0.082
	215	LG1	10.00	830.93	31.90	0.13	Updated Stack Data Provided by Duke 12/03.	0.9	0.9	0.0		0.113	0.113	0.004
	215	LG2	10.00	830.93	31.90	0.13	Updated Stack Data Provided by Duke 12/03.	0.5	0.9	0.0		0.063	0.113	0.004
	245	LVRU	5.12	832.00	30.65	0.20	Updated Stack Data Provided by Duke 12/03.	0.5	0.5	0.0		0.068	0.063	0.004
	--	LH1	4.72	561.00	2.11	0.61	Updated Stack Data Provided by Duke 12/03.	0.2	0.2	0.0		0.025	0.025	0.000
	--	LCU	10.97	1273.00	1.00	2.00	Updated Stack Data Provided by Duke 12/03.	0.3	1.9	0.0		0.038	0.239	0.000
	flare	LEF1	11.00	1273.00	1.00	2.31	Updated Stack Data Provided by Duke 12/03.	0.0	0.2	0.0		0.003	0.025	0.000
Falcon C.S.	2935	FC1	9.75	725.37	26.39	0.70	Updated Stack Data Provided by Duke 7/03.	4.5	1.9	0.5	MD-815	0.567	0.239	0.063
	2935	FC2	9.75	725.37	26.39	0.70	Updated Stack Data Provided by Duke 7/03.	4.5	1.9	0.5		0.567	0.239	0.063
	2935	FC3	9.75	725.37	26.39	0.70	Updated Stack Data Provided by Duke 7/03.	4.5	1.9	0.5		0.567	0.239	0.063
	2935	FC4	9.75	725.37	26.39	0.70	Updated Stack Data Provided by Duke 7/03.	4.5	1.9	0.5		0.567	0.239	0.063
	600	FG1	9.75	737.04	0.01	0.20	Updated Stack Data Provided by Duke 7/03.	0.8	0.4	0.1		0.101	0.050	0.013
	930	FG4	4.57	674.00	30.78	0.20	MD-815	2.1	4.1	0.1		0.265	0.517	0.013
	245	VRU	6.10	932.00	32.60	0.15	MD-815	0.5	1.1	0.1		0.063	0.139	0.013
	--	HTR	4.42	480.00	1.43	0.61	MD-815	0.2	0.2	0.0		0.025	0.025	0.000
	--	FF1	10.67	637.04	4.43	1.37	Updated Stack Data Provided by Duke 7/03.	0.3	1.4	0.1		0.038	0.176	0.013
Mesa 1 (Gobblers Knob)	2790	QM1_1	15.24	711.00	53.95	0.46	CT-2464	4.3	1.9	0.4	CT-2464	0.542	0.239	0.050
	2790	QM1_2	15.24	711.00	53.95	0.46	CT-2464	4.3	1.9	0.4		0.542	0.239	0.050
	3720	QM1_3	15.24	714.00	72.54	0.46	CT-2464	5.7	2.5	0.6		0.718	0.315	0.076
Mesa 2 (Gobblers Knob)	1860	QM2_1	15.24	718.00	41.15	0.46	CT-2465	2.9	1.2	0.2	CT-2465	0.365	0.151	0.025
	2790	QM2_2	15.24	711.00	53.95	0.46	CT-2465	4.3	1.8	0.4		0.542	0.227	0.050
Questar Pinedale (Gobblers Knob)	1860	QP1	15.24	711.00	53.95	0.46	CT-2466	2.9	2.4	0.4	CT-2466	0.365	0.302	0.050
	1860	QP2	15.24	711.00	53.95	0.46	CT-2466	2.9	2.4	0.4		0.365	0.302	0.050
	3720	QP3	15.24	714.00	72.54	0.46	CT-2466	5.7	2.5	0.5		0.718	0.315	0.063
	3720	QP4	15.24	714.00	72.54	0.46	CT-2466	5.7	2.5	0.5		0.718	0.315	0.063

Table D.1 Jonah Regional Compressor Stations
Modeled Stack Data

			Stack Parameters					Permitted / Projected				Modeled		
Facility	**Horsepower**	**Stack ID**	Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	**Stack Parameter Source**	**NOx** (lb/hr)	**CO** (lb/hr)	**Formaldehyde** (lb/hr)	**Emissions Source**	**NO_x** (g/s)	**CO** (g/s)	**Formaldehyde** (g/s)
Paradise C.S.	2935	PC1	7.92	725.37	26.39	0.71	Updated Stack Data Provided by Duke 7/03.	4.5	1.9	0.5	CT-2250	0.567	0.239	0.063
	2935	PC2	7.92	725.37	26.39	0.71	Updated Stack Data Provided by Duke 7/03.	4.5	1.9	0.5		0.567	0.239	0.063
	2935	PC3	7.92	725.37	26.39	0.71	Updated Stack Data Provided by Duke 7/03.	4.5	1.9	0.5		0.567	0.239	0.063
	2935	PC4	7.92	725.37	26.39	0.71	Updated Stack Data Provided by Duke 7/03.	4.5	1.9	0.5		0.567	0.239	0.063
	600	PG1	4.57	737.04	0.01	0.25	Updated Stack Data Provided by Duke 7/03.	0.8	0.4	0.1		0.101	0.050	0.006
	--	PF1	10.67	637.04	4.43	1.37	Updated Stack Data Provided by Duke 7/03.	0.3	1.4	0.1		0.038	0.176	0.013
Yellowpoint C.S.	1121	YC1	7.32	745.93	25.33	0.30	MD-412	2.47	7.41	0.16	MD-412 and Formaldehyde emissions calculated by TRC	0.311	0.934	0.020
Fontenelle C.S.		F1	10.36	819.80	50.60	0.34	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.610	0.610	0.020
		F2	10.36	819.80	50.60	0.34	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.610	0.610	0.020
		F3	10.36	688.70	55.17	0.46	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.610	0.610	0.020
		F4	10.36	844.80	29.90	0.31	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.380	0.380	0.020
		F5	10.36	844.80	29.90	0.31	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.380	0.380	0.020
		F6	13.72	877.04	42.06	0.31	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.305	0.305	0.020
		F7	13.72	877.04	42.06	0.31	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.305	0.305	0.020
		F8	13.72	877.04	42.06	0.31	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.305	0.305	0.070
		F9	13.72	877.04	42.06	0.31	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.305	0.305	0.070
Cow Hollow C.S.		CH1	6.10	658.71	37.61	0.31	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.610	0.610	0.050
		CH2	6.10	658.71	37.61	0.31	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.610	0.610	0.050
North Labarge C.S.		NL1	6.71	633.15	34.31	0.31	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.450	0.450	0.050
		NL2	6.71	633.15	34.31	0.31	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.450	0.450	0.050
		NL3	6.10	449.82	0.30	0.46	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.010	0.010	0.000
		NL4	6.10	449.82	0.30	0.46	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.010	0.010	0.000
Hogsback C.S.		H1	6.71	698.71	48.13	0.31	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.550	0.550	0.060
		H2									Jonah Modeling Completed by TRC in 2001	0.550	0.550	0.060
Labarge C.S.		WFS_L1	8.93	735.93	20.85	2.30	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	5.730	5.730	0.000
Birch Creek C.S.		BiC1	6.10	630.37	39.01	0.36	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.830	0.830	0.080
		BiC2	6.10	630.37	39.01	0.36	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.830	0.830	0.080
Cross Timbers Fontonelle C.S.		CT_F1	6.78	497.04	28.08	0.34	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.210	0.210	0.010
		CT_F2	6.65	513.71	33.88	0.34	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.420	0.420	0.020
		CT_F3	6.81	513.71	33.88	0.34	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.420	0.420	0.020
		CT_F4	7.11	541.48	34.29	0.43	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.250	0.250	0.030
		CT_F5	7.16	513.71	33.88	0.34	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.420	0.420	0.020
		CT_F6	7.14	513.71	33.88	0.34	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.420	0.420	0.020
		CT_F7	3.57	803.15	1.89	0.20	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.240	0.240	0.020
Big Piney C.S.		BP1	7.62	797.04	24.17	0.30	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	3.830	3.830	0.010
		BP2	7.62	797.04	24.17	0.30	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	3.830	3.830	0.010
		BP3	7.62	797.04	19.60	0.30	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.630	0.630	0.010
		BP4	7.62	797.04	19.60	0.30	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.630	0.630	0.010
		BP5	7.32	797.04	20.23	0.25	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	2.320	2.320	0.010
		BP6	7.32	797.04	20.23	0.25	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	2.320	2.320	0.010
		BP7	7.32	797.04	20.23	0.25	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	2.320	2.320	0.010
		BP8	7.32	797.04	20.23	0.25	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	2.320	2.320	0.010
		BP9	7.32	797.04	20.23	0.25	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	2.320	2.320	0.010

Table D.1 Jonah Regional Compressor Stations
Modeled Stack Data

Facility	Horsepower	Stack ID	Stack Parameters Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	Stack Parameter Source	Permitted / Projected NOx (lb/hr)	CO (lb/hr)	Formaldehyde (lb/hr)	Emissions Source	Modeled NO_x (g/s)	CO (g/s)	Formaldehyde (g/s)
		BP10	7.62	797.04	29.35	0.30	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	4.650	4.650	0.010
		BP11	7.62	672.04	27.89	0.91	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	27.020	27.020	0.130
		BP12	9.14	657.59	26.79	0.30	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.420	0.420	0.050
		BP13	9.14	657.59	26.79	0.30	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.420	0.420	0.050
		BP14	3.66	844.26	32.07	0.10	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.300	0.300	0.002
		BP15	10.36	725.93	58.26	0.88	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	2.290	2.290	0.020
											Jonah Modeling Completed by TRC in 2001			
Dry Piney C.S.		DP1	3.66	844.26	32.07	0.10	Historical Modeling Files				Jonah Modeling Completed by TRC in 2001	0.700	0.700	0.001
Future Expansions														
											Based on horsepower projected for expansion.			
Bird Canyon C.S.[1]	3668	BCE1	12.19	726.48	29.75	0.71	Bird Canyon Permit File	5.70	2.40	0.65	Based on horsepower projected for expansion.	0.713	0.255	0.082
	3668	BCE2	12.19	726.48	29.75	0.71	Bird Canyon Permit File	5.70	2.40	0.65	Based on horsepower projected for expansion.	0.713	0.255	0.082
	3668	BCE3	12.19	726.48	29.75	0.71	Bird Canyon Permit File	5.70	2.40	0.65		0.713	0.255	0.082
Falcon C.S.[1]	3668	FCE1	7.92	725.37	26.39	0.71	Falcon Permit File	5.70	2.40	0.65	Based on horsepower projected for expansion.	0.713	0.255	0.082
	3668	FCE2	7.92	725.37	26.39	0.71	Falcon Permit File	5.70	2.40	0.65	Based on horsepower projected for expansion.	0.713	0.255	0.082
Gobblers Knob	3333	QME1	15.24	710.93	72.54	0.46	Gobblers Knobb Permit File	5.10	1.80	0.60	Based on horsepower projected for expansion.	0.648	0.231	0.074
	3333	QME2	15.24	710.93	41.15	0.46	Gobblers Knobb Permit File	5.10	1.80	0.60	Based on horsepower projected for expansion.	0.648	0.231	0.074
	3333	QPE1	15.24	710.93	53.95	0.46	Gobblers Knobb Permit File	5.10	1.80	0.60	Based on horsepower projected for expansion.	0.648	0.231	0.074
Jonah C.S.[1]	3900	JE1	7.62	903.71	28.66	0.406	Jonah Permit File	6.00	2.20	0.70	Based on horsepower projected for expansion.	0.758	0.271	0.087
Luman C.S.[1]	3668	LCE1	13.70	726.50	28.65	0.710	Luman Permit File	5.70	2.40	0.65	Based on horsepower projected for expansion.	0.713	0.255	0.082
	3668	LCE2	13.70	726.50	28.65	0.710	Luman Permit File	5.70	2.40	0.65	Based on horsepower projected for expansion.	0.713	0.255	0.082
	3668	LCE3	13.70	726.50	28.65	0.710	Luman Permit File	5.70	2.40	0.65	Based on horsepower projected for expansion.	0.713	0.255	0.082
	600	LGE1	10.00	642.00	47.56	0.203	Luman Permit File	1.30	1.30	0.11	Based on horsepower projected for expansion.	0.167	0.83	0.012
Paradise C.S.	3668	PCE1	7.92	725.37	26.39	0.710	Paradise Permit File	5.70	2.40	0.65	Based on horsepower projected for expansion.	0.713	0.255	0.082
	3668	PCE2	7.92	725.37	26.39	0.710	Paradise Permit File	5.70	2.40	0.65	Based on horsepower projected for expansion.	0.713	0.255	0.082

1 Analyzed as part of the Jonah Infill Drilling Project.

APPENDIX E:

CALMET INPUT DATA

LIST OF TABLES

Table E.1 Precipitation Stations Used in Development of CALMET Wind Fields.

Table E.2 Upper Air Meteorological Stations Used in Development of the CALMET Wind Fields.

Table E.3 Surface Meteorological Stations Used in Development of the CALMET Wind Fields.

Table E.1 Precipitation Stations Used in Development of the CALMET Wind Fields.

Model ID	X (Lambert Conformal km)	Y (Lambert Conformal km)	Station Code
P001	-34.328	-249.360	52286
P002	49.568	-272.559	55484
P003	-251.906	8.556	103732
P004	-233.557	41.953	104230
P005	-252.533	91.083	104456
P006	-210.422	143.269	109065
P007	-254.853	-201.369	420342
P008	-271.531	-177.297	420820
P009	-211.549	-170.572	421590
P010	-264.402	-202.716	421759
P011	-234.434	-166.124	422385
P012	-70.554	-173.625	422864
P013	-181.985	-228.924	423624
P014	-274.842	-159.152	424538
P015	-260.841	-80.753	425186
P016	-269.236	-89.347	425194
P017	-159.634	-211.499	425815
P018	-258.441	-188.611	425892
P019	-124.262	-215.930	426127
P020	-219.022	-191.884	426374
P021	-275.157	-134.025	426404
P022	-254.783	-235.459	426455
P023	-255.062	-242.678	427064
P024	-116.548	-243.027	427395
P025	-277.292	-184.279	427598
P026	-248.123	-205.187	427846
P027	-213.999	-245.975	428371
P028	-261.104	-222.696	428939
P029	-124.144	-0.613	480697
P030	28.642	93.249	481000
P031	-84.349	106.216	482715
P032	143.111	-141.842	483050
P033	-194.548	-146.643	483100
P034	-172.801	102.667	484910
P035	-14.429	28.720	485390
P036	-157.462	141.698	486440
P037	-144.286	-136.431	486555
P038	-29.676	-132.586	486597
P039	29.069	0.067	486875
P040	134.830	-7.493	487105
P041	123.092	53.124	487375
P042	108.284	-79.755	487533
P043	13.119	51.934	487760
P044	-41.609	-102.056	487845
P045	142.439	-111.382	487995
P046	130.212	-41.687	488070
P047	91.687	136.832	488858
P048	27.206	118.275	488875
P049	-11.646	125.423	488888

Table E.1 (Continued)

Model ID	X (Lambert Conformal km)	Y (Lambert Conformal km)	Station Code
P050	-310.000	150.000	6106
P051	-310.000	90.000	6091
P052	-310.000	10.000	6071
P053	-310.000	-30.000	6061
P054	-310.000	-70.000	6051
P055	-310.000	-170.000	6026
P056	-298.000	-218.000	9014
P057	-290.000	-10.000	11066
P058	-290.000	-130.000	11036
P059	-290.000	-250.000	11006
P060	-278.000	30.000	14076
P061	-270.000	70.000	16086
P062	-270.000	-110.000	16041
P063	-250.000	170.000	21111
P064	-250.000	110.000	21096
P065	-238.000	-30.000	24061
P066	-238.000	-58.000	24054
P067	-238.000	-90.000	24046
P068	-238.000	-130.000	24036
P069	-238.000	-250.000	24006
P070	-218.000	202.000	29119
P071	-210.000	170.000	31111
P072	-210.000	62.000	31084
P073	-210.000	10.000	31071
P074	-210.000	-30.000	31061
P075	-210.000	-78.000	31049
P076	-210.000	-110.000	31041
P077	-210.000	-150.000	31031
P078	-210.000	-218.000	31014
P079	-190.000	122.000	36099
P080	-190.000	90.000	36091
P081	-190.000	10.000	36071
P082	-190.000	-10.000	36066
P083	-190.000	-110.000	36041
P084	-190.000	-190.000	36021
P085	-178.000	142.000	39104
P086	-170.000	190.000	41116
P087	-170.000	158.000	41108
P088	-170.000	50.000	41081
P089	-170.000	-10.000	41066
P090	-170.000	-50.000	41056
P091	-170.000	-158.000	41029
P092	-162.000	22.000	43074
P093	-158.000	174.000	44112
P094	-154.000	114.000	45097
P095	-150.000	-90.000	46046
P096	-150.000	-182.000	46023
P097	-138.000	82.000	49089
P098	-130.000	186.000	51115

Table E.1 (Continued)

Model ID	X (Lambert Conformal km)	Y (Lambert Conformal km)	Station Code
P099	-130.000	150.000	51106
P100	-130.000	118.000	51098
P101	-130.000	170.000	51111
P102	-130.000	30.000	51076
P103	-110.000	170.000	56111
P104	-110.000	-190.000	56021
P105	-90.000	150.000	61106
P106	-90.000	82.000	61089
P107	-90.000	50.000	61081
P108	-90.000	2.000	61069
P109	-90.000	-70.000	61051
P110	-90.000	-190.000	61021
P111	-70.000	178.000	66113
P112	-70.000	130.000	66101
P113	-70.000	90.000	66091
P114	-70.000	50.000	66081
P115	-70.000	10.000	66071
P116	-58.000	-222.000	69013
P117	-50.000	130.000	71101
P118	-50.000	30.000	71076
P119	-50.000	-198.000	71019
P120	-30.000	170.000	76111
P121	-30.000	90.000	76091
P122	-30.000	10.000	76071
P123	-30.000	-222.000	76013
P124	-10.000	-30.000	81061
P125	-10.000	-70.000	81051
P126	-10.000	-222.000	81013
P127	10.000	-130.000	86036
P128	30.000	170.000	91111
P129	30.000	-50.000	91056
P130	30.000	-98.000	91044
P131	30.000	-178.000	91024
P132	50.000	-250.000	96006
P133	70.000	50.000	101081
P134	70.000	-30.000	101061
P135	70.000	-70.000	101051
P136	90.000	-110.000	106041
P137	90.000	-150.000	106031
P138	90.000	-230.000	106011
P139	102.000	202.000	109119
P140	102.000	94.000	109092
P141	102.000	-190.000	109021
P142	106.000	22.000	110074
P143	106.000	-30.000	110061
P144	106.000	-258.000	110004
P145	110.000	150.000	111106
P146	122.000	-130.000	114036
P147	130.000	130.000	116101

Table E.1 (Continued)

Model ID	X (Lambert Conformal km)	Y (Lambert Conformal km)	Station Code
P148	130.000	-154.000	116030
P149	130.000	-218.000	116014
P150	150.000	182.000	121114
P151	150.000	70.000	121086
P152	150.000	-38.000	121059
P153	150.000	-178.000	121024
P154	154.000	-198.000	122019
P155	154.000	-238.000	122009

Table E.2 Upper Air Meteorological Stations Used in Development of the CALMET Wind Fields.

Station Name	X (Lambert Conformal km)	Y (Lambert Conformal km)	Model ID
Denver	321.444	-281.130	23062
Grand Junction	2.012	-369.260	23066
Lander	-14.429	28.720	24021
Salt Lake City	-278.983	-185.610	24127

Table E.3 Surface Meteorolgical Stations Used in the Development of the CALMET Wind Fields.

Station Name	Station Type	X (Lambert Conformal km)	Y (Lambert Conformal km)	Model ID
Amoco	Industrial	-188.837	-117.730	1001
Ande	RAWS	-31.013	-12.050	2001
Baggs	Zirkel	74.785	-166.360	4001
Beaver	WYDOT	20.818	4.010	3001
BitterCreek	WYDOT	-2.654	-97.240	3002
Burr	RAWS	-141.055	140.200	2002
Camp	RAWS	79.256	-21.460	2003
Casper	NWS	163.698	41.900	6007
Centennial	NDDN	194.065	-130.500	5002
Cody	NWS	-35.984	211.760	3003
Con	WYDOT	68.278	-89.450	2004
Cow	RAWS	78.342	-137.150	4002
Craig	Zirkel	78.747	-225.580	2005
Elkhorn	RAWS	-82.435	121.920	7001
Evan	NWS	-200.631	-133.530	1002
Exxon	Industrial	-128.247	-75.080	3004
FirstDivide	WYDOT	-179.798	-132.420	1003
GenC	Industrial	-97.396	-102.530	2006
Getc	RAWS	-213.753	-23.290	2007
Grac	RAWS	-261.735	4.030	2008
Gran	RAWS	-167.686	128.380	7002
Hayden	NWS	115.118	-241.220	3005
Hiland	WYDOT	96.447	59.000	7004
I-25 Divide	WYDOT	147.707	151.128	4003
Idaho Falls	NWS	-274.135	110.280	6005
Jackson	NWS	-169.576	115.150	1004
Jun	Zirkel	42.655	-225.920	1005
Lake Yellowstone	RAWS	-145.592	109.170	7003
Lander	NWS	-14.192	29.040	3006
Meeteetsee	WYDOT	-24.607	184.857	5001
Moon	NPS	-391.200	111.100	6009
Naughton	Industrial	-163.727	-82.890	2009
OCI	Industrial	-89.941	-87.570	2010
Ogden	NWS	-245.962	-154.600	7006
Pat	WYDOT	134.381	2.500	2011
Pine	NDDN	-97.579	41.610	7005
Poccatello	NWS	-318.637	47.830	6006
Pole	RAWS	-259.041	42.350	6008
Rasp	RAWS	-114.350	100.160	2012
Rawlins	NWS	108.284	-79.760	7007
Riley	RAWS	-152.455	-5.340	1006
Riverton	NWS	3.930	48.370	7008
RockSprings	NWS	-41.850	-102.050	2013
Salmon	NWS	-403.494	289.510	7009
Salt Lake City	NWS	-247.589	-219.230	26865
Sheridan	NWS	120.667	239.370	80002
Snider	RAWS	-156.708	-4.430	25785
SodaSprings	NWS	-222.333	-13.320	26764
TG	Industrial	-107.679	-91.600	26763
Vernal	NWS	-62.525	-245.160	26664
West Yellowstone 1	RAWS	-194.758	228.710	80001
West Yellowstone 2	RAWS	-196.181	231.980	26700
Wind	RAWS	-44.560	46.200	90002
Worland	NWS	46.380	152.760	24029
Yellowstone	NPS	-141.500	218.300	90001

APPENDIX F:

MAXIMUM PREDICTED MID-FIELD AND FAR-FIELD IMPACTS

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Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Bridger WA	0.026	0.1[1]	2.5	3.4	3.43	100	100
		Fitzpatrick WA	0.001	0.1[1]	2.5	3.4	3.40	100	100
		Grand Teton NP	0.000	0.1[1]	2.5	3.4	3.40	100	100
		Popo Agie WA	0.009	1.0[2]	25.0	3.4	3.41	100	100
		Teton WA	0.000	0.1[1]	2.5	3.4	3.40	100	100
		Washakie WA	0.000	0.1[1]	2.5	3.4	3.40	100	100
		Wind River RA	0.006	1.0[2]	25.0	3.4	3.41	100	100
		Yellowstone NP	0.000	0.1[1]	2.5	3.4	3.40	100	100

