Emissions Inventory
For the
Wind River Natural Gas Field Development Project

June 2004

Prepared for:

Bureau of Indian Affairs
Wind River Agency
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1.0 INTRODUCTION

Tom Brown Inc., Samson Resources, and Saba Energy of Texas (the Operators) have notified the Wind River Agency of the Bureau of Indian Affairs (BIA) that they intend to drill additional exploration and development wells in and adjacent to the Muddy Ridge and Pavillion Fields and the surrounding areas [collectively referred to as the Wind River Project Area (WRPA)]. The Operators are proposing to drill 325 new wells in the WRPA. Economic conditions and the evaluation of the drilling results would determine the actual number of wells that would be drilled. Drilling is expected to last for approximately 20 years, with a life-of-project (LOP) of 20 to 40 years.

The Proposed Action would specifically require the construction of the following primary components on private, federal, and tribal lands within the WRPA:

325 new wells and associated lease roads (excluding 178 existing wells);
164 miles of new natural gas pipeline (excluding 100.7 existing miles), and
32,800 horsepower (hp) of new compression (excluding 14,540 hp of existing compression.)

In addition to the Proposed Action, the following three alternatives are considered in the NEPA analysis:

Alternative A – Increased Development (485 wells and associated compression);
Alternative B – Reduced Development (233 wells and associated compression), and
Alternative C – No Action (100 wells and associated compression.)

The Wind River Project Area is located in Townships 3 and 4 North and Ranges 2 through 5 East in Fremont County, Wyoming. The WRPA is located within the boundaries overseen by the Wind River Agency of the Bureau of Indian Affairs (BIA) and the Bureau of Reclamation (BOR) Riverton Withdrawal Area. Figure 1-1 presents a map indicating the general location of the WRPA and the boundaries of the study domain utilized for the air quality impact analysis.

The following section of this report (Section 2) provides the emission inventories for the Wind River project related sources. The inventories for the Proposed Action and Alternatives include potential emissions from proposed construction operations, well drilling, well completion, and production activities, along with related gas compression and processing facilities. The inventories reflect a reasonable estimate of actual emissions that could be emitted by the Proposed Action or Alternatives.

Section 3 of this report contains an inventory of air permit actions resulting in increased emissions. Similarly, emissions potentially resulting from approved Reasonably Foreseeable Developments (RFDs) are estimated in Section 4. Specific emission calculations and permit lists are documented in the appendices.

Some uncertainty is inherent in this type of analysis, which attempts to predict impacts for future events. Assumptions described in this document were necessary for completion of the emission inventory. The methodologies utilized for quantifying emissions are in accordance with EPA publication AP-42 Compilation of Air Pollutant Emission Factors, Wyoming Department of Environmental Quality - Air Quality Division (WDEQ-AQD) guidance, and good engineering practices.

Insert Figure 1-1.

2.0 WIND RIVER PROJECT–RELATED SOURCES

Emission inventories for sources directly associated with the Wind River Gas Field Development project were developed for the Proposed Action and each of the analyzed alternatives. The inventories estimated actual emissions for five criteria pollutants; oxides of nitrogen (NO_X), sulfur dioxide (SO_2), carbon monoxide (CO), particulate matter less than 10 microns and 2.5 microns (PM_{10} and $PM_{2.5}$), and volatile organic compounds (VOCs). Hazardous air pollutants (HAPs) typically associated with oil and gas development, including benzene, toluene, ethylbenzene, isomers of xylene (collectively referred to as BTEX), n-hexane, and formaldehyde were also estimated in the inventories.

Emissions resulting from the following project related activities were evaluated in the inventories:

- Construction emissions, including well pad and resource road construction;
- Well drilling, completion and testing;
- Pipeline installation;
- Wind erosion of disturbed areas;
- Tailpipe exhaust from vehicles and heavy equipment;
- Dust resulting from vehicle traffic on unpaved roads;
- Well production emissions, and
- Natural gas compression and processing equipment.

The emission sources associated with the Wind River project are similar to other oil and gas projects located throughout Wyoming. The methodologies utilized to estimate emission rates are consistent with previous NEPA analyses and industry standards including EPA AP-42 and Wyoming Department of Environmental Quality – Air Quality Division (WDEQ-AQD) guidance.