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.1.2 Maximum Modeled NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Proposed Action and Alternative A Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			(μg/m³)	(μg/m³)	(μg/m³)	(μg/m³)	(μg/m³)	(μg/m³)	(μg/m³)
NO_2	Annual	Bridger WA	0.132	0.1[1]	2.5	3.4	3.53	100	100
		Fitzpatrick WA	0.006	0.1[1]	2.5	3.4	3.41	100	100
		Grand Teton NP	0.002	0.1[1]	2.5	3.4	3.40	100	100
		Popo Agie WA	0.044	1.0[2]	25.0	3.4	3.44	100	100
		Teton WA	0.001	0.1[1]	2.5	3.4	3.40	100	100
		Washakie WA	0.001	0.1[1]	2.5	3.4	3.40	100	100
		Wind River RA	0.026	1.0[2]	25.0	3.4	3.43	100	100
		Yellowstone NP	0.001	0.1[1]	2.5	3.4	3.40	100	100

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.1.3 Maximum Modeled NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Alternative B Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Bridger WA	0.062	0.1[1]	2.5	3.4	3.46	100	100
		Fitzpatrick WA	0.003	0.1[1]	2.5	3.4	3.40	100	100
		Grand Teton NP	0.001	0.1[1]	2.5	3.4	3.40	100	100
		Popo Agie WA	0.023	1.0[2]	25.0	3.4	3.42	100	100
		Teton WA	0.000	0.1[1]	2.5	3.4	3.40	100	100
		Washakie WA	0.001	0.1[1]	2.5	3.4	3.40	100	100
		Wind River RA	0.013	1.0[2]	25.0	3.4	3.41	100	100
		Yellowstone NP	0.000	0.1[1]	2.5	3.4	3.40	100	100

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.1.4 Maximum Modeled NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Preferred Alternative Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Bridger WA	0.0613	0.1[1]	2.5	3.4	3.46	100	100
		Fitzpatrick WA	0.0023	0.1[1]	2.5	3.4	3.40	100	100
		Grand Teton NP	0.0007	0.1[1]	2.5	3.4	3.40	100	100
		Popo Agie WA	0.0193	1.0[2]	25.0	3.4	3.42	100	100
		Teton WA	0.0003	0.1[1]	2.5	3.4	3.40	100	100
		Washakie WA	0.0004	0.1[1]	2.5	3.4	3.40	100	100
		Wind River RA	0.0116	1.0[2]	25.0	3.4	3.41	100	100
		Yellowstone NP	0.0002	0.1[1]	2.5	3.4	3.40	100	100

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.1.5 Maximum Modeled Cumulative NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from No Action and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Bridger WA	0.119	0.1[1]	2.5	3.4	3.52	100	100
		Fitzpatrick WA	0.011	0.1[1]	2.5	3.4	3.41	100	100
		Grand Teton NP	0.029	0.1[1]	2.5	3.4	3.43	100	100
		Popo Agie WA	0.027	1.0[2]	25.0	3.4	3.43	100	100
		Teton WA	0.007	0.1[1]	2.5	3.4	3.41	100	100
		Washakie WA	0.009	0.1[1]	2.5	3.4	3.41	100	100
		Wind River RA	0.024	1.0[2]	25.0	3.4	3.42	100	100
		Yellowstone NP	0.003	0.1[1]	2.5	3.4	3.40	100	100

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.1.6 Maximum Modeled Cumulative NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Maximum Production and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Bridger WA	0.143	0.1[1]	2.5	3.4	3.54	100	100
		Fitzpatrick WA	0.012	0.1[1]	2.5	3.4	3.41	100	100
		Grand Teton NP	0.029	0.1[1]	2.5	3.4	3.43	100	100
		Popo Agie WA	0.036	1.0[2]	25.0	3.4	3.44	100	100
		Teton WA	0.007	0.1[1]	2.5	3.4	3.41	100	100
		Washakie WA	0.010	0.1[1]	2.5	3.4	3.41	100	100
		Wind River RA	0.030	1.0[2]	25.0	3.4	3.43	100	100
		Yellowstone NP	0.003	0.1[1]	2.5	3.4	3.40	100	100

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.1.7 Maximum Modeled Cumulative NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Proposed Action and Alternative A and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Bridger WA	0.245	0.1[1]	2.5	3.4	3.64	100	100
		Fitzpatrick WA	0.017	0.1[1]	2.5	3.4	3.42	100	100
		Grand Teton NP	0.030	0.1[1]	2.5	3.4	3.43	100	100
		Popo Agie WA	0.070	1.0[2]	25.0	3.4	3.47	100	100
		Teton WA	0.007	0.1[1]	2.5	3.4	3.41	100	100
		Washakie WA	0.010	0.1[1]	2.5	3.4	3.41	100	100
		Wind River RA	0.051	1.0[2]	25.0	3.4	3.45	100	100
		Yellowstone NP	0.003	0.1[1]	2.5	3.4	3.40	100	100

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.1.8 Maximum Modeled Cumulative NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Alternative B and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	Bridger WA	0.175	0.1[1]	2.5	3.4	3.57	100	100
		Fitzpatrick WA	0.014	0.1[1]	2.5	3.4	3.41	100	100
		Grand Teton NP	0.030	0.1[1]	2.5	3.4	3.43	100	100
		Popo Agie WA	0.049	1.0[2]	25.0	3.4	3.45	100	100
		Teton WA	0.007	0.1[1]	2.5	3.4	3.41	100	100
		Washakie WA	0.010	0.1[1]	2.5	3.4	3.41	100	100
		Wind River RA	0.037	1.0[2]	25.0	3.4	3.44	100	100
		Yellowstone NP	0.003	0.1[1]	2.5	3.4	3.40	100	100

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.1.9 Maximum Modeled Cumulative NO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Preferred Alternative and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			(μg/m³)	(μg/m³)	(μg/m³)	(μg/m³)	(μg/m³)	(μg/m³)	(μg/m³)
NO_2	Annual	Bridger WA	0.174	0.1[1]	2.5	3.4	3.57	100	100
		Fitzpatrick WA	0.014	0.1[1]	2.5	3.4	3.41	100	100
		Grand Teton NP	0.029	0.1[1]	2.5	3.4	3.43	100	100
		Popo Agie WA	0.045	1.0[2]	25.0	3.4	3.44	100	100
		Teton WA	0.007	0.1[1]	2.5	3.4	3.41	100	100
		Washakie WA	0.010	0.1[1]	2.5	3.4	3.41	100	100
		Wind River RA	0.036	1.0[2]	25.0	3.4	3.44	100	100
		Yellowstone NP	0.003	0.1[1]	2.5	3.4	3.40	100	100

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.2.1 Maximum Modeled SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Maximum Production Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
SO_2	Annual	Bridger WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Fitzpatrick WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Grand Teton NP	0.000	0.1[1]	2	9.0	9.00	60	80
		Popo Agie WA	0.000	1.0[2]	20	9.0	9.00	60	80
		Teton WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Washakie WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Wind River RA	0.000	1.0[2]	20	9.0	9.00	60	80
		Yellowstone NP	0.000	0.1[1]	2	9.0	9.00	60	80
SO_2	24-hr	Bridger WA	0.001	0.2[1]	5	43.0	43.00	260	365
		Fitzpatrick WA	0.000	0.2[1]	5	43.0	43.00	260	365
		Grand Teton NP	0.000	0.2[1]	5	43.0	43.00	260	365
		Popo Agie WA	0.000	5.0[2]	91	43.0	43.00	260	365
		Teton WA	0.000	0.2[1]	5	43.0	43.00	260	365
		Washakie WA	0.000	0.2[1]	5	43.0	43.00	260	365
		Wind River RA	0.000	5.0[2]	91	43.0	43.00	260	365
		Yellowstone NP	0.000	0.2[1]	5	43.0	43.00	260	365
SO_2	3-hr	Bridger WA	0.005	1.0[1]	25	132.0	132.01	1,300	1,300
		Fitzpatrick WA	0.001	1.0[1]	25	132.0	132.00	1,300	1,300
		Grand Teton NP	0.000	1.0[1]	25	132.0	132.00	1,300	1,300
		Popo Agie WA	0.002	25.0[2]	512	132.0	132.00	1,300	1,300
		Teton WA	0.001	1.0[1]	25	132.0	132.00	1,300	1,300
		Washakie WA	0.001	1.0[1]	25	132.0	132.00	1,300	1,300
		Wind River RA	0.001	25.0[2]	512	132.0	132.00	1,300	1,300
		Yellowstone NP	0.000	1.0[1]	25	132.0	132.00	1,300	1,300

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.2.2 Maximum Modeled SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Proposed Action and Alternative A Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact ($\mu g/m^3$)	Applicable PSD Significance Level ($\mu g/m^3$)	Applicable PSD Increment ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
SO_2	Annual	Bridger WA	0.004	0.1[1]	2	9.0	9.00	60	80
		Fitzpatrick WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Grand Teton NP	0.000	0.1[1]	2	9.0	9.00	60	80
		Popo Agie WA	0.001	1.0[2]	20	9.0	9.00	60	80
		Teton WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Washakie WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Wind River RA	0.001	1.0[2]	20	9.0	9.00	60	80
		Yellowstone NP	0.000	0.1[1]	2	9.0	9.00	60	80
SO_2	24-hr	Bridger WA	0.073	0.2[1]	5	43.0	43.07	260	365
		Fitzpatrick WA	0.005	0.2[1]	5	43.0	43.01	260	365
		Grand Teton NP	0.002	0.2[1]	5	43.0	43.00	260	365
		Popo Agie WA	0.013	5.0[2]	91	43.0	43.01	260	365
		Teton WA	0.001	0.2[1]	5	43.0	43.00	260	365
		Washakie WA	0.002	0.2[1]	5	43.0	43.00	260	365
		Wind River RA	0.010	5.0[2]	91	43.0	43.01	260	365
		Yellowstone NP	0.001	0.2[1]	5	43.0	43.00	260	365
SO_2	3-hr	Bridger WA	0.229	1.0[1]	25	132.0	132.23	1,300	1,300
		Fitzpatrick WA	0.019	1.0[1]	25	132.0	132.02	1,300	1,300
		Grand Teton NP	0.008	1.0[1]	25	132.0	132.01	1,300	1,300
		Popo Agie WA	0.081	25.0[2]	512	132.0	132.08	1,300	1,300
		Teton WA	0.007	1.0[1]	25	132.0	132.01	1,300	1,300
		Washakie WA	0.006	1.0[1]	25	132.0	132.01	1,300	1,300
		Wind River RA	0.037	25.0[2]	512	132.0	132.04	1,300	1,300
		Yellowstone NP	0.003	1.0[1]	25	132.0	132.00	1,300	1,300

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.2.3 Maximum Modeled SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Alternative B Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact (µg/m³)	Applicable PSD Significance Level (µg/m³)	Applicable PSD Increment (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	WAAQS (µg/m³)	NAAQS (µg/m³)
SO_2	Annual	Bridger WA	0.001	0.1[1]	2	9.0	9.00	60	80
		Fitzpatrick WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Grand Teton NP	0.000	0.1[1]	2	9.0	9.00	60	80
		Popo Agie WA	0.000	1.0[2]	20	9.0	9.00	60	80
		Teton WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Washakie WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Wind River RA	0.000	1.0[2]	20	9.0	9.00	60	80
		Yellowstone NP	0.000	0.1[1]	2	9.0	9.00	60	80
SO_2	24-hr	Bridger WA	0.027	0.2[1]	5	43.0	43.03	260	365
		Fitzpatrick WA	0.002	0.2[1]	5	43.0	43.00	260	365
		Grand Teton NP	0.001	0.2[1]	5	43.0	43.00	260	365
		Popo Agie WA	0.006	5.0[2]	91	43.0	43.01	260	365
		Teton WA	0.000	0.2[1]	5	43.0	43.00	260	365
		Washakie WA	0.001	0.2[1]	5	43.0	43.00	260	365
		Wind River RA	0.004	5.0[2]	91	43.0	43.00	260	365
		Yellowstone NP	0.000	0.2[1]	5	43.0	43.00	260	365
SO_2	3-hr	Bridger WA	0.089	1.0[1]	25	132.0	132.09	1,300	1,300
		Fitzpatrick WA	0.008	1.0[1]	25	132.0	132.01	1,300	1,300
		Grand Teton NP	0.003	1.0[1]	25	132.0	132.00	1,300	1,300
		Popo Agie WA	0.032	25.0[2]	512	132.0	132.03	1,300	1,300
		Teton WA	0.003	1.0[1]	25	132.0	132.00	1,300	1,300
		Washakie WA	0.003	1.0[1]	25	132.0	132.00	1,300	1,300
		Wind River RA	0.014	25.0[2]	512	132.0	132.01	1,300	1,300
		Yellowstone NP	0.001	1.0[1]	25	132.0	132.00	1,300	1,300

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.2.4 Maximum Modeled SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Preferred Alternative Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact (µg/m³)	Applicable PSD Significance Level (µg/m³)	Applicable PSD Increment (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	WAAQS (µg/m³)	NAAQS (µg/m³)
SO_2	Annual	Bridger WA	0.004	0.1[1]	2	9.0	9.00	60	80
		Fitzpatrick WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Grand Teton NP	0.000	0.1[1]	2	9.0	9.00	60	80
		Popo Agie WA	0.001	1.0[2]	20	9.0	9.00	60	80
		Teton WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Washakie WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Wind River RA	0.001	1.0[2]	20	9.0	9.00	60	80
		Yellowstone NP	0.000	0.1[1]	2	9.0	9.00	60	80
SO_2	24-hr	Bridger WA	0.076	0.2[1]	5	43.0	43.08	260	365
		Fitzpatrick WA	0.006	0.2[1]	5	43.0	43.01	260	365
		Grand Teton NP	0.002	0.2[1]	5	43.0	43.00	260	365
		Popo Agie WA	0.014	5.0[2]	91	43.0	43.01	260	365
		Teton WA	0.001	0.2[1]	5	43.0	43.00	260	365
		Washakie WA	0.002	0.2[1]	5	43.0	43.00	260	365
		Wind River RA	0.011	5.0[2]	91	43.0	43.01	260	365
		Yellowstone NP	0.001	0.2[1]	5	43.0	43.00	260	365
SO_2	3-hr	Bridger WA	0.246	1.0[1]	25	132.0	132.25	1,300	1,300
		Fitzpatrick WA	0.020	1.0[1]	25	132.0	132.02	1,300	1,300
		Grand Teton NP	0.008	1.0[1]	25	132.0	132.01	1,300	1,300
		Popo Agie WA	0.087	25.0[2]	512	132.0	132.09	1,300	1,300
		Teton WA	0.008	1.0[1]	25	132.0	132.01	1,300	1,300
		Washakie WA	0.006	1.0[1]	25	132.0	132.01	1,300	1,300
		Wind River RA	0.039	25.0[2]	512	132.0	132.04	1,300	1,300
		Yellowstone NP	0.003	1.0[1]	25	132.0	132.00	1,300	1,300

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.2.5 Maximum Modeled Cumulative SC_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from No Action and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)	(µg/m^3)
SO_2	Annual	Bridger WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Fitzpatrick WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Grand Teton NP	0.007	0.1[1]	2	9.0	9.01	60	80
		Popo Agie WA	0.000	1.0[2]	20	9.0	9.00	60	80
		Teton WA	0.001	0.1[1]	2	9.0	9.00	60	80
		Washakie WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Wind River RA	0.000	1.0[2]	20	9.0	9.00	60	80
		Yellowstone NP	0.001	0.1[1]	2	9.0	9.00	60	80
SO_2	24-hr	Bridger WA	0.041	0.2[1]	5	43.0	43.04	260	365
		Fitzpatrick WA	0.006	0.2[1]	5	43.0	43.01	260	365
		Grand Teton NP	0.038	0.2[1]	5	43.0	43.04	260	365
		Popo Agie WA	0.010	5.0[2]	91	43.0	43.01	260	365
		Teton WA	0.012	0.2[1]	5	43.0	43.01	260	365
		Washakie WA	0.008	0.2[1]	5	43.0	43.01	260	365
		Wind River RA	0.014	5.0[2]	91	43.0	43.01	260	365
		Yellowstone NP	0.013	0.2[1]	5	43.0	43.01	260	365
SO_2	3-hr	Bridger WA	0.164	1.0[1]	25	132.0	132.16	1,300	1,300
		Fitzpatrick WA	0.020	1.0[1]	25	132.0	132.02	1,300	1,300
		Grand Teton NP	0.201	1.0[1]	25	132.0	132.20	1,300	1,300
		Popo Agie WA	0.020	25.0[2]	512	132.0	132.02	1,300	1,300
		Teton WA	0.037	1.0[1]	25	132.0	132.04	1,300	1,300
		Washakie WA	0.022	1.0[1]	25	132.0	132.02	1,300	1,300
		Wind River RA	0.109	25.0[2]	512	132.0	132.11	1,300	1,300
		Yellowstone NP	0.075	1.0[1]	25	132.0	132.07	1,300	1,300

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.2.6 Maximum Modeled Cumulative SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Maximum Production and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact ($\mu g/m^3$)	Applicable PSD Significance Level ($\mu g/m^3$)	Applicable PSD Increment ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
SO_2	Annual	Bridger WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Fitzpatrick WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Grand Teton NP	0.007	0.1[1]	2	9.0	9.01	60	80
		Popo Agie WA	0.000	1.0[2]	20	9.0	9.00	60	80
		Teton WA	0.001	0.1[1]	2	9.0	9.00	60	80
		Washakie WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Wind River RA	0.000	1.0[2]	20	9.0	9.00	60	80
		Yellowstone NP	0.001	0.1[1]	2	9.0	9.00	60	80
SO_2	24-hr	Bridger WA	0.041	0.2[1]	5	43.0	43.04	260	365
		Fitzpatrick WA	0.006	0.2[1]	5	43.0	43.01	260	365
		Grand Teton NP	0.038	0.2[1]	5	43.0	43.04	260	365
		Popo Agie WA	0.010	5.0[2]	91	43.0	43.01	260	365
		Teton WA	0.012	0.2[1]	5	43.0	43.01	260	365
		Washakie WA	0.008	0.2[1]	5	43.0	43.01	260	365
		Wind River RA	0.014	5.0[2]	91	43.0	43.01	260	365
		Yellowstone NP	0.013	0.2[1]	5	43.0	43.01	260	365
SO_2	3-hr	Bridger WA	0.164	1.0[1]	25	132.0	132.16	1,300	1,300
		Fitzpatrick WA	0.020	1.0[1]	25	132.0	132.02	1,300	1,300
		Grand Teton NP	0.201	1.0[1]	25	132.0	132.20	1,300	1,300
		Popo Agie WA	0.020	25.0[2]	512	132.0	132.02	1,300	1,300
		Teton WA	0.037	1.0[1]	25	132.0	132.04	1,300	1,300
		Washakie WA	0.022	1.0[1]	25	132.0	132.02	1,300	1,300
		Wind River RA	0.110	25.0[2]	512	132.0	132.11	1,300	1,300
		Yellowstone NP	0.075	1.0[1]	25	132.0	132.07	1,300	1,300

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.2.7 Maximum Modeled Cumulative SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Proposed Action and Alternative A and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact (μg/m³)	Applicable PSD Significance Level (μg/m³)	Applicable PSD Increment (μg/m³)	Background Concentration (μg/m³)	Total Concentration (μg/m³)	WAAQS (μg/m³)	NAAQS (μg/m³)
SO_2	Annual	Bridger WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Fitzpatrick WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Grand Teton NP	0.007	0.1[1]	2	9.0	9.01	60	80
		Popo Agie WA	0.000	1.0[2]	20	9.0	9.00	60	80
		Teton WA	0.001	0.1[1]	2	9.0	9.00	60	80
		Washakie WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Wind River RA	0.000	1.0[2]	20	9.0	9.00	60	80
		Yellowstone NP	0.001	0.1[1]	2	9.0	9.00	60	80
SO_2	24-hr	Bridger WA	0.080	0.2[1]	5	43.0	43.08	260	365
		Fitzpatrick WA	0.007	0.2[1]	5	43.0	43.01	260	365
		Grand Teton NP	0.038	0.2[1]	5	43.0	43.04	260	365
		Popo Agie WA	0.015	5.0[2]	91	43.0	43.01	260	365
		Teton WA	0.012	0.2[1]	5	43.0	43.01	260	365
		Washakie WA	0.008	0.2[1]	5	43.0	43.01	260	365
		Wind River RA	0.015	5.0[2]	91	43.0	43.01	260	365
		Yellowstone NP	0.013	0.2[1]	5	43.0	43.01	260	365
SO_2	3-hr	Bridger WA	0.243	1.0[1]	25	132.0	132.24	1,300	1,300
		Fitzpatrick WA	0.022	1.0[1]	25	132.0	132.02	1,300	1,300
		Grand Teton NP	0.201	1.0[1]	25	132.0	132.20	1,300	1,300
		Popo Agie WA	0.083	25.0[2]	512	132.0	132.08	1,300	1,300
		Teton WA	0.037	1.0[1]	25	132.0	132.04	1,300	1,300
		Washakie WA	0.022	1.0[1]	25	132.0	132.02	1,300	1,300
		Wind River RA	0.117	25.0[2]	512	132.0	132.12	1,300	1,300
		Yellowstone NP	0.075	1.0[1]	25	132.0	132.07	1,300	1,300

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.2.8 Maximum Modeled Cumulative SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Alternative B and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact ($\mu g/m^3$)	Applicable PSD Significance Level ($\mu g/m^3$)	Applicable PSD Increment ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
SO_2	Annual	Bridger WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Fitzpatrick WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Grand Teton NP	0.007	0.1[1]	2	9.0	9.01	60	80
		Popo Agie WA	0.000	1.0[2]	20	9.0	9.00	60	80
		Teton WA	0.001	0.1[1]	2	9.0	9.00	60	80
		Washakie WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Wind River RA	0.000	1.0[2]	20	9.0	9.00	60	80
		Yellowstone NP	0.001	0.1[1]	2	9.0	9.00	60	80
SO_2	24-hr	Bridger WA	0.04	0.2[1]	5	43.0	43.04	260	365
		Fitzpatrick WA	0.01	0.2[1]	5	43.0	43.01	260	365
		Grand Teton NP	0.04	0.2[1]	5	43.0	43.04	260	365
		Popo Agie WA	0.01	5.0[2]	91	43.0	43.01	260	365
		Teton WA	0.01	0.2[1]	5	43.0	43.01	260	365
		Washakie WA	0.01	0.2[1]	5	43.0	43.01	260	365
		Wind River RA	0.01	5.0[2]	91	43.0	43.01	260	365
		Yellowstone NP	0.01	0.2[1]	5	43.0	43.01	260	365
SO_2	3-hr	Bridger WA	0.17	1.0[1]	25	132.0	132.17	1,300	1,300
		Fitzpatrick WA	0.02	1.0[1]	25	132.0	132.02	1,300	1,300
		Grand Teton NP	0.20	1.0[1]	25	132.0	132.20	1,300	1,300
		Popo Agie WA	0.03	25.0[2]	512	132.0	132.03	1,300	1,300
		Teton WA	0.04	1.0[1]	25	132.0	132.04	1,300	1,300
		Washakie WA	0.02	1.0[1]	25	132.0	132.02	1,300	1,300
		Wind River RA	0.11	25.0[2]	512	132.0	132.11	1,300	1,300
		Yellowstone NP	0.07	1.0[1]	25	132.0	132.07	1,300	1,300

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.2.9 Maximum Modeled Cumulative SO_2 Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Preferred Alternative and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact (μg/m³)	Applicable PSD Significance Level (μg/m³)	Applicable PSD Increment (μg/m³)	Background Concentration (μg/m³)	Total Concentration (μg/m³)	WAAQS (μg/m³)	NAAQS (μg/m³)
SO_2	Annual	Bridger WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Fitzpatrick WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Grand Teton NP	0.007	0.1[1]	2	9.0	9.01	60	80
		Popo Agie WA	0.000	1.0[2]	20	9.0	9.00	60	80
		Teton WA	0.001	0.1[1]	2	9.0	9.00	60	80
		Washakie WA	0.000	0.1[1]	2	9.0	9.00	60	80
		Wind River RA	0.000	1.0[2]	20	9.0	9.00	60	80
		Yellowstone NP	0.001	0.1[1]	2	9.0	9.00	60	80
SO_2	24-hr	Bridger WA	0.083	0.2[1]	5	43.0	43.08	260	365
		Fitzpatrick WA	0.007	0.2[1]	5	43.0	43.01	260	365
		Grand Teton NP	0.038	0.2[1]	5	43.0	43.04	260	365
		Popo Agie WA	0.016	5.0[2]	91	43.0	43.02	260	365
		Teton WA	0.012	0.2[1]	5	43.0	43.01	260	365
		Washakie WA	0.008	0.2[1]	5	43.0	43.01	260	365
		Wind River RA	0.015	5.0[2]	91	43.0	43.01	260	365
		Yellowstone NP	0.013	0.2[1]	5	43.0	43.01	260	365
SO_2	3-hr	Bridger WA	0.261	1.0[1]	25	132.0	132.26	1,300	1,300
		Fitzpatrick WA	0.023	1.0[1]	25	132.0	132.02	1,300	1,300
		Grand Teton NP	0.201	1.0[1]	25	132.0	132.20	1,300	1,300
		Popo Agie WA	0.089	25.0[2]	512	132.0	132.09	1,300	1,300
		Teton WA	0.037	1.0[1]	25	132.0	132.04	1,300	1,300
		Washakie WA	0.022	1.0[1]	25	132.0	132.02	1,300	1,300
		Wind River RA	0.117	25.0[2]	512	132.0	132.12	1,300	1,300
		Yellowstone NP	0.075	1.0[1]	25	132.0	132.07	1,300	1,300

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.3.1 Maximum Modeled PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Maximum Production Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)
PM_{10}	Annual	Bridger WA	0.030	0.2[1]	4	16.0	16.03	50	50
		Fitzpatrick WA	0.003	0.2[1]	4	16.0	16.00	50	50
		Grand Teton NP	0.001	0.2[1]	4	16.0	16.00	50	50
		Popo Agie WA	0.008	1.0[2]	17	16.0	16.01	50	50
		Teton WA	0.001	0.2[1]	4	16.0	16.00	50	50
		Washakie WA	0.001	0.2[1]	4	16.0	16.00	50	50
		Wind River RA	0.006	1.0[2]	17	16.0	16.01	50	50
		Yellowstone NP	0.000	0.2[1]	4	16.0	16.00	50	50
PM_{10}	24-hr	Bridger WA	0.750	0.3[1]	8	33.0	33.75	150	150
		Fitzpatrick WA	0.070	0.3[1]	8	33.0	33.07	150	150
		Grand Teton NP	0.030	0.3[1]	8	33.0	33.03	150	150
		Popo Agie WA	0.150	5.0[2]	30	33.0	33.15	150	150
		Teton WA	0.020	0.3[1]	8	33.0	33.02	150	150
		Washakie WA	0.030	0.3[1]	8	33.0	33.03	150	150
		Wind River RA	0.120	5.0[2]	30	33.0	33.12	150	150
		Yellowstone NP	0.010	0.3[1]	8	33.0	33.01	150	150

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.3.2 Maximum Modeled PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Proposed Action and Alternative A Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Bridger WA	0.063	0.2[1]	4	16.0	16.06	50	50
		Fitzpatrick WA	0.006	0.2[1]	4	16.0	16.01	50	50
		Grand Teton NP	0.003	0.2[1]	4	16.0	16.00	50	50
		Popo Agie WA	0.018	1.0[2]	17	16.0	16.02	50	50
		Teton WA	0.002	0.2[1]	4	16.0	16.00	50	50
		Washakie WA	0.002	0.2[1]	4	16.0	16.00	50	50
		Wind River RA	0.013	1.0[2]	17	16.0	16.01	50	50
		Yellowstone NP	0.001	0.2[1]	4	16.0	16.00	50	50
PM_{10}	24-hr	Bridger WA	1.660	0.3[1]	8	33.0	34.66	150	150
		Fitzpatrick WA	0.180	0.3[1]	8	33.0	33.18	150	150
		Grand Teton NP	0.090	0.3[1]	8	33.0	33.09	150	150
		Popo Agie WA	0.260	5.0[2]	30	33.0	33.26	150	150
		Teton WA	0.040	0.3[1]	8	33.0	33.04	150	150
		Washakie WA	0.080	0.3[1]	8	33.0	33.08	150	150
		Wind River RA	0.190	5.0[2]	30	33.0	33.19	150	150
		Yellowstone NP	0.040	0.3[1]	8	33.0	33.04	150	150

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.3.3 Maximum Modeled PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Alternative B Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)	(µg/m³)
PM_{10}	Annual	Bridger WA	0.041	0.2[1]	4	16.0	16.04	50	50
		Fitzpatrick WA	0.004	0.2[1]	4	16.0	16.00	50	50
		Grand Teton NP	0.002	0.2[1]	4	16.0	16.00	50	50
		Popo Agie WA	0.011	1.0[2]	17	16.0	16.01	50	50
		Teton WA	0.001	0.2[1]	4	16.0	16.00	50	50
		Washakie WA	0.001	0.2[1]	4	16.0	16.00	50	50
		Wind River RA	0.008	1.0[2]	17	16.0	16.01	50	50
		Yellowstone NP	0.001	0.2[1]	4	16.0	16.00	50	50
PM_{10}	24-hr	Bridger WA	0.990	0.3[1]	8	33.0	33.99	150	150
		Fitzpatrick WA	0.110	0.3[1]	8	33.0	33.11	150	150
		Grand Teton NP	0.050	0.3[1]	8	33.0	33.05	150	150
		Popo Agie WA	0.170	5.0[2]	30	33.0	33.17	150	150
		Teton WA	0.030	0.3[1]	8	33.0	33.03	150	150
		Washakie WA	0.040	0.3[1]	8	33.0	33.04	150	150
		Wind River RA	0.140	5.0[2]	30	33.0	33.14	150	150
		Yellowstone NP	0.020	0.3[1]	8	33.0	33.02	150	150

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.3.4 Maximum Modeled PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Preferred Alternative Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact (µg/m³)	Applicable PSD Significance Level (µg/m³)	Applicable PSD Increment (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	WAAQS (µg/m³)	NAAQS (µg/m³)
PM_{10}	Annual	Bridger WA	0.023	0.2[1]	4	16.0	16.02	50	50
		Fitzpatrick WA	0.002	0.2[1]	4	16.0	16.00	50	50
		Grand Teton NP	0.001	0.2[1]	4	16.0	16.00	50	50
		Popo Agie WA	0.007	1.0[2]	17	16.0	16.01	50	50
		Teton WA	0.001	0.2[1]	4	16.0	16.00	50	50
		Washakie WA	0.001	0.2[1]	4	16.0	16.00	50	50
		Wind River RA	0.005	1.0[2]	17	16.0	16.00	50	50
		Yellowstone NP	0.000	0.2[1]	4	16.0	16.00	50	50
PM_{10}	24-hr	Bridger WA	0.633	0.3[1]	8	33.0	33.63	150	150
		Fitzpatrick WA	0.079	0.3[1]	8	33.0	33.08	150	150
		Grand Teton NP	0.036	0.3[1]	8	33.0	33.04	150	150
		Popo Agie WA	0.083	5.0[2]	30	33.0	33.08	150	150
		Teton WA	0.016	0.3[1]	8	33.0	33.02	150	150
		Washakie WA	0.029	0.3[1]	8	33.0	33.03	150	150
		Wind River RA	0.064	5.0[2]	30	33.0	33.06	150	150
		Yellowstone NP	0.016	0.3[1]	8	33.0	33.02	150	150

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.3.5 Maximum Modeled Cumulative PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from No Action and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Bridger WA	0.018	0.2[1]	4	16.0	16.02	50	50
		Fitzpatrick WA	0.005	0.2[1]	4	16.0	16.00	50	50
		Grand Teton NP	0.012	0.2[1]	4	16.0	16.01	50	50
		Popo Agie WA	0.008	1.0[2]	17	16.0	16.01	50	50
		Teton WA	0.005	0.2[1]	4	16.0	16.00	50	50
		Washakie WA	0.003	0.2[1]	4	16.0	16.00	50	50
		Wind River RA	0.009	1.0[2]	17	16.0	16.01	50	50
		Yellowstone NP	0.004	0.2[1]	4	16.0	16.00	50	50
PM_{10}	24-hr	Bridger WA	0.464	0.3[1]	8	33.0	33.46	150	150
		Fitzpatrick WA	0.130	0.3[1]	8	33.0	33.13	150	150
		Grand Teton NP	0.122	0.3[1]	8	33.0	33.12	150	150
		Popo Agie WA	0.137	5.0[2]	30	33.0	33.14	150	150
		Teton WA	0.040	0.3[1]	8	33.0	33.04	150	150
		Washakie WA	0.043	0.3[1]	8	33.0	33.04	150	150
		Wind River RA	0.206	5.0[2]	30	33.0	33.21	150	150
		Yellowstone NP	0.045	0.3[1]	8	33.0	33.05	150	150

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.3.6 Maximum Modeled Cumulative PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Maximum Production and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact (µg/m³)	Applicable PSD Significance Level (µg/m³)	Applicable PSD Increment (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	WAAQS (µg/m³)	NAAQS (µg/m³)
PM_{10}	Annual	Bridger WA	0.047	0.2[1]	4	16.0	16.05	50	50
		Fitzpatrick WA	0.008	0.2[1]	4	16.0	16.01	50	50
		Grand Teton NP	0.013	0.2[1]	4	16.0	16.01	50	50
		Popo Agie WA	0.015	1.0[2]	17	16.0	16.01	50	50
		Teton WA	0.006	0.2[1]	4	16.0	16.01	50	50
		Washakie WA	0.004	0.2[1]	4	16.0	16.00	50	50
		Wind River RA	0.014	1.0[2]	17	16.0	16.01	50	50
		Yellowstone NP	0.004	0.2[1]	4	16.0	16.00	50	50
PM_{10}	24-hr	Bridger WA	0.912	0.3[1]	8	33.0	33.91	150	150
		Fitzpatrick WA	0.151	0.3[1]	8	33.0	33.15	150	150
		Grand Teton NP	0.126	0.3[1]	8	33.0	33.13	150	150
		Popo Agie WA	0.203	5.0[2]	30	33.0	33.20	150	150
		Teton WA	0.052	0.3[1]	8	33.0	33.05	150	150
		Washakie WA	0.049	0.3[1]	8	33.0	33.05	150	150
		Wind River RA	0.227	5.0[2]	30	33.0	33.23	150	150
		Yellowstone NP	0.049	0.3[1]	8	33.0	33.05	150	150

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.3.7 Maximum Modeled Cumulative PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Proposed Action and Alternative A and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Bridger WA	0.081	0.2[1]	4	16.0	16.08	50	50
		Fitzpatrick WA	0.011	0.2[1]	4	16.0	16.01	50	50
		Grand Teton NP	0.015	0.2[1]	4	16.0	16.02	50	50
		Popo Agie WA	0.024	1.0[2]	17	16.0	16.02	50	50
		Teton WA	0.007	0.2[1]	4	16.0	16.01	50	50
		Washakie WA	0.005	0.2[1]	4	16.0	16.00	50	50
		Wind River RA	0.021	1.0[2]	17	16.0	16.02	50	50
		Yellowstone NP	0.005	0.2[1]	4	16.0	16.00	50	50
PM_{10}	24-hr	Bridger WA	1.825	0.3[1]	8	33.0	34.82	150	150
		Fitzpatrick WA	0.204	0.3[1]	8	33.0	33.20	150	150
		Grand Teton NP	0.138	0.3[1]	8	33.0	33.14	150	150
		Popo Agie WA	0.314	5.0[2]	30	33.0	33.31	150	150
		Teton WA	0.079	0.3[1]	8	33.0	33.08	150	150
		Washakie WA	0.092	0.3[1]	8	33.0	33.09	150	150
		Wind River RA	0.292	5.0[2]	30	33.0	33.29	150	150
		Yellowstone NP	0.063	0.3[1]	8	33.0	33.06	150	150

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.3.8 Maximum Modeled Cumulative PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Alternative B and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact (µg/m³)	Applicable PSD Significance Level (µg/m³)	Applicable PSD Increment (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	WAAQS (µg/m³)	NAAQS (µg/m³)
PM_{10}	Annual	Bridger WA	0.058	0.2[1]	4	16.0	16.06	50	50
		Fitzpatrick WA	0.009	0.2[1]	4	16.0	16.01	50	50
		Grand Teton NP	0.014	0.2[1]	4	16.0	16.01	50	50
		Popo Agie WA	0.018	1.0[2]	17	16.0	16.02	50	50
		Teton WA	0.006	0.2[1]	4	16.0	16.01	50	50
		Washakie WA	0.004	0.2[1]	4	16.0	16.00	50	50
		Wind River RA	0.016	1.0[2]	17	16.0	16.02	50	50
		Yellowstone NP	0.004	0.2[1]	4	16.0	16.00	50	50
PM_{10}	24-hr	Bridger WA	1.155	0.3[1]	8	33.0	34.16	150	150
		Fitzpatrick WA	0.164	0.3[1]	8	33.0	33.16	150	150
		Grand Teton NP	0.129	0.3[1]	8	33.0	33.13	150	150
		Popo Agie WA	0.229	5.0[2]	30	33.0	33.23	150	150
		Teton WA	0.062	0.3[1]	8	33.0	33.06	150	150
		Washakie WA	0.062	0.3[1]	8	33.0	33.06	150	150
		Wind River RA	0.250	5.0[2]	30	33.0	33.25	150	150
		Yellowstone NP	0.053	0.3[1]	8	33.0	33.05	150	150

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.3.9 Maximum Modeled Cumulative PM_{10} Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Preferred Alternative and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Applicable PSD Significance Level	Applicable PSD Increment	Background Concentration	Total Concentration	WAAQS	NAAQS
			($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
PM_{10}	Annual	Bridger WA	0.041	0.2[1]	4	16.0	16.04	50	50
		Fitzpatrick WA	0.007	0.2[1]	4	16.0	16.01	50	50
		Grand Teton NP	0.013	0.2[1]	4	16.0	16.01	50	50
		Popo Agie WA	0.013	1.0[2]	17	16.0	16.01	50	50
		Teton WA	0.006	0.2[1]	4	16.0	16.01	50	50
		Washakie WA	0.004	0.2[1]	4	16.0	16.00	50	50
		Wind River RA	0.012	1.0[2]	17	16.0	16.01	50	50
		Yellowstone NP	0.004	0.2[1]	4	16.0	16.00	50	50
PM_{10}	24-hr	Bridger WA	0.787	0.3[1]	8	33.0	33.79	150	150
		Fitzpatrick WA	0.151	0.3[1]	8	33.0	33.15	150	150
		Grand Teton NP	0.125	0.3[1]	8	33.0	33.13	150	150
		Popo Agie WA	0.180	5.0[2]	30	33.0	33.18	150	150
		Teton WA	0.056	0.3[1]	8	33.0	33.06	150	150
		Washakie WA	0.054	0.3[1]	8	33.0	33.05	150	150
		Wind River RA	0.230	5.0[2]	30	33.0	33.23	150	150
		Yellowstone NP	0.050	0.3[1]	8	33.0	33.05	150	150

[1] Proposed Class I significance level, *Federal Register* /Vol. 61, No. 142, pg. 38292, July 23, 1996.

[2] Class II significance level, *Draft New Source Review Workshop Manual, Prevention of Significant Deterioration and Nonattainment Area Permitting* , October 1990, EPA OAQPS.

Table F.4.1 Maximum Modeled $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Maximum Production Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	WAAQS[1] (µg/m³)	NAAQS (µg/m³)
$PM_{2.5}$	Annual	Bridger WA	0.030	5.0	5.03	15	15
		Fitzpatrick WA	0.003	5.0	5.00	15	15
		Grand Teton NP	0.001	5.0	5.00	15	15
		Popo Agie WA	0.008	5.0	5.01	15	15
		Teton WA	0.001	5.0	5.00	15	15
		Washakie WA	0.001	5.0	5.00	15	15
		Wind River RA	0.006	5.0	5.01	15	15
		Yellowstone NP	0.000	5.0	5.00	15	15
$PM_{2.5}$	24-hr	Bridger WA	0.750	13.0	13.75	65	65
		Fitzpatrick WA	0.070	13.0	13.07	65	65
		Grand Teton NP	0.030	13.0	13.03	65	65
		Popo Agie WA	0.150	13.0	13.15	65	65
		Teton WA	0.020	13.0	13.02	65	65
		Washakie WA	0.030	13.0	13.03	65	65
		Wind River RA	0.120	13.0	13.12	65	65
		Yellowstone NP	0.010	13.0	13.01	65	65

[1] Standard not yet enforced in Wyoming.

Table F.4.2 Maximum Modeled $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Proposed Action and Alternative A Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact	Background Concentration	Total Concentration	WAAQS[1]	NAAQS
			(μg/m^3)	(μg/m^3)	(μg/m^3)	(μg/m^3)	(μg/m^3)
$PM_{2.5}$	Annual	Bridger WA	0.063	5.0	5.06	15	15
		Fitzpatrick WA	0.006	5.0	5.01	15	15
		Grand Teton NP	0.003	5.0	5.00	15	15
		Popo Agie WA	0.018	5.0	5.02	15	15
		Teton WA	0.002	5.0	5.00	15	15
		Washakie WA	0.002	5.0	5.00	15	15
		Wind River RA	0.013	5.0	5.01	15	15
		Yellowstone NP	0.001	5.0	5.00	15	15
$PM_{2.5}$	24-hr	Bridger WA	1.660	13.0	14.66	65	65
		Fitzpatrick WA	0.180	13.0	13.18	65	65
		Grand Teton NP	0.090	13.0	13.09	65	65
		Popo Agie WA	0.260	13.0	13.26	65	65
		Teton WA	0.040	13.0	13.04	65	65
		Washakie WA	0.080	13.0	13.08	65	65
		Wind River RA	0.190	13.0	13.19	65	65
		Yellowstone NP	0.040	13.0	13.04	65	65

[1] Standard not yet enforced in Wyoming.

Table F.4.3 Maximum Modeled $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Alternative B Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	WAAQS[1] ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
$PM_{2.5}$	Annual	Bridger WA	0.041	5.0	5.04	15	15
		Fitzpatrick WA	0.004	5.0	5.00	15	15
		Grand Teton NP	0.002	5.0	5.00	15	15
		Popo Agie WA	0.011	5.0	5.01	15	15
		Teton WA	0.001	5.0	5.00	15	15
		Washakie WA	0.001	5.0	5.00	15	15
		Wind River RA	0.008	5.0	5.01	15	15
		Yellowstone NP	0.001	5.0	5.00	15	15
$PM_{2.5}$	24-hr	Bridger WA	0.990	13.0	13.99	65	65
		Fitzpatrick WA	0.110	13.0	13.11	65	65
		Grand Teton NP	0.050	13.0	13.05	65	65
		Popo Agie WA	0.170	13.0	13.17	65	65
		Teton WA	0.030	13.0	13.03	65	65
		Washakie WA	0.040	13.0	13.04	65	65
		Wind River RA	0.140	13.0	13.14	65	65
		Yellowstone NP	0.020	13.0	13.02	65	65

[1] Standard not yet enforced in Wyoming.

Table F.4.4 Maximum Modeled $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Preferred Alternative Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	WAAQS[1] (µg/m³)	NAAQS (µg/m³)
$PM_{2.5}$	Annual	Bridger WA	0.023	5.0	5.02	15	15
		Fitzpatrick WA	0.002	5.0	5.00	15	15
		Grand Teton NP	0.001	5.0	5.00	15	15
		Popo Agie WA	0.007	5.0	5.01	15	15
		Teton WA	0.001	5.0	5.00	15	15
		Washakie WA	0.001	5.0	5.00	15	15
		Wind River RA	0.005	5.0	5.00	15	15
		Yellowstone NP	0.000	5.0	5.00	15	15
$PM_{2.5}$	24-hr	Bridger WA	0.633	13.0	13.63	65	65
		Fitzpatrick WA	0.079	13.0	13.08	65	65
		Grand Teton NP	0.036	13.0	13.04	65	65
		Popo Agie WA	0.083	13.0	13.08	65	65
		Teton WA	0.016	13.0	13.02	65	65
		Washakie WA	0.029	13.0	13.03	65	65
		Wind River RA	0.064	13.0	13.06	65	65
		Yellowstone NP	0.016	13.0	13.02	65	65

[1] Standard not yet enforced in Wyoming.

Table F.4.5 Maximum Modeled Cumulative $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from No Action and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	WAAQS[1] ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
$PM_{2.5}$	Annual	Bridger WA	0.019	5.0	5.02	15	15
		Fitzpatrick WA	0.006	5.0	5.01	15	15
		Grand Teton NP	0.013	5.0	5.01	15	15
		Popo Agie WA	0.009	5.0	5.01	15	15
		Teton WA	0.005	5.0	5.01	15	15
		Washakie WA	0.004	5.0	5.00	15	15
		Wind River RA	0.010	5.0	5.01	15	15
		Yellowstone NP	0.004	5.0	5.00	15	15
$PM_{2.5}$	24-hr	Bridger WA	0.433	13.0	13.43	65	65
		Fitzpatrick WA	0.124	13.0	13.12	65	65
		Grand Teton NP	0.114	13.0	13.11	65	65
		Popo Agie WA	0.128	13.0	13.13	65	65
		Teton WA	0.041	13.0	13.04	65	65
		Washakie WA	0.042	13.0	13.04	65	65
		Wind River RA	0.186	13.0	13.19	65	65
		Yellowstone NP	0.045	13.0	13.04	65	65

[1] Standard not yet enforced in Wyoming.

Table F.4.6 Maximum Modeled Cumulative $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Maximum Production and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	WAAQS[1] (µg/m³)	NAAQS (µg/m³)
$PM_{2.5}$	Annual	Bridger WA	0.048	5.0	5.05	15	15
		Fitzpatrick WA	0.008	5.0	5.01	15	15
		Grand Teton NP	0.014	5.0	5.01	15	15
		Popo Agie WA	0.016	5.0	5.02	15	15
		Teton WA	0.006	5.0	5.01	15	15
		Washakie WA	0.004	5.0	5.00	15	15
		Wind River RA	0.015	5.0	5.02	15	15
		Yellowstone NP	0.004	5.0	5.00	15	15
$PM_{2.5}$	24-hr	Bridger WA	0.909	13.0	13.91	65	65
		Fitzpatrick WA	0.144	13.0	13.14	65	65
		Grand Teton NP	0.119	13.0	13.12	65	65
		Popo Agie WA	0.201	13.0	13.20	65	65
		Teton WA	0.048	13.0	13.05	65	65
		Washakie WA	0.049	13.0	13.05	65	65
		Wind River RA	0.218	13.0	13.22	65	65
		Yellowstone NP	0.049	13.0	13.05	65	65

[1] Standard not yet enforced in Wyoming.

Table F.4.7 Maximum Modeled Cumulative $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Proposed Action and Alternative A and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	WAAQS[1] ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
$PM_{2.5}$	Annual	Bridger WA	0.081	5.0	5.08	15	15
		Fitzpatrick WA	0.012	5.0	5.01	15	15
		Grand Teton NP	0.015	5.0	5.02	15	15
		Popo Agie WA	0.026	5.0	5.03	15	15
		Teton WA	0.007	5.0	5.01	15	15
		Washakie WA	0.005	5.0	5.01	15	15
		Wind River RA	0.022	5.0	5.02	15	15
		Yellowstone NP	0.005	5.0	5.01	15	15
$PM_{2.5}$	24-hr	Bridger WA	1.822	13.0	14.82	65	65
		Fitzpatrick WA	0.204	13.0	13.20	65	65
		Grand Teton NP	0.140	13.0	13.14	65	65
		Popo Agie WA	0.312	13.0	13.31	65	65
		Teton WA	0.075	13.0	13.08	65	65
		Washakie WA	0.092	13.0	13.09	65	65
		Wind River RA	0.283	13.0	13.28	65	65
		Yellowstone NP	0.063	13.0	13.06	65	65

[1] Standard not yet enforced in Wyoming.