In completing the inventories, it was necessary to make assumptions concerning project activity levels and types of emitting equipment. Specific assumptions for each emitting activity are detailed in the inventory calculations contained in the appendices. Where applicable, specific operating conditions and assumptions were applied for each of the five proposed development areas; Pavillion, Muddy Ridge, Sand Mesa, Sand Mesa South and Coastal Extension. Overriding assumptions utilized for the inventories include the following:

- Development of the project is projected to occur over a 20 year period. For purposes of the emission inventory and modeling, it was assumed that all successfully drilled and completed wells would be producing at the same point in time. In actuality, some wells drilled and completed early in the project may no longer be in operation by the time the last wells are drilled.

- A typical drilling program was assumed to occur for each development area (Pavillion, Muddy Ridge, etc.) throughout the projected development period. However, drilling operations are projected to be completed in some development areas before others. Therefore, in the later years of development, actual construction and drilling emissions would be less than assumed for the inventory.

- For inventory purposes it was assumed that the central facilities would be fully constructed and operational soon after the initiation of the project. In actuality, the central facilities (compressor stations) would be constructed in phases as necessary to meet the demands of the drilling program. Individual compressor units would be added at the proposed facilities as the need arises with increased production and reduced formation pressures. Continuous operation (8,760 hours per year) was assumed for all central facilities.

- Temporal simplifications were applied for purposes of the analysis. It was assumed that full construction and drilling operations would occur at the same time that full production and related central facility operation would occur. For reasons previously stated, this scenario is not likely to occur in actuality.

2.1 PROJECT DEVELOPMENT EMISSIONS

Air emissions would result from five sequential short-term development activities: well pad and resource road construction, well drilling, well completion, pad reclamation, and pipeline installation. These development activities consist of different emission sources and are discussed separately in the following sections. Emissions of both criteria pollutants and HAPs are estimated for each activity, when applicable. The emission calculations for each of the activities described below, along with any pertinent assumptions, are provided in the appendices.

2.1.1 Well Pad and Resource Road Construction

Well pad and resource road construction consists of the clearing, grading, and construction of the resource road and well pad. The emission sources affiliated with these activities include fugitive dust emissions from travel on unpaved roads (haul trucks, pickup trucks, etc.) and heavy construction operations, plus tailpipe emissions from mobile sources (haul trucks and heavy equipment, including a dozer, a grader, and a backhoe) used in the construction process. As reported by the operators, water would be applied to the well pads and lease roads when needed during the construction process to control dust emissions. The watering control efficiency was assumed to be 50 percent as recommended by the WDEQ-AQD.

2.1.2 Well Drilling

Well drilling activities consist of the mobilization of the drill rig, drilling of the well, and de-mobilization of the rig. The emission sources associated with well drilling include fugitive dust emissions from travel on unpaved roads (18-wheeler semi-trailer trucks, support trucks, and crew pickup trucks), plus tailpipe emissions from mobile sources (heavy duty diesel engine powered trucks and drill rigs) used in the drilling process. Fugitive dust emissions from unpaved roads were assumed to be controlled only by natural precipitation.

2.1.3 Well Completion and Testing

The emission sources associated with well completion include fugitive dust emissions from travel on unpaved roads (18-wheeler semi-trailer trucks, support trucks, and pickup trucks), tailpipe emissions from mobile sources (heavy-duty diesel engine powered trucks), and well venting to purge completion fluids. Fugitive dust emissions from unpaved roads were assumed to be controlled only by natural precipitation.

2.1.4 Pad Reclamation and Pipeline Installation

Following drilling and completion operations, the drilling pad is partially reclaimed and the gathering pipeline is installed. Emissions sources associated with these activities include fugitive dust and tailpipe emissions from heavy construction equipment, and travel on unpaved roads.

2.1.5 Wind Erosion

The removal of vegetation and disturbance of the soil during construction operations can result in increased wind erosion and fugitive dust emissions during high wind events. Wind erosion rates were estimated based upon soil analyses from existing well pads.