Table F.4.8 Maximum Modeled Cumulative $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Alternative B and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	WAAQS[1] (µg/m³)	NAAQS (µg/m³)
$PM_{2.5}$	Annual	Bridger WA	0.059	5.0	5.06	15	15
		Fitzpatrick WA	0.010	5.0	5.01	15	15
		Grand Teton NP	0.014	5.0	5.01	15	15
		Popo Agie WA	0.020	5.0	5.02	15	15
		Teton WA	0.006	5.0	5.01	15	15
		Washakie WA	0.005	5.0	5.00	15	15
		Wind River RA	0.017	5.0	5.02	15	15
		Yellowstone NP	0.005	5.0	5.00	15	15
$PM_{2.5}$	24-hr	Bridger WA	1.153	13.0	14.15	65	65
		Fitzpatrick WA	0.158	13.0	13.16	65	65
		Grand Teton NP	0.122	13.0	13.12	65	65
		Popo Agie WA	0.227	13.0	13.23	65	65
		Teton WA	0.058	13.0	13.06	65	65
		Washakie WA	0.062	13.0	13.06	65	65
		Wind River RA	0.240	13.0	13.24	65	65
		Yellowstone NP	0.052	13.0	13.05	65	65

[1] Standard not yet enforced in Wyoming.

Table F.4.9 Maximum Modeled Cumulative $PM_{2.5}$ Concentration Impacts at PSD Class I and Sensitive PSD Class II Areas from Preferred Alternative and Regional Sources

Pollutant	Averaging Time	Receptor Area	Direct Modeled Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	WAAQS[1] ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
$PM_{2.5}$	Annual	Bridger WA	0.042	5.0	5.04	15	15
		Fitzpatrick WA	0.008	5.0	5.01	15	15
		Grand Teton NP	0.014	5.0	5.01	15	15
		Popo Agie WA	0.015	5.0	5.02	15	15
		Teton WA	0.006	5.0	5.01	15	15
		Washakie WA	0.004	5.0	5.00	15	15
		Wind River RA	0.014	5.0	5.01	15	15
		Yellowstone NP	0.004	5.0	5.00	15	15
$PM_{2.5}$	24-hr	Bridger WA	0.785	13.0	13.79	65	65
		Fitzpatrick WA	0.145	13.0	13.14	65	65
		Grand Teton NP	0.118	13.0	13.12	65	65
		Popo Agie WA	0.170	13.0	13.17	65	65
		Teton WA	0.052	13.0	13.05	65	65
		Washakie WA	0.054	13.0	13.05	65	65
		Wind River RA	0.221	13.0	13.22	65	65
		Yellowstone NP	0.050	13.0	13.05	65	65

[1] Standard not yet enforced in Wyoming.

Table F.5.1 Maximum Predicted Impacts Within the JIDPA from Maximum Production Sources - Compared to Ambient Air Quality Standards

Pollutant	Averaging Time	Direct Predicted Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	Annual	2.5	3.4	5.9	100	100
SO_2	3 Hour	0.2	132	132.2	1,300	1,300
	24-Hour	0.1	43	43.1	260	365
	Annual	0.0	9	9.0	60	80
PM_{10}	24-Hour	90.4	33	123.4	150	150
	Annual	12.6	16	28.6	50	50
$PM_{2.5}$	24-Hour	16.3	13	29.3	65[1]	65
	Annual	2.0	5	7.0	15[1]	15

[1] Standard not yet enforced in Wyoming.

Table F.5.2 Maximum Predicted Impacts Within the JIDPA from Proposed Action and Alternative A Sources - Compared to Ambient Air Quality Standards

Pollutant	Averaging Time	Direct Predicted Impact (µg/m³)	Background Concentration (µg/m³)	Total Concentration (µg/m³)	WAAQS (µg/m³)	NAAQS (µg/m³)
NO_2	Annual	13.7	3.4	17.1	100	100
SO_2	3 Hour	18.3	132	150.3	1,300	1,300
	24-Hour	3.7	43	46.7	260	365
	Annual	0.4	9	9.4	60	80
PM_{10}	24-Hour	113.2	33	146.2	150	150
	Annual	16.0	16	32.0	50	50
$PM_{2.5}$	24-Hour	21.6	13	34.6	65[1]	65
	Annual	3.1	5	8.1	15[1]	15

[1] Standard not yet enforced in Wyoming.

Table F.5.3 Maximum Predicted Impacts Within the JIDPA from Alternative B Sources -Compared to Ambient Air Quality Standards

Pollutant	Averaging Time	Direct Predicted Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	Annual	11.8	3.4	15.2	100	100
SO_2	3 Hour	17.1	132	149.1	1,300	1,300
	24-Hour	4.2	43	47.2	260	365
	Annual	0.3	9	9.3	60	80
PM_{10}	24-Hour	97.1	33	130.1	150	150
	Annual	13.8	16	29.8	50	50
$PM_{2.5}$	24-Hour	17.7	13	30.7	65[1]	65
	Annual	2.7	5	7.7	15[1]	15

[1] Standard not yet enforced in Wyoming.

Table F.5.4 Maximum Predicted Impacts Within the JIDPA from Preferred Alternative Sources - Compared to Ambient Air Quality Standards

Pollutant	Averaging Time	Direct Predicted Impact	Background Concentration	Total Concentration	WAAQS	NAAQS
		($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	6.8	3.4	10.2	100	100
SO_2	3 Hour	20.0	132	152.0	1,300	1,300
	24-Hour	4.1	43	47.1	260	365
	Annual	0.4	9	9.4	60	80
PM_{10}	24-Hour	23.2	33	56.2	150	150
	Annual	3.5	16	19.5	50	50
$PM_{2.5}$	24-Hour	5.0	13	18.0	65[1]	65
	Annual	0.9	5	5.9	15[1]	15

[1] Standard not yet enforced in Wyoming.

Table F.5.5 Maximum Predicted Cumulative Impacts Within the JIDPA from No Action and Regional Sources - Compared to Ambient Air Quality Standards

Pollutant	Averaging Time	Direct Predicted Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	Annual	1.2	3.4	4.6	100	100
SO_2	3 Hour	0.7	132	132.7	1,300	1,300
	24-Hour	0.1	43	43.1	260	365
	Annual	0.0	9	9.0	60	80
PM_{10}	24-Hour	0.3	33	33.3	150	150
	Annual	0.0	16	16.0	50	50
$PM_{2.5}$	24-Hour	0.3	13	13.3	65[1]	65
	Annual	0.0	5	5.0	15[1]	15

[1] Standard not yet enforced in Wyoming.

Table F.5.6 Maximum Predicted Cumulative Impacts Within the JIDPA from Maximum Production and Regional Sources - Compared to Ambient Air Quality Standards

Pollutant	Averaging Time	Direct Predicted Impact	Background Concentration	Total Concentration	WAAQS	NAAQS
		($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)	($\mu g/m^3$)
NO_2	Annual	3.2	3.4	6.6	100	100
SO_2	3 Hour	0.7	132	132.7	1,300	1,300
	24-Hour	0.1	43	43.1	260	365
	Annual	0.0	9	9.0	60	80
PM_{10}	24-Hour	90.5	33	123.5	150	150
	Annual	12.6	16	28.6	50	50
$PM_{2.5}$	24-Hour	16.5	13	29.5	65[1]	65
	Annual	2.0	5	7.0	15[1]	15

[1] Standard not yet enforced in Wyoming.

Table F.5.7 Maximum Predicted Cumulative Impacts Within the JIDPA from Proposed Action and Alternative A and Regional Sources - Compared to Ambient Air Quality Standards

Pollutant	Averaging Time	Direct Predicted Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	Annual	14.0	3.4	17.4	100	100
SO_2	3 Hour	18.2	132	150.2	1,300	1,300
	24-Hour	3.6	43	46.6	260	365
	Annual	0.4	9	9.4	60	80
PM_{10}	24-Hour	113.4	33	146.4	150	150
	Annual	16.0	16	32.0	50	50
$PM_{2.5}$	24-Hour	21.8	13	34.8	65[1]	65
	Annual	3.1	5	8.1	15[1]	15

[1] Standard not yet enforced in Wyoming.

Table F.5.8 Maximum Predicted Cumulative Impacts Within the JIDPA from Alternative B and Regional Sources - Compared to Ambient Air Quality Standards

Pollutant	Averaging Time	Direct Predicted Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	Annual	12.2	3.4	15.6	100	100
SO_2	3 Hour	17.1	132	149.1	1,300	1,300
	24-Hour	4.0	43	47.0	260	365
	Annual	0.3	9	9.3	60	80
PM_{10}	24-Hour	97.2	33	130.2	150	150
	Annual	13.8	16	29.8	50	50
$PM_{2.5}$	24-Hour	17.9	13	30.9	65[1]	65
	Annual	2.7	5	7.7	15[1]	15

[1] Standard not yet enforced in Wyoming.

Table F.5.9 Maximum Predicted Cumulative Impacts Within the JIDPA from Preferred Alternative and Regional Sources - Compared to Ambient Air Quality Standards

Pollutant	Averaging Time	Direct Predicted Impact ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Total Concentration ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)
NO_2	Annual	7.1	3.4	10.5	100	100
SO_2	3 Hour	19.9	132	151.9	1,300	1,300
	24-Hour	4.0	43	47.0	260	365
	Annual	0.4	9	9.4	60	80
PM_{10}	24-Hour	23.3	33	56.3	150	150
	Annual	3.5	16	19.5	50	50
$PM_{2.5}$	24-Hour	5.0	13	18.0	65[1]	65
	Annual	1.0	5	6.0	15[1]	15

[1] Standard not yet enforced in Wyoming.

Table F.6.1 Maximum Modeled Nitrogen (N) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Project Alternative Sources

	Modeling Scenario				
Receptor Area	Max. Prod. (3100 Wells)	Proposed Action and Alternative A WDR250	Alternative B WDR075	Preferred Alternative WDR250	Deposition Analysis Threshold for Project Alone[1]
Bridger WA	0.0067	0.0349	0.0184	0.0154	0.005
Fitzpatrick WA	0.0006	0.0027	0.0013	0.0011	0.005
Grand Teton NP	0.0002	0.0012	0.0006	0.0005	0.005
Popo Agie WA	0.0034	0.0165	0.0084	0.0071	0.005
Teton WA	0.0001	0.0006	0.0003	0.0002	0.005
Washakie WA	0.0001	0.0007	0.0003	0.0003	0.005
Wind River RA	0.0021	0.0099	0.0049	0.0043	0.005
Yellowstone NP	0.0001	0.0004	0.0002	0.0002	0.005

[1] National Park Service (2001)

Table F.6.2 Maximum Modeled Total Nitrogen (N) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Project Alternative and Regional Sources

	No Action		Maximum Production		Proposed Action and Alternative A		Alternative B		Preferred Alternative		
Receptor Area	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Level of Concern for Total Impacts [1]
Bridger WA	0.0295	1.530	0.0348	1.535	0.0570	1.557	0.0421	1.542	0.0415	1.542	3.00
Fitzpatrick WA	0.0052	1.505	0.0058	1.506	0.0079	1.508	0.0065	1.507	0.0063	1.506	3.00
Grand Teton NP	0.0093	1.509	0.0095	1.509	0.0104	1.510	0.0098	1.510	0.0097	1.510	3.00
Popo Agie WA	0.0124	1.512	0.0158	1.516	0.0288	1.529	0.0207	1.521	0.0193	1.519	3.00
Teton WA	0.0031	1.503	0.0032	1.503	0.0036	1.504	0.0033	1.503	0.0033	1.503	3.00
Washakie WA	0.0035	1.503	0.0036	1.504	0.0040	1.504	0.0038	1.504	0.0037	1.504	3.00
Wind River RA	0.0107	1.511	0.0128	1.513	0.0206	1.521	0.0156	1.516	0.0149	1.515	3.00
Yellowstone NP	0.0023	1.502	0.0024	1.502	0.0026	1.503	0.0025	1.502	0.0024	1.502	3.00

[1] Fox et al. (1989)
[2] Includes N deposition value of 1.5 kg/ha-yr measured at the CASTNET/NADP site near Pinedale for the year 2001.

Table F.6.3 Maximum Modeled Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Project Alternative Sources

	Modeling Scenario				
Receptor Area	Max. Prod. (3100 Wells)	Proposed Action and Alternative A WDR250	Alternative B WDR075	Preferred Alternative WDR250	Deposition Analysis Threshold for Project Alone[1]
Bridger WA	0.000032	0.001442	0.000623	0.001540	0.005
Fitzpatrick WA	0.000004	0.000148	0.000055	0.000158	0.005
Grand Teton NP	0.000002	0.000066	0.000025	0.000070	0.005
Popo Agie WA	0.000018	0.000732	0.000295	0.000779	0.005
Teton WA	0.000001	0.000037	0.000014	0.000039	0.005
Washakie WA	0.000001	0.000042	0.000016	0.000045	0.005
Wind River RA	0.000011	0.000427	0.000155	0.000453	0.005
Yellowstone NP	0.000001	0.000024	0.000009	0.000026	0.005

[1] National Park Service (2001)

Table F.6.4 Maximum Modeled Total Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Project Alternative and Regional Sources

	No Action		Maximum Production		Proposed Action and Alternative A		Alternative B		Preferred Alternative		
Receptor Area	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Level of Concern for Total Impacts [1]
Bridger WA	-0.00091	0.749	-0.00091	0.749	-0.00086	0.749	-0.00089	0.749	-0.00085	0.749	5.00
Fitzpatrick WA	-0.00081	0.749	-0.00081	0.749	-0.00076	0.749	-0.00079	0.749	-0.00075	0.749	5.00
Grand Teton NP	0.00337	0.753	0.00338	0.753	0.00344	0.753	0.00340	0.753	0.00344	0.753	5.00
Popo Agie WA	-0.00257	0.747	-0.00257	0.747	-0.00213	0.748	-0.00245	0.748	-0.00210	0.748	5.00
Teton WA	0.00081	0.751	0.00081	0.751	0.00085	0.751	0.00083	0.751	0.00085	0.751	5.00
Washakie WA	-0.00014	0.750	-0.00014	0.750	-0.00013	0.750	-0.00014	0.750	-0.00013	0.750	5.00
Wind River RA	-0.00115	0.749	-0.00115	0.749	-0.00109	0.749	-0.00113	0.749	-0.00109	0.749	5.00
Yellowstone NP	0.00099	0.751	0.00100	0.751	0.00102	0.751	0.00100	0.751	0.00102	0.751	5.00

[1] Fox et al. (1989)

[2] Includes S deposition value of 0.75 kg/ha-yr measured at the CASTNET/NADP site near Pinedale for the year 2001.

Note: Negative results reflect a net decrease in cumulative SO_2 emissions.

Table F.7.1 Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Maximum Production Sources

Lake	Wilderness Area	Background ANC (µeq/L)	Level of Acceptable Change[1] (µeq/L)	ANC Change (µeq/L)	Percent ANC Change (%)
Black Joe	Bridger	67.0	6.70	0.022	0.033%
Deep	Bridger	59.9	5.99	0.024	0.041%
Hobbs	Bridger	69.9	6.99	0.004	0.006%
Lazy Boy	Bridger	18.8	1.00	0.001	0.008%
Upper Frozen	Bridger	5.0	1.00	0.028	0.567%
Lower Saddlebag	Popo Agie	55.5	5.55	0.026	0.046%
Ross	Fitzpatrick	53.5	5.35	0.001	0.003%

[1] USFS Level of Acceptable Change (USFS 2000).

Table F.7.2 Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Proposed Action and Alternative A Sources

Lake	Wilderness Area	Background ANC (µeq/L)	Level of Acceptable Change[1] (µeq/L)	ANC Change (µeq/L)	Percent ANC Change (%)
Black Joe	Bridger	67.0	6.70	0.104	0.155%
Deep	Bridger	59.9	5.99	0.114	0.190%
Hobbs	Bridger	69.9	6.99	0.021	0.030%
Lazy Boy	Bridger	18.8	1.00	0.007	0.038%
Upper Frozen	Bridger	5.0	1.00	0.140	2.808%
Lower Saddlebag	Popo Agie	55.5	5.55	0.128	0.231%
Ross	Fitzpatrick	53.5	5.35	0.007	0.013%

[1] USFS Level of Acceptable Change (USFS 2000).

Table F.7.3 Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Alternative B Sources

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change	Percent ANC Change
		(µeq/L)	(µeq/L)	(µeq/L)	(%)
Black Joe	Bridger	67.0	6.70	0.053	0.079%
Deep	Bridger	59.9	5.99	0.057	0.095%
Hobbs	Bridger	69.9	6.99	0.010	0.014%
Lazy Boy	Bridger	18.8	1.00	0.004	0.019%
Upper Frozen	Bridger	5.0	1.00	0.069	1.386%
Lower Saddlebag	Popo Agie	55.5	5.55	0.065	0.117%
Ross	Fitzpatrick	53.5	5.35	0.003	0.007%

[1] USFS Level of Acceptable Change (USFS 2000).

Table F.7.4 Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Preferred Alternative Sources

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change	Percent ANC Change
		(µeq/L)	(µeq/L)	(µeq/L)	(%)
Black Joe	Bridger	67.0	6.70	0.047	0.070%
Deep	Bridger	59.9	5.99	0.051	0.086%
Hobbs	Bridger	69.9	6.99	0.010	0.014%
Lazy Boy	Bridger	18.8	1.00	0.003	0.016%
Upper Frozen	Bridger	5.0	1.00	0.064	1.286%
Lower Saddlebag	Popo Agie	55.5	5.55	0.057	0.102%
Ross	Fitzpatrick	53.5	5.35	0.003	0.006%

[1] USFS Level of Acceptable Change (USFS 2000).

Table F.7.5 Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from No Action and Regional Sources

Lake	Wilderness Area	Background ANC (µeq/L)	Level of Acceptable Change[1] (µeq/L)	ANC Change (µeq/L)	Percent ANC Change (%)
Black Joe	Bridger	67.0	6.70	0.085	0.127%
Deep	Bridger	59.9	5.99	0.087	0.144%
Hobbs	Bridger	69.9	6.99	0.042	0.060%
Lazy Boy	Bridger	18.8	1.00	0.025	0.132%
Upper Frozen	Bridger	5.0	1.00	0.091	1.826%
Lower Saddlebag	Popo Agie	55.5	5.55	0.096	0.174%
Ross	Fitzpatrick	53.5	5.35	0.026	0.048%

[1] USFS Level of Acceptable Change (USFS 2000).

Table F.7.6 Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Maximum Production and Regional Sources

Lake	Wilderness Area	Background ANC (μeq/L)	Level of Acceptable Change[1] (μeq/L)	ANC Change (μeq/L)	Percent ANC Change (%)
Black Joe	Bridger	67.0	6.70	0.107	0.160%
Deep	Bridger	59.9	5.99	0.111	0.185%
Hobbs	Bridger	69.9	6.99	0.046	0.066%
Lazy Boy	Bridger	18.8	1.00	0.026	0.140%
Upper Frozen	Bridger	5.0	1.00	0.120	2.391%
Lower Saddlebag	Popo Agie	55.5	5.55	0.122	0.220%
Ross	Fitzpatrick	53.5	5.35	0.027	0.050%

[1] USFS Level of Acceptable Change (USFS 2000).

Table F.7.7 Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Proposed Action and Alternative A and Regional Sources

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change	Percent ANC Change
		(µeq/L)	(µeq/L)	(µeq/L)	(%)
Black Joe	Bridger	67.0	6.70	0.185	0.276%
Deep	Bridger	59.9	5.99	0.196	0.327%
Hobbs	Bridger	69.9	6.99	0.062	0.089%
Lazy Boy	Bridger	18.8	1.00	0.032	0.168%
Upper Frozen	Bridger	5.0	1.00	0.227	4.532%
Lower Saddlebag	Popo Agie	55.5	5.55	0.220	0.397%
Ross	Fitzpatrick	53.5	5.35	0.032	0.060%

[1] USFS Level of Acceptable Change (USFS 2000).

Table F.7.8 Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Alternative B and Regional Sources

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change	Percent ANC Change
		(µeq/L)	(µeq/L)	(µeq/L)	(%)
Black Joe	Bridger	67.0	6.70	0.137	0.204%
Deep	Bridger	59.9	5.99	0.142	0.237%
Hobbs	Bridger	69.9	6.99	0.051	0.074%
Lazy Boy	Bridger	18.8	1.00	0.028	0.150%
Upper Frozen	Bridger	5.0	1.00	0.159	3.173%
Lower Saddlebag	Popo Agie	55.5	5.55	0.160	0.287%
Ross	Fitzpatrick	53.5	5.35	0.029	0.054%

[1] USFS Level of Acceptable Change (USFS 2000).

Table F.7.9 Maximum Modeled Change in Acid Neutralizing Capacity (ANC) at Acid Sensitive Lakes from Preferred Alternative and Regional Sources

Lake	Wilderness Area	Background ANC	Level of Acceptable Change[1]	ANC Change	Percent ANC Change
		(µeq/L)	(µeq/L)	(µeq/L)	(%)
Black Joe	Bridger	67.0	6.70	0.127	0.190%
Deep	Bridger	59.9	5.99	0.133	0.221%
Hobbs	Bridger	69.9	6.99	0.050	0.072%
Lazy Boy	Bridger	18.8	1.00	0.027	0.146%
Upper Frozen	Bridger	5.0	1.00	0.149	2.982%
Lower Saddlebag	Popo Agie	55.5	5.55	0.147	0.265%
Ross	Fitzpatrick	53.5	5.35	0.028	0.053%

[1] USFS Level of Acceptable Change (USFS 2000).

Table F.8.1 Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Maximum Production Sources

	FLAG Background Data[1]			IMPROVE Background Data[1]		
Receptor Area	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv
	(Δdv)	(days)	(days)	(Δdv)	(days)	(days)
Bridger WA	1.02	3	1	1.14	3	1
Fitzpatrick WA	0.13	0	0	0.15	0	0
Grand Teton NP	0.08	0	0	0.08	0	0
Popo Agie WA	0.21	0	0	0.24	0	0
Teton WA	0.03	0	0	0.03	0	0
Washakie WA	0.06	0	0	0.06	0	0
Wind River RA	0.18	0	0	0.20	0	0
Yellowstone NP	0.04	0	0	0.04	0	0

[1] Δdv = change in deciview.

Table F.8.2 Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Proposed Action and Alternative A Sources

	FLAG Background Data[1]			IMPROVE Background Data[1]		
Receptor Area	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv
	(Δdv)	(days)	(days)	(Δdv)	(days)	(days)
Bridger WA	3.16	22	9	3.48	28	10
Fitzpatrick WA	0.56	2	0	0.64	3	0
Grand Teton NP	0.32	0	0	0.33	0	0
Popo Agie WA	0.54	2	0	0.62	2	0
Teton WA	0.14	0	0	0.14	0	0
Washakie WA	0.24	0	0	0.24	0	0
Wind River RA	0.45	0	0	0.52	1	0
Yellowstone NP	0.16	0	0	0.16	0	0

[1] Δdv = change in deciview.

Table F.8.3 Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Alternative B Sources

	FLAG Background Data[1]			IMPROVE Background Data[1]		
Receptor Area	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv
	(Δdv)	(days)	(days)	(Δdv)	(days)	(days)
Bridger WA	1.71	11	2	1.90	12	4
Fitzpatrick WA	0.28	0	0	0.32	0	0
Grand Teton NP	0.17	0	0	0.17	0	0
Popo Agie WA	0.29	0	0	0.34	0	0
Teton WA	0.07	0	0	0.07	0	0
Washakie WA	0.12	0	0	0.12	0	0
Wind River RA	0.24	0	0	0.28	0	0
Yellowstone NP	0.08	0	0	0.08	0	0

[1] Δdv = change in deciview.

Table F.8.4 Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Preferred Alternative Sources

	FLAG Background Data[1]			IMPROVE Background Data[1]		
Receptor Area	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv
	(Δdv)	(days)	(days)	(Δdv)	(days)	(days)
Bridger WA	1.50	9	2	1.66	9	3
Fitzpatrick WA	0.28	0	0	0.33	0	0
Grand Teton NP	0.13	0	0	0.14	0	0
Popo Agie WA	0.25	0	0	0.29	0	0
Teton WA	0.06	0	0	0.06	0	0
Washakie WA	0.10	0	0	0.10	0	0
Wind River RA	0.22	0	0	0.26	0	0
Yellowstone NP	0.06	0	0	0.06	0	0

[1] Δdv = change in deciview.

Table F.8.5 Maximum Modeled Cumulative Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from No Action and Regional Sources

	FLAG Background Data[1]			IMPROVE Background Data[1]		
Receptor Area	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv
	(Δdv)	(days)	(days)	(Δdv)	(days)	(days)
Bridger WA	1.69	8	3	1.94	11	3
Fitzpatrick WA	0.42	0	0	0.49	0	0
Grand Teton NP	0.33	0	0	0.33	0	0
Popo Agie WA	0.49	0	0	0.58	1	0
Teton WA	0.14	0	0	0.14	0	0
Washakie WA	0.17	0	0	0.17	0	0
Wind River RA	0.73	3	0	0.81	3	0
Yellowstone NP	0.15	0	0	0.16	0	0

[1] Δdv = change in deciview.

Table F.8.6 Maximum Modeled Cumulative Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Maximum Production and Regional Sources

	FLAG Background Data[1]			IMPROVE Background Data[1]		
Receptor Area	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv
	(Δdv)	(days)	(days)	(Δdv)	(days)	(days)
Bridger WA	1.98	12	4	2.26	15	4
Fitzpatrick WA	0.48	0	0	0.56	1	0
Grand Teton NP	0.34	0	0	0.35	0	0
Popo Agie WA	0.57	1	0	0.66	3	0
Teton WA	0.16	0	0	0.16	0	0
Washakie WA	0.20	0	0	0.20	0	0
Wind River RA	0.82	3	0	0.92	4	0
Yellowstone NP	0.17	0	0	0.17	0	0

[1] Δdv = change in deciview.

Table F.8.7 Maximum Modeled Cumulative Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Proposed Action and Alternative A and Regional Sources

	FLAG Background Data[1]			IMPROVE Background Data[1]		
Receptor Area	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv
	(Δdv)	(days)	(days)	(Δdv)	(days)	(days)
Bridger WA	3.65	40	11	4.01	46	17
Fitzpatrick WA	0.76	5	0	0.87	7	0
Grand Teton NP	0.49	0	0	0.50	1	0
Popo Agie WA	0.85	8	0	0.99	16	0
Teton WA	0.23	0	0	0.24	0	0
Washakie WA	0.34	0	0	0.34	0	0
Wind River RA	1.08	6	1	1.21	12	2
Yellowstone NP	0.25	0	0	0.25	0	0

[1] Δdv = change in deciview.

Table F.8.8 Maximum Modeled Cumulative Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Alternative B and Regional Sources

	FLAG Background Data[1]			IMPROVE Background Data[1]		
Receptor Area	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv
	(Δdv)	(days)	(days)	(Δdv)	(days)	(days)
Bridger WA	2.38	21	5	2.71	28	7
Fitzpatrick WA	0.53	2	0	0.61	2	0
Grand Teton NP	0.36	0	0	0.36	0	0
Popo Agie WA	0.68	4	0	0.78	6	0
Teton WA	0.18	0	0	0.18	0	0
Washakie WA	0.25	0	0	0.25	0	0
Wind River RA	0.90	4	0	1.01	6	1
Yellowstone NP	0.18	0	0	0.18	0	0

[1] Δdv = change in deciview.

Table F.8.9 Maximum Modeled Cumulative Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Preferred Alternative and Regional Sources

	FLAG Background Data[1]			IMPROVE Background Data[1]		
Receptor Area	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 0.5 Δdv	Number of Days > 1.0 Δdv
	(Δdv)	(days)	(days)	(Δdv)	(days)	(days)
Bridger WA	2.29	19	5	2.62	21	6
Fitzpatrick WA	0.49	0	0	0.57	2	0
Grand Teton NP	0.34	0	0	0.35	0	0
Popo Agie WA	0.64	2	0	0.75	4	0
Teton WA	0.17	0	0	0.17	0	0
Washakie WA	0.23	0	0	0.23	0	0
Wind River RA	0.86	4	0	0.96	4	0
Yellowstone NP	0.17	0	0	0.18	0	0

[1] Δdv = change in deciview.

Table F.8.10 Bridger Wilderness Area - Summary of Days Above Visibility Thresholds Using FLAG Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
1	1	1	-	-	-	-	0.76	0.77	0.81	0.77	0.77
3	1	3	-	-	-	-	-	-	0.56	-	-
5	1	5	0.79	2.93	1.65	1.43	1.69	1.98	3.22	2.38	2.29
6	1	6	0.58	1.65	0.93	0.75	0.69	1.15	2.16	1.48	1.30
16	1	16	-	-	-	-	-	-	0.54	-	-
17	1	17	-	-	-	-	-	-	0.50	-	-
19	1	19	-	0.53	-	-	-	-	0.65	-	-
20	1	20	-	0.70	-	-	-	-	0.89	0.59	0.54
22	1	22	-	1.34	0.73	0.66	-	0.65	1.64	1.04	0.97
23	1	23	-	0.66	-	-	1.02	1.19	1.61	1.28	1.27
25	1	25	-	0.53	-	-	-	-	0.62	-	-
26	1	26	-	-	-	-	-	-	0.62	-	-
27	1	27	-	-	-	-	0.80	0.83	0.92	0.85	0.85
29	1	29	-	1.78	0.89	0.94	-	-	1.85	0.97	1.01
39	2	8	-	0.65	-	-	-	-	0.69	-	-
43	2	12	-	0.82	-	-	-	-	0.99	0.63	0.57
44	2	13	-	-	-	-	-	-	0.58	-	-
52	2	21	-	-	-	-	0.62	0.62	0.62	0.62	0.62
60	3	1	-	-	-	-	-	0.52	0.85	0.62	0.62
61	3	2	-	-	-	-	-	-	0.59	-	-
62	3	3	-	-	-	-	-	-	0.71	-	-
85	3	26	-	-	-	-	-	-	0.68	-	-
89	3	30	-	-	-	-	-	-	0.56	-	-
107	4	17	-	1.24	0.65	0.59	-	-	1.28	0.70	0.63
108	4	18	-	1.75	0.90	0.86	-	-	1.79	0.94	0.90
131	5	11	-	-	-	-	-	-	0.70	-	-
262	9	19	-	-	-	-	-	-	0.51	-	-
264	9	21	-	0.60	-	-	-	-	0.69	-	-
273	9	30	-	0.99	0.53	-	-	0.57	1.31	0.86	0.82
279	10	6	-	-	-	-	-	-	0.51	-	-
281	10	8	-	0.67	-	-	-	-	0.73	0.51	-
308	11	4	-	-	-	-	-	-	0.66	-	-
350	12	16	-	-	-	-	-	-	0.54	-	-
351	12	17	-	1.16	0.71	0.55	-	-	1.26	0.81	0.65
352	12	18	-	0.90	0.55	-	-	-	0.95	0.61	-
353	12	19	-	0.73	-	-	-	-	0.82	-	-
355	12	21	1.02	3.16	1.71	1.50	1.00	1.65	3.65	2.28	2.05
356	12	22	-	1.24	0.61	0.53	-	0.77	1.55	0.94	0.86
361	12	27	-	0.56	-	-	0.70	0.76	0.93	0.81	0.78
362	12	28	-	0.74	-	-	-	-	0.99	0.59	0.63
Number of Days Δ dv >= 0.5			2	14	7	6	6	9	30	14	14
Number of Days Δ dv >= 1.0			1	9	2	2	3	4	11	5	5
Maximum Δ dv			0.79	2.93	1.65	1.43	1.69	1.98	3.22	2.38	2.29

Table F.8.11 Bridger Wilderness Area - Summary of Days Above Visibility Thresholds Using IMPROVE Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
1	1	1	-	-	-	-	0.88	0.89	0.93	0.89	0.89
2	1	2	-	-	-	-	-	-	0.54	-	-
3	1	3	-	0.53	-	-	-	-	0.65	-	-
5	1	5	0.91	3.33	1.89	1.64	1.94	2.26	3.66	2.71	2.62
6	1	6	0.67	1.89	1.07	0.86	0.80	1.33	2.47	1.70	1.49
16	1	16	-	-	-	-	-	-	0.62	-	-
17	1	17	-	-	-	-	-	-	0.58	-	-
19	1	19	-	0.62	-	-	-	-	0.75	-	-
20	1	20	-	0.81	-	-	-	-	1.03	0.69	0.63
22	1	22	-	1.54	0.84	0.76	-	0.75	1.88	1.20	1.11
23	1	23	-	0.76	-	-	1.17	1.37	1.85	1.47	1.46
25	1	25	-	0.61	-	-	-	-	0.72	-	-
26	1	26	-	-	-	-	-	-	0.71	0.51	-
27	1	27	-	-	-	-	0.92	0.96	1.06	0.97	0.98
29	1	29	-	2.04	1.03	1.08	-	0.53	2.12	1.12	1.16
38	2	7	-	0.52	-	-	-	-	0.57	-	-
39	2	8	-	0.76	-	-	-	-	0.80	-	-
42	2	11	-	-	-	-	-	-	0.50	-	-
43	2	12	-	0.95	0.52	-	-	-	1.15	0.73	0.66
44	2	13	-	-	-	-	-	-	0.67	0.51	-
52	2	21	-	-	-	-	0.72	0.72	0.72	0.72	0.72
60	3	1	-	-	-	-	0.52	0.61	0.99	0.72	0.72
61	3	2	-	-	-	-	-	-	0.69	0.51	-
62	3	3	-	0.57	-	-	0.51	0.53	0.82	0.58	0.51
73	3	14	-	-	-	-	0.52	0.53	0.54	0.53	0.53
84	3	25	-	-	-	-	-	-	0.52	-	-
85	3	26	-	0.54	-	-	-	-	0.78	0.54	-
89	3	30	-	0.52	-	-	-	-	0.65	-	-
107	4	17	-	1.12	0.59	0.53	-	-	1.16	0.63	0.57
108	4	18	-	1.59	0.81	0.78	-	-	1.63	0.86	0.82
131	5	11	-	-	-	-	-	-	0.64	-	-
264	9	21	-	-	-	-	-	-	0.57	-	-
273	9	30	-	0.82	-	-	-	-	1.08	0.71	0.67
279	10	6	-	-	-	-	-	-	0.58	-	-
280	10	7	-	-	-	-	-	-	0.54	-	-
281	10	8	-	0.76	0.51	-	-	-	0.82	0.57	-
308	11	4	-	0.54	-	-	-	-	0.73	0.51	-
325	11	21	-	-	-	-	-	-	0.55	-	-
350	12	16	-	0.52	-	-	-	-	0.60	-	-
351	12	17	-	1.29	0.79	0.62	-	-	1.40	0.91	0.72
352	12	18	-	1.00	0.62	-	-	-	1.06	0.68	-
353	12	19	-	0.82	-	-	-	-	0.91	-	-
355	12	21	1.14	3.48	1.90	1.66	1.11	1.83	4.01	2.52	2.27
356	12	22	-	1.38	0.68	0.60	-	0.86	1.72	1.04	0.95
361	12	27	-	0.62	-	-	0.78	0.85	1.03	0.90	0.87
362	12	28	-	0.82	-	-	-	0.51	1.11	0.66	0.70
Number of Days Δ dv >= 0.5			3	28	12	9	11	15	46	28	21
Number of Days Δ dv >= 1.0			1	10	4	3	3	4	17	7	6
Maximum Δ dv			1.14	3.48	1.90	1.66	1.94	2.26	4.01	2.71	2.62

Table F.8.12 Fitzpatrick Wilderness Area - Summary of Days Above Visibility Thresholds Using FLAG Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
5	1	5	-	-	-	-	-	-	0.51	-	-
25	1	25	-	-	-	-	-	-	0.66	-	-
26	1	26	-	0.53	-	-	-	-	0.76	0.51	-
29	1	29	-	0.56	-	-	-	-	0.60	-	-
44	2	13	-	-	-	-	-	-	0.61	0.53	-
Number of Days Δ dv >= 0.5			0	2	0	0	0	0	5	2	0
Number of Days Δ dv >= 1.0			0	0	0	0	0	0	0	0	0
Maximum Δ dv			0.00	0.56	0.00	0.00	0.00	0.00	0.76	0.53	0.00

Table F.8.13 Fitzpatrick Wilderness Area - Summary of Days Above Visibility Thresholds Using IMPROVE Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
5	1	5	-	-	-	-	-	-	0.59	-	-
25	1	25	-	0.55	-	-	-	-	0.76	-	-
26	1	26	-	0.62	-	-	-	-	0.87	0.59	0.52
29	1	29	-	0.64	-	-	-	-	0.69	-	-
44	2	13	-	-	-	-	-	0.56	0.71	0.61	0.57
82	3	23	-	-	-	-	-	-	0.54	-	-
355	12	21	-	-	-	-	-	-	0.55	-	-
Number of Days Δ dv >= 0.5			0	3	0	0	0	1	7	2	2
Number of Days Δ dv >= 1.0			0	0	0	0	0	0	0	0	0
Maximum Δ dv			0.00	0.64	0.00	0.00	0.00	0.56	0.87	0.61	0.57

Table F.8.14 Popo Agie Wilderness Area - Summary of Days Above Visibility Thresholds Using FLAG Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
6	1	6	-	0.54	-	-	-	-	0.83	0.59	0.54
23	1	23	-	-	-	-	-	-	0.64	0.51	-
60	3	1	-	-	-	-	-	0.57	0.85	0.68	0.64
61	3	2	-	-	-	-	-	-	0.60	-	-
280	10	7	-	-	-	-	-	-	0.52	-	-
356	12	22	-	0.54	-	-	-	-	0.73	0.51	-
361	12	27	-	-	-	-	-	-	0.59	-	-
362	12	28	-	-	-	-	-	-	0.59	-	-
Number of Days Δ dv >= 0.5			0	2	0	0	0	1	8	4	2
Number of Days Δ dv >= 1.0			0	0	0	0	0	0	0	0	0
Maximum Δ dv			0.00	0.54	0.00	0.00	0.00	0.57	0.85	0.68	0.64

Table F.8.15 Popo Agie Wilderness Area - Summary of Days Above Visibility Thresholds Using IMPROVE Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
1	1	1	-	-	-	-	-	-	0.52	-	-
2	1	2	-	-	-	-	-	-	0.52	-	-
6	1	6	-	0.62	-	-	-	0.52	0.95	0.68	0.63
17	1	17	-	-	-	-	-	-	0.51	-	-
22	1	22	-	-	-	-	-	-	0.54	-	-
23	1	23	-	-	-	-	-	0.51	0.74	0.59	0.57
42	2	11	-	-	-	-	-	-	0.57	-	-
44	2	13	-	-	-	-	-	-	0.50	-	-
45	2	14	-	-	-	-	-	-	0.53	-	-
60	3	1	-	-	-	-	0.58	0.66	0.99	0.78	0.75
61	3	2	-	-	-	-	-	-	0.70	0.53	0.50
280	10	7	-	-	-	-	-	-	0.59	-	-
325	11	21	-	-	-	-	-	-	0.53	-	-
356	12	22	-	0.60	-	-	-	-	0.82	0.57	-
361	12	27	-	-	-	-	-	-	0.65	0.54	-
362	12	28	-	-	-	-	-	-	0.66	-	-
Number of Days Δ dv >= 0.5			0	2	0	0	1	3	16	6	4
Number of Days Δ dv >= 1.0			0	0	0	0	0	0	0	0	0
Maximum Δ dv			0.00	0.62	0.00	0.00	0.58	0.66	0.99	0.78	0.75

Table F.8.16 Wind River Roadless Area - Summary of Days Above Visibility Thresholds Using FLAG Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
26	1	26	-	-	-	-	-	-	0.56	-	-
44	2	13	-	-	-	-	0.65	0.73	0.98	0.81	0.76
60	3	1	-	-	-	-	-	-	0.63	0.52	0.51
73	3	14	-	-	-	-	0.54	0.56	0.61	0.57	0.57
356	12	22	-	-	-	-	-	-	0.61	-	-
361	12	27	-	-	-	-	0.73	0.82	1.08	0.90	0.86
Number of Days Δ dv >= 0.5			0	0	0	0	3	3	6	4	4
Number of Days Δ dv >= 1.0			0	0	0	0	0	0	1	0	0
Maximum Δ dv			0.00	0.00	0.00	0.00	0.73	0.82	1.08	0.90	0.86

Table F.8.17 Wind River Roadless Area - Summary of Days Above Visibility Thresholds Using IMPROVE Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
6	1	6	-	-	-	-	-	-	0.51	-	-
15	1	15	-	-	-	-	-	-	0.57	0.52	-
26	1	26	-	-	-	-	-	-	0.64	-	-
29	1	29	-	0.52	-	-	-	-	0.58	-	-
43	2	12	-	-	-	-	-	-	0.55	-	-
44	2	13	-	-	-	-	0.75	0.85	1.13	0.94	0.88
60	3	1	-	-	-	-	-	0.53	0.73	0.61	0.59
61	3	2	-	-	-	-	-	-	0.52	-	-
73	3	14	-	-	-	-	0.63	0.65	0.71	0.66	0.67
280	10	7	-	-	-	-	-	-	0.56	-	-
356	12	22	-	-	-	-	-	-	0.68	0.53	-
361	12	27	-	-	-	-	0.81	0.92	1.21	1.01	0.96
Number of Days Δ dv >= 0.5			0	1	0	0	3	4	12	6	4
Number of Days Δ dv >= 1.0			0	0	0	0	0	0	2	1	0
Maximum Δ dv			0.00	0.52	0.00	0.00	0.81	0.92	1.21	1.01	0.96

Table F.9.1 Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Maximum Production Sources

	FLAG Background Data		IMPROVE Background Data	
Receptor Area	Maximum Visibility Impact	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 1.0 Δdv
	(Δdv)[1]	(days)	(Δdv)[1]	(days)
Big Piney	0.57	0	0.66	0
Big Sandy	0.76	0	0.85	0
Boulder	0.49	0	0.56	0
Bronx	0.31	0	0.36	0
Cora	0.60	0	0.69	0
Daniel	0.49	0	0.57	0
Farson	0.47	0	0.55	0
Labarge	0.26	0	0.30	0
Merna	0.19	0	0.22	0
Pinedale	0.93	0	1.07	1

[1] Δdv = change in deciview.

Table F.9.2 Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Proposed Action and Alternative A Sources

	FLAG Background Data		IMPROVE Background Data	
Receptor Area	Maximum Visibility Impact	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 1.0 Δdv
	(Δdv)[1]	(days)	(Δdv)[1]	(days)
Big Piney	1.75	2	2.01	6
Big Sandy	2.77	19	3.05	23
Boulder	2.09	9	2.39	12
Bronx	1.48	1	1.70	1
Cora	2.81	1	3.20	1
Daniel	2.24	1	2.56	1
Farson	2.04	5	2.33	6
Labarge	1.15	2	1.32	2
Merna	0.68	0	0.79	0
Pinedale	3.78	2	4.27	3

[1] Δdv = change in deciview.

Table F.9.3 Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Alternative B Sources

	FLAG Background Data		IMPROVE Background Data	
Receptor Area	Maximum Visibility Impact	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 1.0 Δdv
	(Δdv)[1]	(days)	(Δdv)[1]	(days)
Big Piney	0.90	0	1.04	1
Big Sandy	1.61	3	1.79	6
Boulder	1.08	2	1.24	3
Bronx	0.73	0	0.85	0
Cora	1.44	1	1.66	1
Daniel	1.15	1	1.32	1
Farson	1.05	1	1.21	3
Labarge	0.57	0	0.66	0
Merna	0.36	0	0.42	0
Pinedale	2.09	1	2.39	1

[1] Δdv = change in deciview.

Table F.9.4 Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Preferred Alternative Sources

	FLAG Background Data		IMPROVE Background Data	
Receptor Area	Maximum Visibility Impact	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 1.0 Δdv
	(Δdv)[1]	(days)	(Δdv)[1]	(days)
Big Piney	0.79	0	0.92	0
Big Sandy	1.30	1	1.45	4
Boulder	0.95	0	1.10	2
Bronx	0.77	0	0.89	0
Cora	1.52	1	1.75	1
Daniel	1.19	1	1.37	1
Farson	1.03	1	1.19	1
Labarge	0.50	0	0.57	0
Merna	0.30	0	0.35	0
Pinedale	2.07	1	2.37	1

[1] Δdv = change in deciview.

Table F.9.5 Maximum Modeled Cumulative Visibility Impacts at Wyoming Regional Community Locations from No Action and Regional Sources

	FLAG Background Data		IMPROVE Background Data	
Receptor Area	Maximum Visibility Impact	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 1.0 Δdv
	(Δdv)[1]	(days)	(Δdv)[1]	(days)
Big Piney	1.91	5	2.18	7
Big Sandy	1.27	1	1.45	2
Boulder	2.56	4	2.92	4
Bronx	0.66	0	0.74	0
Cora	0.74	0	0.85	0
Daniel	0.68	0	0.79	0
Farson	1.33	3	1.48	3
Labarge	1.62	6	1.86	6
Merna	0.88	0	0.98	0
Pinedale	1.55	2	1.78	2

[1] Δdv = change in deciview.

Table F.9.6 Maximum Modeled Cumulative Visibility Impacts at Wyoming Regional Community Locations from Maximum Production and Regional Sources

Receptor Area	FLAG Background Data		IMPROVE Background Data	
	Maximum Visibility Impact	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 1.0 Δdv
	(Δdv)[1]	(days)	(Δdv)[1]	(days)
Big Piney	1.98	7	2.26	11
Big Sandy	1.64	4	1.88	9
Boulder	2.67	5	3.04	5
Bronx	0.69	0	0.77	0
Cora	0.81	0	0.93	0
Daniel	0.79	0	0.89	0
Farson	1.47	6	1.69	8
Labarge	1.79	6	2.05	6
Merna	0.91	0	1.01	1
Pinedale	1.69	4	1.94	5

[1] Δdv = change in deciview.

Table F.9.7 Maximum Modeled Cumulative Visibility Impacts at Wyoming Regional Community Locations from Proposed Action and Alternative A and Regional Sources

	FLAG Background Data		IMPROVE Background Data	
Receptor Area	Maximum Visibility Impact	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 1.0 Δdv
	(Δdv)[1]	(days)	(Δdv)[1]	(days)
Big Piney	2.29	16	2.62	20
Big Sandy	3.29	31	3.62	34
Boulder	3.26	19	3.70	21
Bronx	1.56	1	1.79	1
Cora	2.92	6	3.32	8
Daniel	2.34	6	2.67	11
Farson	2.49	11	2.75	12
Labarge	2.54	9	2.90	12
Merna	0.99	0	1.13	5
Pinedale	3.91	8	4.41	10

[1] Δdv = change in deciview.

Table F.9.8 Maximum Modeled Cumulative Visibility Impacts at Wyoming Regional Community Locations from Alternative B and Regional Sources

	FLAG Background Data		IMPROVE Background Data	
Receptor Area	Maximum Visibility Impact	Number of Days > 1.0 Δdv	Maximum Visibility Impact	Number of Days > 1.0 Δdv
	(Δdv)[1]	(days)	(Δdv)[1]	(days)
Big Piney	2.05	10	2.34	14
Big Sandy	2.20	13	2.43	16
Boulder	2.79	9	3.17	9
Bronx	0.82	0	0.94	0
Cora	1.57	1	1.80	3
Daniel	1.26	1	1.44	2
Farson	1.78	10	2.04	10
Labarge	2.07	6	2.37	6
Merna	0.94	0	1.05	1
Pinedale	2.23	5	2.55	8

[1] Δdv = change in deciview.