2.2 WELL PRODUCTION EMISSIONS

Emissions to the atmosphere result from several aspects of gas production operations including three-phase separation, condensate storage, and well venting. The emissions of both criteria pollutants and HAPs were estimated for each process as applicable.

2.2.1 Three-Phase Separator Heaters

As reported by the Operators, a natural gas-fired three-phase separator heater would operate an average of 30 minutes per hour throughout the cold season (approximately November through April). The heaters would be appropriately sized for each development area.

2.2.2 Condensate Storage Tanks

Condensate storage tank emissions result from two distinct processes, flashing losses and working and breathing losses. Flashing emissions occur as a result of pressure differentials between the three-phase separator and the atmospheric storage tank. Storage tank working and breathing losses occur as a result of the filling and emptying of the storage tanks in addition to the daily heating and cooling of the condensate which results in thermal expansion and contraction. A process simulation program, E&P Tanks, was utilized to estimate both the flashing losses and the working and breathing losses.

2.2.3 Pumper Vehicle Emissions

As a result of the proposed development program, additional pumpers would be required to service the new wells. Pumper vehicle emissions were accounted for in the inventory.

2.2.4 Well Venting Emissions

As reported by the operators, approximately 20% of the new wells would require venting on a weekly basis to purge accumulated fluids.

2.2.5 Fugitive VOC Emissions

Fugitive VOC emissions from gas well production facilities typically account for less than one percent of the VOC emission inventory. Therefore, fugitive VOC emissions were assumed to be negligible for the Wind River Project.

2.3 CENTRAL FACILITY EMISSIONS

In order to treat and transport produced natural gas from the proposed wells, existing central facilities would be expanded and new central facilities would be constructed. Proposed equipment at the central facilities includes natural gas compressors, heated separators, TEG dehydrators, and electric generators.

2.3.1 Central Facility Engine Emissions

Natural gas-fueled engines would be utilized to power compressors and generators. The make and model of the engines to be utilized for compression and generation has yet to be determined. Therefore criteria pollutant emissions factors were applied assuming the application of the Wyoming BACT process. Hazardous air pollutant emission rates were estimated based on AP-42 emission factors.

2.3.2 Separator Heaters

Heated separation equipment would be operated at the central facilities. Unlike the well site production units, it was assumed that the central facility heaters would operate year around.

2.3.3 TEG Dehydrator Emissions

TEG dehydrators are proposed for several of the central facilities. A process simulation software package, GRI GlyCalc, was utilized to estimate the reboiler still vent emissions from the dehydrators. Emissions from the reboiler heaters were also estimated. Again it was assumed that the dehydrators would operate 12 months per year.

2.4 PROJECT EMISSIONS SUMMARY

As previously discussed, emission inventories were prepared for the Proposed Action and each of the analyzed Alternatives. For the Proposed Action, a post-construction summary was prepared, illustrating the significant reduction in particulate and NO_X emissions that would be realized once construction operations are completed. In addition, an inventory was prepared for the existing oil and gas operations within the Project Area. Table 2-1 summarizes the emissions associated with each Alternative and the existing operations. Detailed inventory calculations are contained in the appendices.

Table 2-1. Wind River Gas Development Project Emissions Summary.

Pollutant	Proposed Action [325 Wells 32,800 hp] (tons/yr)	Proposed Action Post-Construction [325 Wells 32,8000 hp] (tons/yr)	Alternative A Increased Development [485 Wells 46,050 hp] (tons/yr)	Alternative B Reduced Development [233 Wells 22,700 hp] (tons/yr)	Alternative C No Action [100 Wells 3,200 hp] (tons/yr)	Existing Development [172 Wells 14,550 hp] (tons/yr)
NO_X	518	338	664	414	45	546
CO	719	656	988	516	72	303
VOC	906	779	1,224	681	204	518
SO_X	3.2	0.04	3.4	3.2	0.18	0.04
PM_{10}	597	24	629	589	87	128
$PM_{2.5}$	113	24	127	106	16	19
Formaldehyde	22	22	31	15	2.2	4.4
Benzene	3.4	3.4	5.4	2.5	0.20	0.41
Toluene	1.3	1.2	1.7	0.93	0.18	0.65
Ethylbenzene	0.09	0.08	0.11	0.06	0.03	0.04
Xylenes	0.44	0.43	0.60	0.32	0.04	0.23
n-Hexane	2.6	2.5	3.6	2.1	0.26	2.7

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3.0 PERMITTED SOURCES

This section summarizes state permitted emission sources located within the study domain as evidenced by records available from the Wyoming, Idaho and Montana DEQ air permit files. The permitted source inventory prepared by TRC Environmental Corporation for the Rawlins and Pinedale RMP revisions was used as a starting point for this inventory. The RMP inventory was supplemented with permitted sources located in Montana.

3.1 STATE PERMITTED SOURCE INCLUSION CRITERIA

A list of permitted sources provided by the states was initially reviewed to determine included/excluded sources. Sources were included in, or excluded from, the inventory based upon the following criteria:

- Sources permitted and operating between January 1, 2001 and June 30, 2003 were included in the inventory.
- Sources permitted between July 1, 1999 and June 30, 2003 *but not yet operating* were included as Reasonably Foreseeable Future Action (RFFA) sources.
- Sources located outside of the study domain as shown in Figure 1-1 were excluded from the inventory.
- Sources permitted and operating prior to January 1, 2001, were excluded from the inventory
- Sources with permits cancelled or rescinded were excluded from the inventory.
- Sources with no NO_x, SO_2, PM_{10} or $PM_{2.5}$ emissions were excluded from the inventory.

The permitted source inventories are summarized in Table 3-1. Permitted emission decreases were considered non-consequential and therefore were omitted from the inventory. A summary of the permitted sources included in the inventories along with their corresponding emissions are located in Appendix E. Figure 3-1 presents a map indicating the location of the permitted sources within the study domain.

TABLE 3-1. State Permitted Source Inventory Summary.

Permit Category	NO_X (tons/yr)	SO_2 (tons/yr)	PM_{10} (tons/yr)	$PM_{2.5}$ (tons/yr)
Operational Permitted Sources (70 sources)	2,116	109	67	23
Reasonable Foreseeable Future Action (RFFA) Permitted Sources (119 sources)	4,621	124	109	109
Total Permitted Source Inventory	**6,737**	**233**	**176**	**132**

3.2 EXCLUDED STATE PERMITTED SOURCES

Permitted sources located within the study domain were excluded from the inventory if they did not meet the inclusion criteria stated in Section 3.1, or if it was reported that the source was no longer in operation. A list of the excluded sources and the reason for exclusion is contained in Appendix F.

3.3 SOURCES WITHIN TRIBAL LANDS

Some sources located within tribal lands may not be subject to state permitting requirements. Records available from the Wind River Environmental Quality Commission, including Title V permits issued by the EPA, were utilized for this inventory. Table 3-2 summarizes the NO_X and CO emissions for theses sources within Tribal Lands.

Table 3-2. Emission Sources on Tribal Lands.

Source	Horsepower Rating	UTM Easting (meters)	UTM Northing (meters)	NO_X Emissions (tons/yr)	CO Emissions (tons/yr)
Riverton Gas Plant	3,739	716,475	4,757,212	358	460
Peak Sulfur Plant	N.A.	710,660	4,763,800	7.0	--
Riverton Compressor Station	1,180	726,108	4,765,574	17	23
Total	**--**	**--**	**--**	**382**	**483**

Insert Figure 3-1.

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4.0 OIL AND GAS WELL EMISSIONS

An emissions inventory for producing wells that became operational on or after January 1, 2001 was prepared. The inventory developed by TRC Environmental Corporation for the Rawlins and Pinedale RMP revisions was used as a starting point for the production well inventory. Natural gas, coal bed methane (CBM) and oil well permit data were obtained from the Wyoming Oil and Gas Conservation Commission (WYOGCC). Production wells, not specifically associated with a previously approved NEPA action, were included in the inventory. The following table summarizes the production well emissions.

Table 4-1. Production Well Emissions.