Table F.9.9 Maximum Modeled Cumulative Visibility Impacts at Wyoming Regional Community Locations from Preferred Alternative and Regional Sources

Receptor Area	FLAG Background Data		IMPROVE Background Data	
	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv (days)
Big Piney	1.99	8	2.28	13
Big Sandy	1.88	9	2.13	12
Boulder	2.72	6	3.09	9
Bronx	0.84	0	0.97	0
Cora	1.62	1	1.86	2
Daniel	1.28	1	1.47	2
Farson	1.63	8	1.87	10
Labarge	2.02	6	2.30	6
Merna	0.93	0	1.03	1
Pinedale	2.19	5	2.50	6

[1] Δdv = change in deciview.

Table F.9.10 Big Piney - Summary of Days Above Visibility Thresholds Using FLAG Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
5	1	5	-	-	-	-	-	-	1.45	-	-
19	1	19	-	-	-	-	1.27	1.27	1.27	1.27	1.27
20	1	20	-	-	-	-	-	-	1.36	1.03	-
22	1	22	-	-	-	-	1.47	1.63	2.29	1.87	1.85
23	1	23	-	-	-	-	1.91	1.98	2.17	2.05	1.99
27	1	27	-	-	-	-	1.06	1.09	1.15	1.11	1.09
39	2	8	-	-	-	-	-	-	1.15	-	-
43	2	12	-	-	-	-	-	-	1.45	1.08	1.05
60	3	1	-	1.75	-	-	-	1.09	2.19	1.40	1.35
61	3	2	-	1.38	-	-	-	-	1.54	-	-
123	5	3	-	-	-	-	-	-	1.14	-	-
353	12	19	-	-	-	-	-	-	1.16	-	-
354	12	20	-	-	-	-	-	-	1.03	-	-
355	12	21	-	-	-	-	-	1.12	1.75	1.36	1.33
356	12	22	-	-	-	-	-	-	1.22	1.04	-
360	12	26	-	-	-	-	1.25	1.25	1.25	1.25	1.25
Number of Days Δ dv >= 1.0			0	2	0	0	5	7	16	10	8
Maximum Δ dv			0.00	1.75	0.00	0.00	1.91	1.98	2.29	2.05	1.99

Table F.9.11 Big Piney - Summary of Days Above Visibility Thresholds Using IMPROVE Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
2	1	2	-	-	-	-	1.10	1.10	1.10	1.10	1.10
5	1	5	-	1.14	-	-	-	-	1.66	1.14	1.08
19	1	19	-	-	-	-	1.46	1.46	1.46	1.46	1.46
20	1	20	-	-	-	-	-	-	1.56	1.19	1.15
22	1	22	-	1.09	-	-	1.69	1.87	2.62	2.14	2.12
23	1	23	-	-	-	-	2.18	2.26	2.47	2.34	2.28
27	1	27	-	-	-	-	1.22	1.25	1.32	1.27	1.26
39	2	8	-	1.00	-	-	-	-	1.33	-	-
43	2	12	-	1.04	-	-	-	1.05	1.67	1.25	1.21
60	3	1	-	2.01	1.04	1.00	-	1.26	2.51	1.62	1.56
61	3	2	-	1.59	-	-	-	-	1.77	1.08	-
86	3	27	-	-	-	-	-	-	1.16	-	-
123	5	3	-	-	-	-	-	-	1.03	-	-
350	12	16	-	-	-	-	-	-	1.11	-	-
352	12	18	-	-	-	-	-	-	1.03	-	-
353	12	19	-	-	-	-	-	1.02	1.29	1.09	1.08
354	12	20	-	-	-	-	-	-	1.14	-	-
355	12	21	-	-	-	-	1.10	1.25	1.94	1.52	1.48
356	12	22	-	-	-	-	-	1.04	1.36	1.16	1.02
360	12	26	-	-	-	-	1.39	1.39	1.39	1.39	1.39
Number of Days Δ dv >= 1.0			0	6	1	1	7	11	20	14	13
Maximum Δ dv			0.00	2.01	1.04	1.00	2.18	2.26	2.62	2.34	2.28

Table F.9.12 Big Sandy - Summary of Days Above Visibility Thresholds Using FLAG Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
1	1	1	-	-	-	-	-	-	1.26	1.00	-
2	1	2	-	-	-	-	-	-	1.06	-	-
3	1	3	-	-	-	-	-	-	1.19	-	-
5	1	5	-	-	-	-	-	-	1.08	-	-
6	1	6	-	1.63	-	-	-	1.19	2.24	1.56	1.49
16	1	16	-	-	-	-	-	-	1.07	-	-
19	1	19	-	-	-	-	-	-	1.17	-	-
21	1	21	-	1.25	-	-	-	-	1.36	-	-
22	1	22	-	1.96	-	1.06	-	-	2.39	1.35	1.53
23	1	23	-	1.50	-	-	-	1.22	2.28	1.68	1.63
27	1	27	-	1.45	-	-	1.27	1.64	2.54	1.90	1.94
29	1	29	-	1.17	-	-	-	-	1.52	1.00	-
43	2	12	-	1.13	-	-	-	-	1.34	-	-
85	3	26	-	-	-	-	-	-	1.30	-	-
89	3	30	-	1.87	-	1.08	-	-	2.03	1.16	1.24
91	4	1	-	-	-	-	-	-	1.12	-	-
115	4	25	-	-	-	-	-	-	1.06	-	-
262	9	19	-	1.24	-	-	-	-	1.37	-	-
272	9	29	-	1.43	-	-	-	-	1.67	1.03	1.01
273	9	30	-	1.80	1.00	-	-	-	2.17	1.39	1.37
308	11	4	-	-	-	-	-	-	1.13	-	-
319	11	15	-	1.01	-	-	-	-	1.08	-	-
351	12	17	-	1.00	-	-	-	-	1.10	-	-
353	12	19	-	1.53	-	-	-	-	1.63	-	-
355	12	21	-	2.77	1.61	1.39	-	1.40	3.29	2.20	1.96
356	12	22	-	1.98	1.19	1.09	-	-	2.36	1.61	1.49
358	12	24	-	1.20	-	-	-	-	1.65	1.16	1.12
359	12	25	-	1.33	-	-	-	-	1.52	-	-
360	12	26	-	-	-	-	-	-	1.04	-	-
361	12	27	-	-	-	-	-	-	1.20	-	-
362	12	28	-	1.69	-	-	-	-	2.23	1.52	1.48
Number of Days Δ dv >= 1.0			0	19	3	4	1	4	31	13	11
Maximum Δ dv			0.00	2.77	1.61	1.39	1.27	1.64	3.29	2.20	1.96

Table F.9.13 Big Sandy - Summary of Days Above Visibility Thresholds Using IMPROVE Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
1	1	1	-	-	-	-	-	1.04	1.45	1.16	1.13
2	1	2	-	-	-	-	-	-	1.22	-	-
3	1	3	-	1.06	-	-	-	-	1.37	1.06	-
5	1	5	-	1.06	-	-	-	-	1.24	-	-
6	1	6	-	1.87	1.05	-	-	1.37	2.56	1.78	1.71
16	1	16	-	-	-	-	-	-	1.24	-	-
19	1	19	-	-	-	-	-	-	1.35	1.12	-
21	1	21	-	1.44	-	-	-	-	1.57	1.07	-
22	1	22	-	2.24	-	1.22	-	1.12	2.73	1.55	1.75
23	1	23	-	1.72	1.01	-	1.08	1.41	2.60	1.92	1.87
27	1	27	-	1.67	-	-	1.45	1.88	2.89	2.17	2.22
29	1	29	-	1.35	-	-	-	-	1.75	1.15	1.14
43	2	12	-	1.31	-	-	-	-	1.55	-	-
52	2	21	-	-	-	-	-	-	1.10	-	-
60	3	1	-	-	-	-	-	-	1.02	-	-
85	3	26	-	1.15	-	-	-	-	1.50	-	-
89	3	30	-	2.15	1.15	1.25	-	-	2.33	1.35	1.43
91	4	1	-	-	-	-	-	-	1.02	-	-
262	9	19	-	1.02	-	-	-	-	1.14	-	-
272	9	29	-	1.18	-	-	-	-	1.39	-	-
273	9	30	-	1.50	-	-	-	-	1.80	1.15	1.13
280	10	7	-	-	-	-	-	-	1.08	-	-
308	11	4	-	-	-	-	-	-	1.25	-	-
319	11	15	-	1.12	-	-	-	-	1.20	-	-
351	12	17	-	1.12	-	-	-	-	1.23	-	-
353	12	19	-	1.70	-	-	-	-	1.81	-	1.03
354	12	20	-	-	-	-	-	-	1.10	-	-
355	12	21	-	3.05	1.79	1.54	-	1.55	3.62	2.43	2.18
356	12	22	-	2.19	1.32	1.21	-	1.10	2.61	1.78	1.66
358	12	24	-	1.34	-	-	-	1.04	1.83	1.29	1.24
359	12	25	-	1.48	-	-	-	-	1.69	1.03	1.03
360	12	26	-	-	-	-	-	-	1.15	-	-
361	12	27	-	1.01	-	-	-	-	1.34	-	-
362	12	28	-	1.88	1.05	1.02	-	1.03	2.46	1.68	1.64
Number of Days Δ dv >= 1.0			0	23	6	5	2	9	34	16	14
Maximum Δ dv			0.00	3.05	1.79	1.54	1.45	1.88	3.62	2.43	2.22

Table F.9.14 Boulder - Summary of Days Above Visibility Thresholds Using FLAG Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
5	1	5	-	2.09	1.08	-	1.65	1.99	3.26	2.44	2.37
6	1	6	-	-	-	-	-	-	1.35	1.03	-
20	1	20	-	1.72	-	-	-	1.25	2.39	1.71	1.68
22	1	22	-	-	-	-	1.78	1.95	2.39	2.08	2.06
23	1	23	-	-	-	-	2.56	2.67	3.01	2.79	2.74
28	1	28	-	1.06	-	-	-	-	1.13	-	-
29	1	29	-	1.85	1.06	1.01	-	-	2.06	1.28	1.23
43	2	12	-	1.36	-	-	-	-	1.60	1.04	-
60	3	1	-	-	-	-	-	-	1.35	-	-
61	3	2	-	-	-	-	-	-	1.10	-	-
131	5	11	-	-	-	-	-	-	1.07	1.01	1.00
321	11	17	-	1.00	-	-	-	-	1.20	-	-
324	11	20	-	-	-	-	-	-	1.08	-	-
351	12	17	-	-	-	-	-	-	1.00	-	-
352	12	18	-	1.21	-	-	-	-	1.29	-	-
353	12	19	-	1.04	-	-	-	-	1.17	-	-
354	12	20	-	1.32	-	-	-	-	1.46	-	-
355	12	21	-	-	-	-	1.65	1.87	2.37	2.06	1.96
357	12	23	-	-	-	-	-	-	1.07	-	-
Number of Days Δ dv >= 1.0			0	9	2	1	4	5	19	9	7
Maximum Δ dv			0.00	2.09	1.08	1.01	2.56	2.67	3.26	2.79	2.74

Table F.9.15 Boulder - Summary of Days Above Visibility Thresholds Using IMPROVE Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
3	1	3	-	-	-	-	-	-	1.11	-	-
5	1	5	-	2.39	1.24	1.14	1.89	2.28	3.70	2.79	2.70
6	1	6	-	-	-	-	-	-	1.56	1.19	1.15
20	1	20	-	1.97	1.13	1.09	-	1.43	2.73	1.97	1.93
22	1	22	-	-	-	-	2.03	2.23	2.72	2.37	2.35
23	1	23	-	-	-	-	2.92	3.04	3.42	3.17	3.12
25	1	25	-	-	-	-	-	-	1.13	-	-
28	1	28	-	1.22	-	-	-	-	1.30	-	-
29	1	29	-	2.12	1.22	1.17	-	-	2.36	1.48	1.41
39	2	8	-	-	-	-	-	-	1.01	-	-
43	2	12	-	1.57	-	-	-	-	1.85	1.20	1.10
60	3	1	-	-	-	-	-	-	1.56	1.12	1.12
61	3	2	-	-	-	-	-	-	1.28	-	-
321	11	17	-	1.11	-	-	-	-	1.34	-	-
324	11	20	-	1.08	-	-	-	-	1.20	-	-
351	12	17	-	1.01	-	-	-	-	1.12	-	-
352	12	18	-	1.34	-	-	-	-	1.43	-	-
353	12	19	-	1.15	-	-	-	-	1.31	-	-
354	12	20	-	1.47	-	-	-	-	1.63	-	-
355	12	21	-	-	-	-	1.83	2.08	2.62	2.28	2.17
357	12	23	-	1.01	-	-	-	-	1.19	-	-
Number of Days Δ dv >= 1.0			0	12	3	3	4	5	21	9	9
Maximum Δ dv			0.00	2.39	1.24	1.17	2.92	3.04	3.70	3.17	3.12

Table F.9.16 Bronx - Summary of Days Above Visibility Thresholds Using FLAG Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
29	1	29	-	1.48	-	-	-	-	1.56	-	-
Number of Days Δ dv >= 1.0			0	1	0	0	0	0	1	0	0
Maximum Δ dv			0.00	1.48	0.00	0.00	0.00	0.00	1.56	0.00	0.00

Table F.9.17 Bronx - Summary of Days Above Visibility Thresholds Using IMPROVE Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
29	1	29	-	1.70	-	-	-	-	1.79	-	1.00
Number of Days Δ dv >= 1.0			0	1	0	0	0	0	1	0	1
Maximum Δ dv			0.00	1.70	0.00	0.00	0.00	0.00	1.79	0.00	1.00

Table F.9.18 Cora - Summary of Days Above Visibility Thresholds Using FLAG Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
5	1	5	-	-	-	-	-	-	1.06	-	-
6	1	6	-	-	-	-	-	-	1.10	-	-
25	1	25	-	-	-	-	-	-	1.24	-	-
26	1	26	-	-	-	-	-	-	1.23	-	-
29	1	29	-	2.81	1.44	1.58	-	-	2.92	1.57	1.68
355	12	21	-	-	-	-	-	-	1.03	-	-
Number of Days Δ dv >= 1.0			0	1	1	1	0	0	6	1	1
Maximum Δ dv			0.00	2.81	1.44	1.58	0.00	0.00	2.92	1.57	1.68

Table F.9.19 Cora - Summary of Days Above Visibility Thresholds Using IMPROVE Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
5	1	5	-	-	-	-	-	-	1.22	1.03	1.01
6	1	6	-	-	-	-	-	-	1.27	-	-
20	1	20	-	-	-	-	-	-	1.10	-	-
25	1	25	-	-	-	-	-	-	1.43	-	-
26	1	26	-	-	-	-	-	-	1.42	1.06	1.02
29	1	29	-	3.20	1.66	1.81	-	-	3.32	1.80	1.93
44	2	13	-	-	-	-	-	-	1.01	-	-
355	12	21	-	-	-	-	-	-	1.14	-	-
Number of Days Δ dv >= 1.0			0	1	1	1	0	0	8	3	3
Maximum Δ dv			0.00	3.20	1.66	1.81	0.00	0.00	3.32	1.80	1.93

Table F.9.20 Daniel - Summary of Days Above Visibility Thresholds Using FLAG Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
5	1	5	-	-	-	-	-	-	1.04	-	-
20	1	20	-	-	-	-	-	-	1.22	-	-
23	1	23	-	-	-	-	-	-	1.02	-	-
29	1	29	-	2.24	1.15	1.23	-	-	2.34	1.26	1.33
39	2	8	-	-	-	-	-	-	1.09	-	-
355	12	21	-	-	-	-	-	-	1.17	-	-
Number of Days Δ dv >= 1.0			0	1	1	1	0	0	6	1	1
Maximum Δ dv			0.00	2.24	1.15	1.23	0.00	0.00	2.34	1.26	1.33

Table F.9.21 Daniel - Summary of Days Above Visibility Thresholds Using IMPROVE Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
5	1	5	-	-	-	-	-	-	1.19	-	-
6	1	6	-	-	-	-	-	-	1.09	-	-
20	1	20	-	-	-	-	-	-	1.40	-	-
23	1	23	-	-	-	-	-	-	1.18	-	-
29	1	29	-	2.56	1.32	1.42	-	-	2.67	1.44	1.52
39	2	8	-	-	-	-	-	-	1.26	-	-
44	2	13	-	-	-	-	-	-	1.06	-	-
61	3	2	-	-	-	-	-	-	1.11	-	-
86	3	27	-	-	-	-	-	-	1.14	-	-
354	12	20	-	-	-	-	-	-	1.05	-	-
355	12	21	-	-	-	-	-	-	1.30	1.03	1.02
Number of Days Δ dv >= 1.0			0	1	1	1	0	0	11	2	2
Maximum Δ dv			0.00	2.56	1.32	1.42	0.00	0.00	2.67	1.44	1.52

Table F.9.22 Farson - Summary of Days Above Visibility Thresholds Using FLAG Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
2	1	2	-	-	-	-	1.05	1.16	1.30	1.21	1.14
21	1	21	-	2.04	1.05	1.06	-	-	2.25	1.27	1.28
22	1	22	-	1.28	-	-	-	-	1.89	1.27	1.20
27	1	27	-	1.22	-	-	1.17	1.47	2.26	1.78	1.67
28	1	28	-	1.69	-	-	-	1.10	2.24	1.54	1.39
353	12	19	-	-	-	-	-	-	1.04	-	-
354	12	20	-	1.92	-	-	-	1.13	2.49	1.62	1.44
356	12	22	-	-	-	-	-	-	1.45	1.04	-
358	12	24	-	-	-	-	-	1.03	1.35	1.14	1.06
359	12	25	-	-	-	-	-	-	1.32	1.09	-
362	12	28	-	-	-	-	1.33	1.43	1.54	1.47	1.39
Number of Days Δ dv >= 1.0			0	5	1	1	3	6	11	10	8
Maximum Δ dv			0.00	2.04	1.05	1.06	1.33	1.47	2.49	1.78	1.67

Table F.9.23 Farson - Summary of Days Above Visibility Thresholds Using IMPROVE Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
2	1	2	-	-	-	-	1.21	1.33	1.49	1.39	1.31
21	1	21	-	2.33	1.21	1.22	-	-	2.56	1.46	1.47
22	1	22	-	1.48	-	-	-	1.09	2.16	1.47	1.38
27	1	27	-	1.40	-	-	1.34	1.69	2.58	2.04	1.91
28	1	28	-	1.93	1.08	-	-	1.26	2.56	1.77	1.59
331	11	27	-	-	-	-	-	-	1.04	-	-
353	12	19	-	-	-	-	-	-	1.16	-	-
354	12	20	-	2.12	1.10	-	-	1.26	2.75	1.79	1.60
356	12	22	-	1.02	-	-	-	-	1.61	1.16	1.04
358	12	24	-	-	-	-	-	1.15	1.50	1.27	1.18
359	12	25	-	-	-	-	-	1.08	1.47	1.21	1.06
362	12	28	-	-	-	-	1.48	1.59	1.71	1.63	1.54
Number of Days Δ dv >= 1.0			0	6	3	1	3	8	12	10	10
Maximum Δ dv			0.00	2.33	1.21	1.22	1.48	1.69	2.75	2.04	1.91

Table F.9.24 La Barge - Summary of Days Above Visibility Thresholds Using FLAG Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
5	1	5	-	1.12	-	-	-	-	1.25	-	-
21	1	21	-	-	-	-	1.22	1.27	1.44	1.32	1.32
22	1	22	-	1.15	-	-	1.62	1.79	2.54	2.07	2.02
42	2	11	-	-	-	-	-	-	1.07	-	-
354	12	20	-	-	-	-	1.53	1.61	1.86	1.71	1.66
355	12	21	-	-	-	-	-	-	1.05	-	-
358	12	24	-	-	-	-	1.03	1.05	1.10	1.06	1.06
359	12	25	-	-	-	-	1.24	1.27	1.34	1.29	1.29
362	12	28	-	-	-	-	1.57	1.58	1.58	1.58	1.57
Number of Days Δ dv >= 1.0			0	2	0	0	6	6	9	6	6
Maximum Δ dv			0.00	1.15	0.00	0.00	1.62	1.79	2.54	2.07	2.02

Table F.9.25 La Barge - Summary of Days Above Visibility Thresholds Using IMPROVE Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
5	1	5	-	1.29	-	-	-	-	1.44	-	-
20	1	20	-	-	-	-	-	-	1.03	-	-
21	1	21	-	-	-	-	1.40	1.46	1.66	1.52	1.52
22	1	22	-	1.32	-	-	1.86	2.05	2.90	2.37	2.31
42	2	11	-	-	-	-	-	-	1.24	-	-
60	3	1	-	-	-	-	-	-	1.02	-	-
353	12	19	-	-	-	-	-	-	1.10	-	-
354	12	20	-	-	-	-	1.70	1.79	2.06	1.89	1.84
355	12	21	-	-	-	-	-	-	1.17	-	-
358	12	24	-	-	-	-	1.15	1.16	1.22	1.18	1.18
359	12	25	-	-	-	-	1.38	1.41	1.49	1.44	1.43
362	12	28	-	-	-	-	1.75	1.75	1.75	1.75	1.75
Number of Days Δ dv >= 1.0			0	2	0	0	6	6	12	6	6
Maximum Δ dv			0.00	1.32	0.00	0.00	1.86	2.05	2.90	2.37	2.31

Table F.9.26 Merna - Summary of Days Above Visibility Thresholds Using FLAG Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
There are no days at or above 1.0 Δdv using this method at this location.											
Number of Days Δ dv >= 1.0			0	0	0	0	0	0	0	0	0
Maximum Δ dv			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table F.9.27 Merna - Summary of Days Above Visibility Thresholds Using IMPROVE Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
23	1	23	-	-	-	-	-	-	1.05	-	-
24	1	24	-	-	-	-	-	-	1.01	-	-
39	2	8	-	-	-	-	-	-	1.09	-	-
61	3	2	-	-	-	-	-	-	1.13	-	-
356	12	22	-	-	-	-	-	1.01	1.11	1.05	1.03
Number of Days Δ dv >= 1.0			0	0	0	0	0	1	5	1	1
Maximum Δ dv			0.00	0.00	0.00	0.00	0.00	1.01	1.13	1.05	1.03

Table F.9.28 Pinedale - Summary of Days Above Visibility Thresholds Using FLAG Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
5	1	5	-	-	-	-	1.55	1.69	2.19	1.87	1.84
6	1	6	-	-	-	-	-	-	1.34	1.05	1.01
20	1	20	-	-	-	-	-	-	1.38	-	-
23	1	23	-	-	-	-	1.05	1.11	1.26	1.16	1.12
25	1	25	-	1.30	-	-	-	-	1.46	-	-
26	1	26	-	-	-	-	-	-	1.23	-	-
29	1	29	-	3.78	2.09	2.16	-	1.09	3.91	2.23	2.28
355	12	21	-	-	-	-	-	1.00	1.48	1.19	1.15
Number of Days Δ dv >= 1.0			0	2	1	1	2	4	8	5	5
Maximum Δ dv			0.00	3.78	2.09	2.16	1.55	1.69	3.91	2.23	2.28

Table F.9.29 Pinedale - Summary of Days Above Visibility Thresholds Using IMPROVE Background Data Predicted Δ dv Shown for Each Modeling Scenario (1-9)

JDAY	MO	DAY	1	2	3	4	5	6	7	8	9
5	1	5	-	-	-	-	1.78	1.94	2.50	2.14	2.11
6	1	6	-	-	-	-	-	1.02	1.54	1.21	1.17
20	1	20	-	1.09	-	-	-	-	1.58	1.09	1.09
23	1	23	-	-	-	-	1.21	1.27	1.45	1.34	1.29
25	1	25	-	1.49	-	-	-	-	1.67	1.04	-
26	1	26	-	-	-	-	-	-	1.42	1.03	-
29	1	29	1.07	4.27	2.39	2.47	-	1.26	4.41	2.55	2.60
43	2	12	-	-	-	-	-	-	1.02	-	-
352	12	18	-	-	-	-	-	-	1.05	-	-
355	12	21	-	-	-	-	-	1.12	1.65	1.32	1.28
Number of Days Δ dv >= 1.0			1	3	1	1	2	5	10	8	6
Maximum Δ dv			1.07	4.27	2.39	2.47	1.78	1.94	4.41	2.55	2.60

Table F.10.1 - Summary of Maximum Modeled NO_2 Concentration Impacts ($\mu g/m^3$) at PSD Class I and Sensitive PSD Class II Areas from Direct Project Sources

		Bridger Wilderness Class I		Fitzpatrick Wilderness Class I		Popo Agie Wilderness Class II		Wind River Roadless Area Class II	
		Direct Modeled Impact	Total Concentration[1]	Direct Modeled Impact	Total Concentration[1]	Direct Modeled Impact	Total Concentration[1]	Direct Modeled Impact	Total Concentration[1]
Alternative	WDR	Annual	Annual	Annual	Annual	Annual	Annual	Annual	Annual
No Action	--	--	3.40	--	3.40	--	3.40	--	3.40
Maximum Production (3100 Wells)	0	0.026	3.43	0.001	3.40	0.009	3.41	0.006	3.41
Proposed Action and Alternative A	250	0.132	3.53	0.006	3.41	0.044	3.44	0.026	3.43
Alternative B	75	0.062	3.46	0.003	3.40	0.023	3.42	0.013	3.41
Preferred Alternative	250	0.061	3.46	0.002	3.40	0.019	3.42	0.012	3.41

		Grand Teton National Park Class I		Teton Wilderness Class I		Yellowstone National Park Class I		Washakie Wilderness Area Class I	
		Direct Modeled Impact	Total Concentration[1]	Direct Modeled Impact	Total Concentration[1]	Direct Modeled Impact	Total Concentration[1]	Direct Modeled Impact	Total Concentration[1]
Alternative	WDR	Annual	Annual	Annual	Annual	Annual	Annual	Annual	Annual
No Action	--	--	3.40	--	3.40	--	3.40	--	3.40
Maximum Production (3100 Wells)	0	0.000	3.40	0.000	3.40	0.000	3.40	0.000	3.40
Proposed Action and Alternative A	250	0.002	3.40	0.001	3.40	0.001	3.40	0.001	3.40
Alternative B	75	0.001	3.40	0.000	3.40	0.000	3.40	0.001	3.40
Preferred Alternative	250	0.001	3.40	0.000	3.40	0.000	3.40	0.000	3.40

[1] Total concentration includes direct modeled impact and background concentration for comparison to NAAQS/WAAQS which are 100 $\mu g/m^3$ on an annual basis.