County	Number of Wells				NO_X Emissions (tpy)			
	Oil	Gas	CBM	Total	Oil [1]	Gas [2]	CBM [2]	Total
Big Horn	15	8	0	23	4.5	0.4	0.0	4.9
Fremont	25	183	1	209	7.5	8.2	0.0	15.8
Hot Springs	12	1	2	15	3.6	0.0	0.1	3.7
Johnson	0	0	0	0	0.0	0.0	0.0	0.0
Lincoln	0	15	0	15	0.0	0.7	0.0	0.7
Natrona	69	20	0	89	20.7	0.9	0.0	21.6
Park	70	16	0	86	21.0	0.7	0.0	21.7
Sheridan	0	0	2	2	0.0	0.0	0.1	0.1
Sublette	0	37	0	37	0.0	1.7	0.0	1.7
Teton	0	0	0	0	0.0	0.0	0.0	0.0
Washakie	10	1	0	11	3.0	0.0	0.0	3.0
TOTAL	**201**	**281**	**5**	**487**	**60.3**	**12.6**	**0.2**	**73.2**

[1] Oil well NO_X emission rates estimated at 0.3 tpy/well as per Denise Kohtala, WDEQ-WQD 2003.
[2] Natural gas and CBM well emission estimated at 0.045 tpy/well as per EnCana stack test.

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5.0 REASONABLY FORESEEABLE DEVELOPMENT

An emissions inventory for potential sources considered to be Reasonably Foreseeable Development (RFD) was prepared. The starting point for this inventory was the RFD inventory developed by TRC Environmental Corporation for the Rawlins and Pinedale RMP revisions. The RMP inventory was revised with information provided by various project proponents.

For purposes of this inventory, definitions agreed upon by the BLM, EPA, WDEQ-AQD, and USDA Forest Service for use in EIS projects were utilized. In accordance with these definitions, RFD sources were defined as:

1) NEPA-authorized but not yet developed portions of NEPA projects, or

2) Not yet authorized NEPA projects for which air quality analyses are in progress and for which emissions have been quantified.

Table 5-1 summarizes the RFD inventory utilized for the Wind River analysis and Figure 5-1 presents the location of the RFD projects. Additional information concerning the RFD inventory is contained in Appendix G.

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TABLE 5-1. - RFD Emissions Associated With NEPA Projects.

RFD Project Listed by Field Office	Wells Remaining to be Developed	Projected Well NO_X Emissions (tons/yr)	Compression Remaining to be Developed (hp)	Projected Compressor NO_X Emissions (tons/yr)	Emissions for Ancillary Facilities to be Developed				Total Projected NO_X (tons/yr)	Total Projected SO_2 (tons/yr)	Total Projected PM_{10} (tons/yr)	Total Projected $PM_{2.5}$ (tons/yr)
					NO_X (tpy)	SO_2 (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)				
Bridger-Teton National Forest												
Cliff Creek - MA 22	10	0.45							0.45			
Cottonwood Creek - MA 25	10	0.45							0.45			
Horse Creek - MA 24	10	0.45							0.45			
LaBarge Creek - MA 12	10	0.45							0.45			
Little Greys River - MA 31	10	0.45							0.45			
Lower Greys River - MA32	10	0.45							0.45			
Piney Creeks - 26	10	0.45							0.45			
Upper Hoback - MA 23	10	0.45							0.45			
Willow Creek - MA 49	10	0.45							0.45			
Buffalo Field Office												
Powder River Basin	36,012	1,633	840,453	12,173					13,806			
Casper Field Office												
Cave Gulch	82	3.72							3.72			
Cooper Reservoir (1998)	45	2.04	22	26.80					28.84			
Kemmerer Field Office												
Riley Ridge	15	0.68							0.68			
Pinedale Field Office												
Big Piney-LaBarge	52	2.36							2.36			
Compresor Station, Pipeline-Williams	--	0	1,000	19.10					19.10			
Pinedale Anticline Project	353	15.99							15.99			
Soda Unit	12	0.54							0.54			
South Piney- Infinity & Williams[2]	210	280.45	20,000	160.78	295.45	0.57	47.09	47.09	736.68	0.57	47.09	47.09
Burley	17	5.10							5.10			
Jonah Infill	3100	140.43							140.43			
Rock Springs Field Office												
Fontenelle Natural Gas Infill Drilling	1,141	51.75	268.35	3.11					54.86			
Jack Morrow Hills	110	4.99	3,480	40.32					45.31			
Total	**41,239**	**2,145**	**865,223**	**12,423**	**295.5**	**0.6**	**47.1**	**47.1**	**14,684**	**0.6**	**47.1**	**47.1**

Insert Figure 5-1.

Appendix A

Proposed Action Emission Inventory

Appendix B

Alternative A Emissions Inventory

Appendix C

Alternative B Emission Inventory

Appendix D

Alternative C Emission Inventory

Appendix E

Existing Project Source Inventory

Appendix F

Permitted Source Inventory

Appendix G

Reasonable Foreseeable Development Inventory

Buys & Associates, Inc.
Environmental Consultants

Project: Wind River Proposed Action Inventory
Date: 7/8/2004

106. Central Facility Summary

South Pavillion

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	31.865			31.865
NO [b]	18.703			18.703
NO2 [c]	3.187			3.187
CO	63.730			63.730
VOC	31.865			31.865
SO2	0.000			0.000
TSP	2.246			2.246
PM10	2.246			2.246
PM2.5	2.246			2.246
Formaldehyde	2.231			2.231
Benzene	0.183			0.183
Toluene	0.065			0.065
Ethylbenzene	0.003			0.003
Xylenes	0.023			0.023
n-Hexane				0.000

Pavillion Plant

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	16.415			16.415
NO [b]	9.635			9.635
NO2 [c]	1.642			1.642
CO	32.831			32.831
VOC	16.415			16.415
SO2	0.000			0.000
TSP	1.157			1.157
PM10	1.157			1.157
PM2.5	1.157			1.157
Formaldehyde	1.149			1.149
Benzene	0.094			0.094
Toluene	0.033			0.033
Ethylbenzene	0.001			0.001
Xylenes	0.012			0.012
n-Hexane				0.000

Muddy Ridge

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	43.452	0.230		43.682
NO [b]	25.505	0.135		25.640
NO2 [c]	4.345	0.023		4.368
CO	86.905	0.193		87.098
VOC	43.452	0.006	3.964	47.423
SO2	0.000	0.000		0.000
TSP	3.063	0.017		3.081
PM10	3.063	0.017		3.081
PM2.5	3.063	0.017		3.081
Formaldehyde	3.042	0.000		3.042
Benzene	0.249	0.000	0.203	0.452
Toluene	0.088	0.000	0.000	0.088
Ethylbenzene	0.004		0.000	0.004
Xylenes	0.031		0.000	0.031
n-Hexane		0.004	0.010	0.014

NOTES

a NOx measured as NO_2
b Emitted NOx assumed to be 90% NO. Emissions corrected for the difference in molecular weights (30 mw NO/46 mw NO2)
c Emitted NOx assumed to be 10% NO_2.

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Proposed Action Inventory Date: 7/8/2004

107. Central Facility Summary Continued

Hidden Valley

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	16.415			16.415
NO [b]	9.635			9.635
NO2 [c]	1.642			1.642
CO	32.831			32.831
VOC	16.415			16.415
SO2	0.000			0.000
TSP	1.157			1.157
PM10	1.157			1.157
PM2.5	1.157			1.157
Formaldehyde	1.149			1.149
Benzene	0.094			0.094
Toluene	0.033			0.033
Ethylbenzene	0.001			0.001
Xylenes	0.012			0.012
n-Hexane				0.000

Shoshoni Booster

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	36.693	0.066		36.759
NO [b]	21.537	0.039		21.576
NO2 [c]	3.669	0.007		3.676
CO	73.386	0.055		73.441
VOC	36.693	0.002		36.695
SO2	0.000	0.000		0.000
TSP	2.587	0.005		2.592
PM10	2.587	0.005		2.592
PM2.5	2.587	0.005		2.592
Formaldehyde	2.569	0.000		2.569
Benzene	0.211	0.000		0.211
Toluene	0.074	0.000		0.074
Ethylbenzene	0.003			0.003
Xylenes	0.026			0.026
n-Hexane		0.001		0.001