[2] JIDP % Emissions Reductions

Table F.10.2 - Summary of Maximum Modeled Cumulative NO_2 Concentration Impacts ($\mu g/m^3$) at PSD Class I and Sensitive PSD Class II Areas from Direct Project and Regional Sources

		Bridger Wilderness Class I		Fitzpatrick Wilderness Class I		Popo Agie Wilderness Class II		Wind River Roadless Area Class II	
		Direct Modeled Impact	Total Concentration[1]	Direct Modeled Impact	Total Concentration[1]	Direct Modeled Impact	Total Concentration[1]	Direct Modeled Impact	Total Concentration[1]
Alternative	WDR	Annual	Annual	Annual	Annual	Annual	Annual	Annual	Annual
No Action	--	0.119	3.52	0.011	3.41	0.027	3.43	0.024	3.42
Maximum Production (3100 Wells)	0	0.143	3.54	0.012	3.41	0.036	3.44	0.030	3.43
Proposed Action and Alternative A	250	0.245	3.64	0.017	3.42	0.070	3.47	0.051	3.45
Alternative B	75	0.175	3.57	0.014	3.41	0.049	3.45	0.037	3.44
Preferred Alternative	250	0.174	3.57	0.013	3.41	0.044	3.44	0.036	3.44

		Grand Teton National Park Class I		Teton Wilderness Class I		Yellowstone National Park Class I		Washakie Wilderness Area Class I	
		Direct Modeled Impact	Total Concentration[1]	Direct Modeled Impact	Total Concentration[1]	Direct Modeled Impact	Total Concentration[1]	Direct Modeled Impact	Total Concentration[1]
Alternative	WDR	Annual	Annual	Annual	Annual	Annual	Annual	Annual	Annual
No Action	--	0.029	3.43	0.007	3.41	0.003	3.40	0.009	3.41
Maximum Production (3100 Wells)	0	0.029	3.43	0.007	3.41	0.003	3.40	0.010	3.41
Proposed Action and Alternative A	250	0.030	3.43	0.007	3.41	0.003	3.40	0.010	3.41
Alternative B	75	0.030	3.43	0.007	3.41	0.003	3.40	0.010	3.41
Preferred Alternative	250	0.029	3.43	0.007	3.41	0.003	3.40	0.010	3.41

[1] Total concentration includes direct modeled impact and background concentration for comparison to NAAQS/WAAQS which are 100 $\mu g/m^3$ on an annual basis.

[2] JIDP % Emissions Reductions

Table F.10.3 - Summary of Maximum Modeled SO_2 Concentration ($\mu g/m^3$) at PSD Class I and Sensitive PSD Class II Areas from Direct Project Sources

		Bridger Wilderness Class I						Fitzpatrick Wilderness Class I						Popo Agie Wilderness Class II						Wind River Roadless Area Class II					
		Direct Modeled Impact			Total Concentration[1]			Direct Modeled Impact			Total Concentration[1]			Direct Modeled Impact			Total Concentration[1]			Direct Modeled Impact			Total Concentration[1]		
Alternative	WDR	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual
No Action	--	--	--	--	132.0	43.0	9.00	--	--	--	132.0	43.0	9.00	--	--	--	132.0	43.0	9.00	--	--	--	132.0	43.0	9.00
Maximum Production (3100 Wells)	0	0.005	0.001	0.000	132.0	43.0	9.00	0.001	0.000	0.000	132.0	43.0	9.00	0.002	0.000	0.000	132.0	43.0	9.00	0.001	0.000	0.000	132.0	43.0	9.00
Proposed Action and Alternative A	250	0.229	0.073	0.004	132.2	43.1	9.00	0.019	0.005	0.000	132.0	43.0	9.00	0.081	0.013	0.001	132.1	43.0	9.00	0.037	0.010	0.001	132.0	43.0	9.00
Alternative B	75	0.089	0.027	0.001	132.1	43.0	9.00	0.008	0.002	0.000	132.0	43.0	9.00	0.032	0.006	0.000	132.0	43.0	9.00	0.014	0.004	0.000	132.0	43.0	9.00
Preferred Alternative	250	0.246	0.076	0.004	132.25	43.08	9.00	0.020	0.006	0.000	132.02	43.01	9.00	0.087	0.014	0.001	132.09	43.01	9.00	0.039	0.011	0.001	132.04	43.01	9.00

		Grand Teton National Park Class I						Teton Wilderness Class I						Yellowstone National Park Class I						Washakie Wilderness Area Class I					
		Direct Modeled Impact			Total Concentration[1]			Direct Modeled Impact			Total Concentration[1]			Direct Modeled Impact			Total Concentration[1]			Direct Modeled Impact			Total Concentration[1]		
Alternative	WDR	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual
No Action	--	--	--	--	132.0	43.0	9.00	--	--	--	132.0	43.0	9.00	--	--	--	132.0	43.0	9.00	--	--	--	132.0	43.0	9.00
Maximum Production (3100 Wells)	0	0.000	0.000	0.000	132.0	43.0	9.00	0.001	0.000	0.000	132.0	43.0	9.00	0.000	0.000	0.000	132.0	43.0	9.00	0.001	0.000	0.000	132.0	43.0	9.00
Proposed Action and Alternative A	250	0.008	0.002	0.000	132.0	43.0	9.00	0.007	0.001	0.000	132.0	43.0	9.00	0.003	0.001	0.000	132.0	43.0	9.00	0.006	0.002	0.000	132.0	43.0	9.00
Alternative B	75	0.003	0.001	0.000	132.0	43.0	9.00	0.003	0.000	0.000	132.0	43.0	9.00	0.001	0.000	0.000	132.0	43.0	9.00	0.003	0.001	0.000	132.0	43.0	9.00
Preferred Alternative	250	0.008	0.002	0.000	132.01	43.00	9.00	0.008	0.001	0.000	132.01	43.00	9.00	0.003	0.001	0.000	132.00	43.00	9.00	0.006	0.002	0.000	132.01	43.00	9.00

[1] Total concentration includes direct modeled impact and background concentration for comparison with NAAQS/WAAQS which are 1,300$\mu g/m^3$ on a 3-hour basis, 365/260 $\mu g/m^3$ on a 24-hour basis and 80/60 $\mu g/m^3$ on an annual basis.

Table F.10.4 - Summary of Maximum Modeled Cumulative SO_2 Concentration ($\mu g/m^3$) at PSD Class I and Sensitive PSD Class II Areas from Direct Project and Regional Sources

		Bridger Wilderness Class I						Fitzpatrick Wilderness Class I						Popo Agie Wilderness Class II						Wind River Roadless Area Class II					
		Direct Modeled Impact			Total Concentration[1]			Direct Modeled Impact			Total Concentration[1]			Direct Modeled Impact			Total Concentration[1]			Direct Modeled Impact			Total Concentration[1]		
Alternative	WDR	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual
No Action	--	0.16	0.04	0.00	132.16	43.04	9.00	0.02	0.01	0.00	132.02	43.01	9.00	0.02	0.01	0.00	132.02	43.01	9.00	0.11	0.01	0.00	132.11	43.01	9.00
Maximum Production (3100 Wells)	0	0.16	0.04	0.00	132.16	43.04	9.00	0.02	0.01	0.00	132.02	43.01	9.00	0.02	0.01	0.00	132.02	43.01	9.00	0.11	0.01	0.00	132.11	43.01	9.00
Proposed Action and Alternative A	250	0.24	0.08	0.00	132.24	43.08	9.00	0.02	0.01	0.00	132.02	43.01	9.00	0.08	0.01	0.00	132.08	43.01	9.00	0.12	0.01	0.00	132.12	43.01	9.00
Alternative B	75	0.17	0.04	0.00	132.17	43.04	9.00	0.02	0.01	0.00	132.02	43.01	9.00	0.03	0.01	0.00	132.03	43.01	9.00	0.11	0.01	0.00	132.11	43.01	9.00
Preferred Alternative	250	0.261	0.083	0.000	132.26	43.08	9.00	0.023	0.007	0.000	132.02	43.01	9.00	0.089	0.016	0.000	132.09	43.02	9.00	0.117	0.015	0.000	132.12	43.01	9.00

		Grand Teton National Park Class I						Teton Wilderness Class I						Yellowstone National Park Class I						Washakie Wilderness Area Class I					
		Direct Modeled Impact			Total Concentration[1]			Direct Modeled Impact			Total Concentration[1]			Direct Modeled Impact			Total Concentration[1]			Direct Modeled Impact			Total Concentration[1]		
Alternative	WDR	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual
No Action	--	0.20	0.04	0.01	132.20	43.04	9.01	0.04	0.01	0.00	132.04	43.01	9.00	0.07	0.01	0.00	132.07	43.01	9.00	0.02	0.01	0.00	132.02	43.01	9.00
Maximum Production (3100 Wells)	0	0.20	0.04	0.01	132.20	43.04	9.01	0.04	0.01	0.00	132.04	43.01	9.00	0.07	0.01	0.00	132.07	43.01	9.00	0.02	0.01	0.00	132.02	43.01	9.00
Proposed Action and Alternative A	250	0.20	0.04	0.01	132.20	43.04	9.01	0.04	0.01	0.00	132.04	43.01	9.00	0.07	0.01	0.00	132.07	43.01	9.00	0.02	0.01	0.00	132.02	43.01	9.00
Alternative B	75	0.20	0.04	0.01	132.20	43.04	9.01	0.04	0.01	0.00	132.04	43.01	9.00	0.07	0.01	0.00	132.07	43.01	9.00	0.02	0.01	0.00	132.02	43.01	9.00
Preferred Alternative	250	0.201	0.038	0.007	132.20	43.04	9.01	0.037	0.012	0.001	132.04	43.01	9.00	0.075	0.013	0.001	132.07	43.01	9.00	0.022	0.008	0.000	132.02	43.01	9.00

[1] Total concentration includes direct modeled impact and background concentration for comparison with NAAQS/WAAQS which are 1,300 $\mu g/m^3$ on a 3-hour basis, 365/260 $\mu g/m^3$ on a 24-hour basis and 80/60 $\mu g/m^3$ on an annual basis.

Table F.10.5 - Summary of Maximum Modeled PM_{10} Concentration Impacts ($\mu g/m^3$) at PSD Class I and Sensitive PSD Class II Areas from Direct Project Sources

		Bridger Wilderness Class I				Fitzpatrick Wilderness Class I				Popo Agie Wilderness Class II				Wind River Roadless Area Class II			
		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]	
Alternative	WDR	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual
No Action	--	--	--	33.0	16.00	--	--	33.0	16.00	--	--	33.0	16.00	--	--	33.0	16.00
Maximum Production (3100 Wells)	0	0.75	0.030	33.7	16.03	0.07	0.003	33.1	16.00	0.15	0.008	33.1	16.01	0.12	0.006	33.1	16.01
Proposed Action and Alternative A	250	1.66	0.063	34.7	16.06	0.18	0.006	33.2	16.01	0.26	0.018	33.3	16.02	0.19	0.013	33.2	16.01
Alternative B	75	0.99	0.041	34.0	16.04	0.11	0.004	33.1	16.00	0.17	0.011	33.2	16.01	0.14	0.008	33.1	16.01
Preferred Alternative	250	0.633	0.023	33.63	16.02	0.079	0.002	33.08	16.00	0.083	0.007	33.08	16.01	0.064	0.005	33.06	16.00

		Grand Teton National Park Class I				Teton Wilderness Class I				Yellowstone National Park Class I				Washakie Wilderness Area Class I			
		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]	
Alternative	WDR	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual
No Action	--	--	--	33.0	16.00	--	--	33.0	16.00	--	--	33.0	16.00	--	--	33.0	16.00
Maximum Production (3100 Wells)	0	0.03	0.001	33.0	16.00	0.02	0.001	33.0	16.00	0.01	0.000	33.0	16.00	0.03	0.001	33.0	16.00
Proposed Action and Alternative A	250	0.09	0.003	33.1	16.00	0.04	0.002	33.0	16.00	0.04	0.001	33.0	16.00	0.08	0.002	33.1	16.00
Alternative B	75	0.05	0.002	33.1	16.00	0.03	0.001	33.0	16.00	0.02	0.001	33.0	16.00	0.04	0.001	33.0	16.00
Preferred Alternative	250	0.036	0.001	33.04	16.00	0.016	0.001	33.02	16.00	0.016	0.000	33.02	16.00	0.029	0.001	33.03	16.00

[1] Total Concentration includes direct modeled impact and background concentration for comparison to NAAQS/WAAQS whaich are 150 $\mu g/m^3$ on a 24-hour basis and 50 $\mu g/m^3$ on an annual basis.

Table F.10.6 - Summary of Maximum Modeled Cumulative PM_{10} Concentration Impacts ($\mu g/m^3$) at PSD Class I and Sensitive PSD Class II Areas from Direct Project and Regional Sources

		Bridger Wilderness Class I				Fitzpatrick Wilderness Class I				Popo Agie Wilderness Class II				Wind River Roadless Area Class II			
		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]	
Alternative	WDR	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual
No Action	--	0.46	0.018	33.46	16.02	0.13	0.005	33.13	16.00	0.14	0.008	33.14	16.01	0.21	0.009	33.21	16.01
Maximum Production (3100 Wells)	0	0.91	0.047	33.91	16.05	0.15	0.008	33.15	16.01	0.20	0.015	33.20	16.01	0.23	0.014	33.23	16.01
Proposed Action and Alternative A	250	1.82	0.081	34.82	16.08	0.20	0.011	33.20	16.01	0.31	0.024	33.31	16.02	0.29	0.021	33.29	16.02
Alternative B	75	1.16	0.058	34.16	16.06	0.16	0.009	33.16	16.01	0.23	0.018	33.23	16.02	0.25	0.016	33.25	16.02
Preferred Alternative	250	0.787	0.041	33.79	16.04	0.151	0.007	33.15	16.01	0.180	0.013	33.18	16.01	0.230	0.012	33.23	16.01

		Grand Teton National Park Class I				Teton Wilderness Class I				Yellowstone National Park Class I				Washakie Wilderness Area Class I			
		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]	
Alternative	WDR	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual
No Action	--	0.12	0.012	33.12	16.01	0.04	0.005	33.04	16.00	0.05	0.004	33.05	16.00	0.04	0.003	33.04	16.00
Maximum Production (3100 Wells)	0	0.13	0.013	33.13	16.01	0.05	0.006	33.05	16.01	0.05	0.004	33.05	16.00	0.05	0.004	33.05	16.00
Proposed Action and Alternative A	250	0.14	0.015	33.14	16.02	0.08	0.007	33.08	16.01	0.06	0.005	33.06	16.00	0.09	0.005	33.09	16.00
Alternative B	75	0.13	0.014	33.13	16.01	0.06	0.006	33.06	16.01	0.05	0.004	33.05	16.00	0.06	0.004	33.06	16.00
Preferred Alternative	250	0.125	0.013	33.13	16.01	0.056	0.006	33.06	16.01	0.050	0.004	33.05	16.00	0.054	0.004	33.05	16.00

[1] Total Concentration includes direct modeled impact and background concentration for comparison to NAAQS/WAAQS whaich are 150 $\mu g/m^3$ on a 24-hour basis and 50 $\mu g/m^3$ on an annual basis.

Table F.10.7 - Summary of Maximum Modeled $PM_{2.5}$ Concentration Impacts ($\mu g/m^3$) at PSD Class I and Sensitive PSD Class II Areas from Direct Project Sources

		Bridger Wilderness Class I				Fitzpatrick Wilderness Class I				Popo Agie Wilderness Class II				Wind River Roadless Area Class II			
		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]	
Alternative	WDR	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual
No Action	--	--	--	13.0	5.00	--	--	13.0	5.00	--	--	13.0	5.00	--	--	13.0	5.00
Maximum Production (3100 Wells)	0	0.75	0.030	13.7	5.03	0.07	0.003	13.1	5.00	0.15	0.008	13.1	5.01	0.12	0.006	13.1	5.01
Proposed Action and Alternative A	250	1.66	0.063	14.7	5.06	0.18	0.006	13.2	5.01	0.26	0.018	13.3	5.02	0.19	0.013	13.2	5.01
Alternative B	75	0.99	0.041	14.0	5.04	0.11	0.004	13.1	5.00	0.17	0.011	13.2	5.01	0.14	0.008	13.1	5.01
Preferred Alternative	250	0.633	0.023	13.63	5.02	0.079	0.002	13.08	5.00	0.083	0.007	13.08	5.01	0.064	0.005	13.06	5.00

		Grand Teton National Park Class I				Teton Wilderness Class I				Yellowstone National Park Class I				Washakie Wilderness Area Class I			
		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]	
Alternative	WDR	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual
No Action	--	--	--	13.0	5.00	--	--	13.0	5.00	--	--	13.0	5.00	--	--	13.0	5.00
Maximum Production (3100 Wells)	0	0.03	0.001	13.0	5.00	0.02	0.001	13.0	5.00	0.01	0.000	13.0	5.00	0.03	0.001	13.0	5.00
Proposed Action and Alternative A	250	0.09	0.003	13.1	5.00	0.04	0.002	13.0	5.00	0.04	0.001	13.0	5.00	0.08	0.002	13.1	5.00
Alternative B	75	0.05	0.002	13.1	5.00	0.03	0.001	13.0	5.00	0.02	0.001	13.0	5.00	0.04	0.001	13.0	5.00
Preferred Alternative	250	0.036	0.001	13.04	5.00	0.016	0.001	13.02	5.00	0.016	0.000	13.02	5.00	0.029	0.001	13.03	5.00

[1] Total concentration includes direct modeled impact and background concentration for comparison to NAAQS/WAAQS which are 65 $\mu g/m^3$ on a 24-hour basis and 15 $\mu g/m^3$ on an annual basis.

Table F.10.8 - Summary of Maximum Modeled Cumulative $PM_{2.5}$ Concentration Impacts ($\mu g/m^3$) at PSD Class I and Sensitive PSD Class II Areas from Direct Project and Regional Sources

		Bridger Wilderness Class I				Fitzpatrick Wilderness Class I				Popo Agie Wilderness Class II				Wind River Roadless Area Class II			
		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]	
Alternative	WDR	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual
No Action	--	0.43	0.019	13.43	5.02	0.12	0.006	13.12	5.01	0.13	0.009	13.13	5.01	0.19	0.010	13.19	5.01
Maximum Production (3100 Wells)	0	0.91	0.048	13.91	5.05	0.14	0.008	13.14	5.01	0.20	0.016	13.20	5.02	0.22	0.015	13.22	5.02
Proposed Action and Alternative A	250	1.82	0.081	14.82	5.08	0.20	0.012	13.20	5.01	0.31	0.026	13.31	5.03	0.28	0.022	13.28	5.02
Alternative B	75	1.15	0.059	14.15	5.06	0.16	0.010	13.16	5.01	0.23	0.020	13.23	5.02	0.24	0.017	13.24	5.02
Preferred Alternative	250	0.785	0.042	13.79	5.04	0.145	0.008	13.14	5.01	0.170	0.015	13.17	5.02	0.221	0.014	13.22	5.01

		Grand Teton National Park Class I				Teton Wilderness Class I				Yellowstone National Park Class I				Washakie Wilderness Area Class I			
		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]		Direct Modeled Impact		Total Concentration[1]	
Alternative	WDR	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual
No Action	--	0.11	0.013	13.11	5.01	0.04	0.005	13.04	5.01	0.04	0.004	13.04	5.00	0.04	0.004	13.04	5.00
Maximum Production (3100 Wells)	0	0.12	0.014	13.12	5.01	0.05	0.006	13.05	5.01	0.05	0.004	13.05	5.00	0.05	0.004	13.05	5.00
Proposed Action and Alternative A	250	0.14	0.015	13.14	5.02	0.08	0.007	13.08	5.01	0.06	0.005	13.06	5.01	0.09	0.005	13.09	5.01
Alternative B	75	0.12	0.014	13.12	5.01	0.06	0.006	13.06	5.01	0.05	0.005	13.05	5.00	0.06	0.005	13.06	5.00
Preferred Alternative	250	0.118	0.014	13.12	5.01	0.052	0.006	13.05	5.01	0.050	0.004	13.05	5.00	0.054	0.004	13.05	5.00

[1] Total concentration includes direct modeled impact and background concentration for comparison to NAAQS/WAAQS which are 65 $\mu g/m^3$ on a 24-hour basis and 15 $\mu g/m^3$ on an annual basis.

Table F.10.9 - Summary of Maximum Modeled In-field Pollutant Concentrations (μg/m^3) from Direct Project Sources Within the JIDPA Compared to NAAQS/WAAQS

		NO_2			SO_2									PM_{10}						$PM_{2.5}$					
		Direct Modeled Impact	Total Concentration[1]	NAAQS/WAAQS	Direct Modeled Impact			Total Concentration[1]			NAAQS/WAAQS			Direct Modeled Impact		Total Concentration[1]		NAAQS/WAAQS		Direct Modeled Impact		Total Concentration[1]		NAAQS/WAAQS	
Alternative	WDR	Annual	Annual	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual
No Action	--	--	3.4	100	--	--	--	132	43	9	1,300	365/260	80/60	--	--	33	16	150	50	--	--	13	5	65	15
Maximum Production (3100 Wells)	0	2.5	5.9	100	0.2	0.1	0.0	132.2	43.1	9.0	1,300	365/260	80/60	90.4	12.6	123.4	28.6	150	50	16.3	2.0	29.3	7.0	65	15
Proposed Action and Alternative A	250	13.7	17.1	100	18.3	3.7	0.4	150.3	46.7	9.4	1,300	365/260	80/60	113.2	16.0	146.2	32.0	150	50	21.6	3.1	34.6	8.1	65	15
Alternative B	75	11.8	15.2	100	17.1	4.2	0.3	149.1	47.2	9.3	1,300	365/260	80/60	97.1	13.8	130.1	29.8	150	50	17.7	2.7	30.7	7.7	65	15
Preferred Alternative	250	6.8	10.2	100	20.0	4.1	0.4	152.0	47.1	9.4	1,300	365/260	80/60	23.2	3.5	56.2	19.5	150	50	5.0	0.9	18.0	5.9	65	15

[1] Total concentration includes direct modeled impact and background concentration.

Table F.10.10 - Summary of Maximum Modeled Cumulative In-field Pollutant Concentrations ($\mu g/m^3$) from Direct Project and Regional Sources Within the JIDPA Compared to NAAQS/WAAQS

		NO_2			SO_2									PM_{10}						$PM_{2.5}$					
		Direct Modeled Impact	Total Concentration[1]	NAAQS/WAAQS	Direct Modeled Impact			Total Concentration[1]			NAAQS/WAAQS			Direct Modeled Impact		Total Concentration[1]		NAAQS/WAAQS		Direct Modeled Impact		Total Concentration[1]		NAAQS/WAAQS	
Alternative	WDR	Annual	Annual	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	3-hr	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual	24-hr	Annual
No Action	--	1.2	4.6	100	0.7	0.1	0.0	132.7	43.1	9.0	1,300	365/260	80/60	0.3	0.0	33.3	16.0	150	50	0.3	0.0	13.3	5.0	65	15
Maximum Production (3100 Wells)	0	3.2	6.6	100	0.7	0.1	0.0	132.7	43.1	9.0	1,300	365/260	80/60	90.5	12.6	123.5	28.6	150	50	16.5	2.0	29.5	7.0	65	15
Proposed Action and Alternative A	250	14.0	17.4	100	18.2	3.6	0.4	150.2	46.6	9.4	1,300	365/260	80/60	113.4	16.0	146.4	32.0	150	50	21.8	3.1	34.8	8.1	65	15
Alternative B	75	12.2	15.6	100	17.1	4.0	0.3	149.1	47.0	9.3	1,300	365/260	80/60	97.2	13.8	130.2	29.8	150	50	17.9	2.7	30.9	7.7	65	15
Preferred Alternative	250	7.1	10.5	100	19.9	3.9	0.4	151.9	46.9	9.4	1,300	365/260	80/60	23.3	3.5	56.3	19.5	150	50	5.0	1.0	18.0	6.0	65	15

[1] Total concentration includes direct modeled impact and background concentration.

Table F.10.11 - Summary of Maximum Modeled Nitrogen (N) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Direct Project Sources[1]

Alternative	WDR	Bridger Wilderness Class I	Fitzpatrick Wilderness Class I	Popo Agie Wilderness Class II	Wind River Roadless Area Class II	Grand Teton National Park Class I	Teton Wilderness Class I	Yellowstone National Park Class I	Washakie Wilderness Area Class I
Maximum Production (3100 Wells)	0	0.00669	0.00057	0.00344	0.00212	0.00023	0.00011	0.00008	0.00014
Proposed Action and Alternative A	250	0.03487	0.00266	0.01654	0.00988	0.00116	0.00056	0.00041	0.00072
Alternative B	75	0.01837	0.00130	0.00844	0.00486	0.00056	0.00027	0.00020	0.00035
Preferred Alternative	250	0.0154	0.0011	0.0071	0.0043	0.0005	0.0002	0.0002	0.0003

[1] Nitrogen deposition analysis threshold for direct project impacts = 0.005 kg/ha-yr.

Table F.10.12 - Summary of Maximum Modeled Total Nitrogen (N) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Direct Project and Regional Sources[1]

		Bridger Wilderness Class I		Fitzpatrick Wilderness Class I		Popo Agie Wilderness Class II		Wind River Roadless Area Class II	
Alternative	WDR	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]
No Action	--	0.030	1.5295	0.005	1.5052	0.012	1.5124	0.011	1.5107
Maximum Production (3100 Wells)	0	0.035	1.5348	0.006	1.5058	0.016	1.5158	0.013	1.5128
Proposed Action and Alternative A	250	0.057	1.5570	0.008	1.5079	0.029	1.5288	0.021	1.5206
Alternative B	75	0.042	1.5421	0.007	1.5065	0.021	1.5207	0.016	1.5156
Preferred Alternative	250	0.0415	1.5415	0.0063	1.5063	0.0193	1.5193	0.0149	1.5149

		Grand Teton National Park Class I		Teton Wilderness Class I		Yellowstone National Park Class I		Washakie Wilderness Area Class I	
Alternative	WDR	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]
No Action	--	0.009	1.5093	0.003	1.5031	0.002	1.5023	0.003	1.5035
Maximum Production (3100 Wells)	0	0.009	1.5095	0.003	1.5032	0.002	1.5024	0.004	1.5036
Proposed Action and Alternative A	250	0.010	1.5104	0.004	1.5036	0.003	1.5026	0.004	1.5040
Alternative B	75	0.010	1.5098	0.003	1.5033	0.002	1.5024	0.004	1.5041
Preferred Alternative	250	0.0097	1.5097	0.0033	1.5033	0.0024	1.5024	0.0037	1.5037

[1] Nitrogen deposition analysis level of concern for total impacts - 3.00 kg/ha-yr.

[2] Includes N deposition value of 1.5 kg/ha-yr measured at the CASTNET/NADP site near Pinedale for the year 2001.

Table F.10.13 - Summary of Maximum Modeled Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Direct Project Sources[1]

Alternative	WDR	Bridger Wilderness Class I	Fitzpatrick Wilderness Class I	Popo Agie Wilderness Class II	Wind River Roadless Area Class II	Grand Teton National Park Class I	Teton Wilderness Class I	Yellowstone National Park Class I	Washakie Wilderness Area Class I
Maximum Production (3100 Wells)	0	0.0000316	0.0000036	0.0000184	0.0000114	0.0000015	0.0000008	0.0000006	0.0000010
Proposed Action and Alternative A	250	0.0014419	0.0001484	0.0007323	0.0004267	0.0000656	0.0000367	0.0000241	0.0000425
Alternative B	75	0.0006225	0.0000547	0.0002954	0.0001552	0.0000246	0.0000135	0.0000090	0.0000155
Preferred Alternative	250	0.00154	0.00016	0.00078	0.00045	0.00007	0.00004	0.00003	0.00005

[1] Sulfur deposition analysis threshold for direct Project impacts = 0.005 kg/ha-yr.

Table F.10.14 - Summary of Maximum Modeled Total Sulfur (S) Deposition Impacts (kg/ha-yr) at PSD Class I and Sensitive PSD Class II Areas from Direct Project and Regional Sources[1]

		Bridger Wilderness Class I		Fitzpatrick Wilderness Class I		Popo Agie Wilderness Class II		Wind River Roadless Area Class II	
Alternative	WDR	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]
No Action	--	-0.001	0.7491	-0.001	0.7492	-0.003	0.7474	-0.001	0.7489
Maximum Production (3100 Wells)	0	-0.001	0.7491	-0.001	0.7492	-0.003	0.7474	-0.001	0.7489
Proposed Action and Alternative A	250	-0.001	0.7491	-0.001	0.7492	-0.002	0.7479	-0.001	0.7489
Alternative B	75	-0.001	0.7491	-0.001	0.7492	-0.002	0.7476	-0.001	0.7489
Preferred Alternative	250	-0.0009	0.7491	-0.0008	0.7492	-0.0021	0.7479	-0.0011	0.7489

		Grand Teton National Park Class I		Teton Wilderness Class I		Yellowstone National Park Class I		Washakie Wilderness Area Class I	
Alternative	WDR	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]	Modeled Impact	Total Impact[2]
No Action	--	0.003	0.7534	0.001	0.7508	0.001	0.7510	0.000	0.7499
Maximum Production (3100 Wells)	0	0.003	0.7534	0.001	0.7508	0.001	0.7510	0.000	0.7499
Proposed Action and Alternative A	250	0.003	0.7534	0.001	0.7508	0.001	0.7510	0.000	0.7499
Alternative B	75	0.003	0.7534	0.001	0.7508	0.001	0.7510	0.000	0.7499
Preferred Alternative	250	0.0034	0.7534	0.0009	0.7509	0.0010	0.7510	-0.0001	0.7499

1 Sulfur deposition analysis level of concern for total impacts = 5.0 kg/ha-y.

2 Includes S deposition value of 0.75 kg/ha-yr measured at the CASTNET/NADP site near Pinedale for the year 2001.

Note: Negative results reflect a net decrease in cumulative SO_2 emissions.

Table F.10.15 - Summary of Maximum Modeled Change in ANC (μeq/L) at Acid Sensitive Lakes from Direct Project Sources

Alternative	WDR	Black Joe Lake, Bridger Wilderness Class I: ANC Change (μeq/L)	Black Joe Lake: ANC Change (%)	Deep Lake, Bridger Wilderness Class I: ANC Change (μeq/L)	Deep Lake: ANC Change (%)	Hobbs Lake, Bridger Wilderness Class I: ANC Change (μeq/L)	Hobbs Lake: ANC Change (%)	Lazy Boy Lake, Bridger Wilderness Class I: ANC Change (μeq/L)	Lazy Boy Lake: ANC Change (%)	Upper Frozen Lake, Bridger Wilderness Class I: ANC Change (μeq/L)	Upper Frozen Lake: ANC Change (%)	Lower Saddlebag, Popo Agie Wilderness Class II: ANC Change (μeq/L)	Lower Saddlebag: ANC Change (%)	Ross Lake, Fitzpatrick Wilderness Class I: ANC Change (μeq/L)	Ross Lake: ANC Change (%)
Level of Acceptable Change(μeq/L)	--	6.70	--	5.99	--	6.99	--	1.00	--	1.00	--	5.55	--	5.35	--
No Action/ Background[1]	--	67.0	--	59.9	--	69.9	--	18.8	--	5.0	--	55.5	--	53.5	--
Maximum Production (3100 Wells)	0	0.02	0.033%	0.02	0.041%	0.00	0.006%	0.00	0.008%	0.03	0.567%	0.03	0.046%	0.00	0.003%
Proposed Action and Alternative A	250	0.10	0.155%	0.11	0.190%	0.02	0.030%	0.01	0.038%	0.14	2.808%	0.13	0.231%	0.01	0.013%
Alternative B	75	0.05	0.079%	0.06	0.095%	0.01	0.014%	0.00	0.019%	0.07	1.386%	0.06	0.117%	0.00	0.007%
Preferred Alternative	250	0.047	0.07%	0.051	0.09%	0.010	0.01%	0.003	0.02%	0.064	1.29%	0.057	0.10%	0.003	0.01%

[1] No Action Alternative was not modeled; ANC represents background only.

Table F.10.16 - Summary of Maximum Modeled Cumulative Change in ANC (μeq/L) at Acid Sensitive Lakes from Direct Project and Regional Sources

		Black Joe Lake		Deep Lake		Hobbs Lake		Lazy Boy Lake		Upper Frozen Lake		Lower Saddlebag		Ross Lake	
		Bridger Wilderness Class I		Bridger Wilderness Class I		Bridger Wilderness Class I		Bridger Wilderness Class I		Bridger Wilderness Class I		Popo Agie Wilderness Class II		Fitzpatrick Wilderness Class I	
Alternative	WDR	ANC Change (μeq/L)	ANC Change (%)	ANC Change (μeq/L)	ANC Change (%)	ANC Change (μeq/L)	ANC Change (%)	ANC Change (μeq/L)	ANC Change (%)	ANC Change (μeq/L)	ANC Change (%)	ANC Change (μeq/L)	ANC Change (%)	ANC Change (μeq/L)	ANC Change (%)
Level of Acceptable Change(μeq/L)	--	6.70	--	5.99	--	6.99	--	1.00	--	1.00	--	5.55	--	5.35	--
Background ANC	--	67.0	--	59.9	--	69.9	--	18.8	--	5.0	--	55.5	--	53.5	--
No Action	--	0.085	0.13%	0.087	0.14%	0.042	0.06%	0.025	0.13%	0.091	1.83%	0.096	0.17%	0.026	0.05%
Maximum Production (3100 Wells)	0	0.107	0.16%	0.111	0.18%	0.046	0.07%	0.026	0.14%	0.120	2.39%	0.122	0.22%	0.027	0.05%
Proposed Action and Alternative A	250	0.185	0.28%	0.196	0.33%	0.062	0.09%	0.032	0.17%	0.227	4.53%	0.220	0.40%	0.032	0.06%
Alternative B	75	0.137	0.20%	0.142	0.24%	0.051	0.07%	0.028	0.15%	0.159	3.17%	0.160	0.29%	0.029	0.05%
Preferred Alternative	250	0.127	0.19%	0.133	0.22%	0.050	0.07%	0.028	0.15%	0.149	2.98%	0.147	0.27%	0.028	0.05%

Table F.10.17 - Summary of Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Direct Project Sources Using FLAG Background Data

		Bridger Wilderness Class I			Fitzpatrick Wilderness Class I			Popo Agie Wilderness Class II			Wind River Roadless Area Class II		
Alternative	WDR	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)
Maximum Production (3100 Wells)	0	1.02	3	1	0.13	0	0	0.21	0	0	0.18	0	0
Proposed Action and Alternative A	250	3.16	22	9	0.56	2	0	0.54	2	0	0.45	0	0
Alternative B	75	1.71	11	2	0.28	0	0	0.29	0	0	0.24	0	0
Preferred Alternative	250	1.50	9	2	0.28	0	0	0.25	0	0	0.22	0	0

		Grand Teton National Park Class I			Teton Wilderness Class I			Yellowstone National Park Class I			Washakie Wilderness Area Class I		
Alternative	WDR	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)
Maximum Production (3100 Wells)	0	0.08	0	0	0.03	0	0	0.04	0	0	0.06	0	0
Proposed Action and Alternative A	250	0.32	0	0	0.14	0	0	0.16	0	0	0.24	0	0
Alternative B	75	0.17	0	0	0.07	0	0	0.08	0	0	0.12	0	0
Preferred Alternative	250	0.13	0	0	0.06	0	0	0.06	0	0	0.10	0	0

Note: Δdv = change in deciview.

Table F.10.18 - Summary of Maximum Modeled Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Direct Project Sources Using IMPROVE Background Data

		Bridger Wilderness Class I			Fitzpatrick Wilderness Class I			Popo Agie Wilderness Class II			Wind River Roadless Area Class II		
Alternative	WDR	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)
Maximum Production (3100 Wells)	0	1.14	3	1	0.15	0	0	0.24	0	0	0.20	0	0
Proposed Action and Alternative A	250	3.48	28	10	0.64	3	0	0.62	2	0	0.52	1	0
Alternative B	75	1.90	12	4	0.32	0	0	0.34	0	0	0.28	0	0
Preferred Alternative	250	1.66	9	3	0.33	0	0	0.29	0	0	0.26	0	0

		Grand Teton National Park Class I			Teton Wilderness Class I			Yellowstone National Park Class I			Washakie Wilderness Area Class I		
Alternative	WDR	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)
Maximum Production (3100 Wells)	0	0.08	0	0	0.03	0	0	0.04	0	0	0.06	0	0
Proposed Action and Alternative A	250	0.33	0	0	0.14	0	0	0.16	0	0	0.24	0	0
Alternative B	75	0.17	0	0	0.07	0	0	0.08	0	0	0.12	0	0
Preferred Alternative	250	0.14	0	0	0.06	0	0	0.06	0	0	0.10	0	0

Note: Δdv = change in deciview.

Table F.10.19 - Summary of Maximum Modeled Cumulative Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Direct Project and Regional Sources Using FLAG Background Data

		Bridger Wilderness Class I			Fitzpatrick Wilderness Class I			Popo Agie Wilderness Class II			Wind River Roadless Area Class II		
Alternative	WDR	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)
No Action	--	1.69	8	3	0.42	0	0	0.49	0	0	0.73	3	0
Maximum Production (3100 Wells)	0	1.98	12	4	0.48	0	0	0.57	1	0	0.82	3	0
Proposed Action and Alternative A	250	3.65	40	11	0.76	5	0	0.85	8	0	1.08	6	1
Alternative B	75	2.38	21	5	0.53	2	0	0.68	4	0	0.90	4	0
Preferred Alternative	250	2.29	19	5	0.49	0	0	0.64	2	0	0.86	4	0

		Grand Teton National Park Class I			Teton Wilderness Class I			Yellowstone National Park Class I			Washakie Wilderness Area Class I		
Alternative	WDR	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)
No Action	--	0.33	0	0	0.14	0	0	0.15	0	0	0.17	0	0
Maximum Production (3100 Wells)	0	0.34	0	0	0.16	0	0	0.17	0	0	0.20	0	0
Proposed Action and Alternative A	250	0.49	0	0	0.23	0	0	0.25	0	0	0.34	0	0
Alternative B	75	0.36	0	0	0.18	0	0	0.18	0	0	0.25	0	0
Preferred Alternative	250	0.34	0	0	0.17	0	0	0.17	0	0	0.23	0	0

[1] Δdv = change in deciview.

Table F.10.20 - Summary of Maximum Modeled Cumulative Visibility Impacts at PSD Class I and Sensitive PSD Class II Areas from Direct Project and Regional Sources Using IMPROVE Background Data

		Bridger Wilderness Class I			Fitzpatrick Wilderness Class I			Popo Agie Wilderness Class II			Wind River Roadless Area Class II		
Alternative	WDR	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)
No Action	--	1.94	11	3	0.49	0	0	0.58	1	0	0.81	3	0
Maximum Production - Proposed Action	0	2.26	15	4	0.56	1	0	0.66	3	0	0.92	4	0
Alternative A	250	4.01	46	17	0.87	7	0	0.99	16	0	1.21	12	2
Alternative B	75	2.71	28	7	0.61	2	0	0.78	6	0	1.01	6	1
Preferred Alternative	250	2.62	21	6	0.57	2	0	0.75	4	0	0.96	4	0

		Grand Teton National Park Class I			Teton Wilderness Class I			Yellowstone National Park Class I			Washakie Wilderness Area Class I		
Alternative	WDR	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)	Maximum Visibility Impact (Δdv)	Number of Days > 0.5 Δdv (days)	Number of Days > 1.0 Δdv (days)
No Action	--	0.33	0	0	0.14	0	0	0.16	0	0	0.17	0	0
Maximum Production (3100 Wells)	0	0.35	0	0	0.16	0	0	0.17	0	0	0.20	0	0
Proposed Action and Alternative A	250	0.50	1	0	0.24	0	0	0.25	0	0	0.34	0	0
Alternative B	75	0.36	0	0	0.18	0	0	0.18	0	0	0.25	0	0
Preferred Alternative	250	0.35	0	0	0.17	0	0	0.18	0	0	0.23	0	0

[1] Δdv = change in deciview.

Table F.10.21 - Summary of Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Direct Project Sources Using FLAG Background Data

		Big Piney		Big Sandy		Boulder		Bronx		Cora	
Alternative	WDR	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)
Maximum Production - Proposed Action	0	0.57	0	0.76	0	0.49	0	0.31	0	0.60	0
Alternative A	250	1.75	2	2.77	19	2.09	9	1.48	1	2.81	1
Alternative B	75	0.90	0	1.61	3	1.08	2	0.73	0	1.44	1
Preferred Alternative	250	0.79	0	1.30	1	0.95	0	0.77	0	1.52	1

		Daniel		Farson		Labarge		Merna		Pinedale	
Alternative	WDR	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)
Maximum Production (3100 Wells)	0	0.49	0	0.47	0	0.26	0	0.19	0	0.93	0
Proposed Action and Alternative A	250	2.24	1	2.04	5	1.15	2	0.68	0	3.78	2
Alternative B	75	1.15	1	1.05	1	0.57	0	0.36	0	2.09	1
Preferred Alternative	250	1.19	1	1.03	1	0.50	0	0.30	0	2.07	1

[1] Δdv = change in deciview.

Table F.10.22 - Summary of Maximum Modeled Visibility Impacts at Wyoming Regional Community Locations from Direct Project Sources Using IMPROVE Background Data

		Big Piney		Big Sandy		Boulder		Bronx		Cora	
Alternative	WDR	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)
Maximum Production (3100 Wells)	0	0.66	0	0.85	0	0.56	0	0.36	0	0.69	0
Proposed Action and Alternative A	250	2.01	6	3.05	23	2.39	12	1.70	1	3.20	1
Alternative B	75	1.04	1	1.79	6	1.24	3	0.85	0	1.66	1
Preferred Alternative	250	0.92	0	1.45	4	1.10	2	0.89	0	1.75	1

		Daniel		Farson		Labarge		Merna		Pinedale	
Alternative	WDR	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)
Maximum Production (3100 Wells)	0	0.57	0	0.55	0	0.30	0	0.22	0	1.07	1
Proposed Action and Alternative A	250	2.56	1	2.33	6	1.32	2	0.79	0	4.27	3
Alternative B	75	1.32	1	1.21	3	0.66	0	0.42	0	2.39	1
Preferred Alternative	250	1.37	1	1.19	1	0.57	0	0.35	0	2.37	1

[1] Δdv = change in deciview.

Table F.10.23 - Summary of Maximum Modeled Cumulative Visibility Impacts at Wyoming Regional Community Locations from Direct Project and Regional Sources Using FLAG Background Data

		Big Piney		Big Sandy		Boulder		Bronx		Cora	
Alternative	WDR	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)
No Action	--	1.91	5	1.27	1	2.56	4	0.66	0	0.74	0
Maximum Production (3100 Wells)	0	1.98	7	1.64	4	2.67	5	0.69	0	0.81	0
Proposed Action and Alternative A	250	2.29	16	3.29	31	3.26	19	1.56	1	2.92	6
Alternative B	75	2.05	10	2.20	13	2.79	9	0.82	0	1.57	1
Preferred Alternative	250	1.99	8	1.88	9	2.72	6	0.84	0	1.62	1

		Daniel		Farson		Labarge		Merna		Pinedale	
Alternative	WDR	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)
No Action	--	0.68	0	1.33	3	1.62	6	0.88	0	1.55	2
Maximum Production (3100 Wells)	0	0.79	0	1.47	6	1.79	6	0.91	0	1.69	4
Proposed Action and Alternative A	250	2.34	6	2.49	11	2.54	9	0.99	0	3.91	8
Alternative B	75	1.26	1	1.78	10	2.07	6	0.94	0	2.23	5
Preferred Alternative	250	1.28	1	1.63	8	2.02	6	0.93	0	2.19	5

[1] Δdv = change in deciview.

Table F.10.24 - Summary of Maximum Modeled Cumulative Visibility Impacts at Wyoming Regional Community Locations from Direct Project and Regional Sources Using IMPROVE Background Data

		Big Piney		Big Sandy		Boulder		Bronx		Cora	
Alternative	WDR	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)
No Action	--	2.18	7	1.45	2	2.92	4	0.74	0	0.85	0
Maximum Production (3100 Wells)	0	2.26	11	1.88	9	3.04	5	0.77	0	0.93	0
Proposed Action and Alternative A	250	2.62	20	3.62	34	3.70	21	1.79	1	3.32	8
Alternative B	75	2.34	14	2.43	16	3.17	9	0.94	0	1.80	3
Preferred Alternative	250	2.28	13	2.13	12	3.09	9	0.97	0	1.86	2

		Daniel		Farson		Labarge		Merna		Pinedale	
Alternative	WDR	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)	Maximum Visibility Impact (Δdv)[1]	Number of Days > 1.0 Δdv[1] (days)
No Action	--	0.79	0	1.48	3	1.86	6	0.98	0	1.78	2
Maximum Production (3100 Wells)	0	0.89	0	1.69	8	2.05	6	1.01	1	1.94	5
Proposed Action and Alternative A	250	2.67	11	2.75	12	2.90	12	1.13	5	4.41	10
Alternative B	75	1.44	2	2.04	10	2.37	6	1.05	1	2.55	8
Preferred Alternative	250	1.47	2	1.87	10	2.30	6	1.03	1	2.50	6

[1] Δdv = change in deciview.