Sand Mesa

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	99.458	0.646		100.104
NO [b]	58.377	0.379		58.757
NO2 [c]	9.946	0.065		10.010
CO	198.915	0.543		199.458
VOC	99.458	0.018	10.902	110.377
SO2	0.000	0.000		0.000
TSP	7.011	0.049		7.061
PM10	7.011	0.049		7.061
PM2.5	7.011	0.049		7.061
Formaldehyde	6.962	0.000		6.963
Benzene	0.571	0.000	0.557	1.128
Toluene	0.202	0.000	0.000	0.202
Ethylbenzene	0.009		0.000	0.009
Xylenes	0.070		0.000	0.070
n-Hexane		0.012	0.027	0.039

108. Central Facility Summary Continued

Sand Mesa South

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	46.349	0.361		46.711
NO [b]	27.205	0.212		27.417
NO2 [c]	4.635	0.036		4.671
CO	92.698	0.304		93.002
VOC	46.349	0.010	5.154	51.513
SO2	0.000	0.000		0.000
TSP	3.267	0.027		3.295
PM10	3.267	0.027		3.295
PM2.5	3.267	0.027		3.295
Formaldehyde	3.244	0.000		3.245
Benzene	0.266	0.000	0.263	0.529
Toluene	0.094	0.000	0.000	0.094
Ethylbenzene	0.004		0.000	0.004
Xylenes	0.033		0.000	0.033
n-Hexane		0.007	0.013	0.019

Coastal Extension

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	26.071	0.285		26.356
NO [b]	15.303	0.167		15.470
NO2 [c]	2.607	0.028		2.636
CO	52.143	0.239		52.382
VOC	26.071	0.008	3.964	30.044
SO2	0.000	0.000		0.000
TSP	1.838	0.022		1.860
PM10	1.838	0.022		1.860
PM2.5	1.838	0.022		1.860
Formaldehyde	1.825	0.000		1.825
Benzene	0.150	0.000	0.203	0.352
Toluene	0.053	0.000	0.000	0.053
Ethylbenzene	0.002		0.000	0.002
Xylenes	0.018		0.000	0.018
n-Hexane		0.005	0.010	0.015

Total Facility

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	316.720	1.588		318.307
NO [b]	185.901	0.932		186.833
NO2 [c]	31.672	0.159		31.831
CO	633.439	1.334		634.773
VOC	316.720	0.044	23.984	340.747
SO2	0.000	0.000		0.000
TSP	22.328	0.121		22.448
PM10	22.328	0.121		22.448
PM2.5	22.328	0.121		22.448
Formaldehyde	22.170	0.001		22.172
Benzene	1.818	0.000	1.225	3.043
Toluene	0.642	0.000	0.000	0.642
Ethylbenzene	0.029		0.000	0.029
Xylenes	0.224		0.000	0.224
n-Hexane		0.029	0.059	0.088

82. Central Facility Heater Summary

Species	Muddy Ridge (tons/yr)	Shoshoni Booster (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx [a]	0.230	0.066	0.646	0.361	0.285	1.588
CO [a]	0.193	0.055	0.543	0.304	0.239	1.334
TOC [c]	0.025	0.007	0.071	0.040	0.031	0.175
VOC	0.006	0.002	0.018	0.010	0.008	0.044
SOx [b]	0.000	0.000	0.000	0.000	0.000	0.000
TSP [c]	0.017	0.005	0.049	0.027	0.022	0.121
PM10 [c]	0.017	0.005	0.049	0.027	0.022	0.121
PM2.5 [c]	0.017	0.005	0.049	0.027	0.022	0.121
Benzene [d]	0.000	0.000	0.000	0.000	0.000	0.000
Toluene [d]	0.000	0.000	0.000	0.000	0.000	0.000
Hexane [d]	0.004	0.001	0.012	0.007	0.005	0.029
Formaldehyde [d]	0.000	0.000	0.000	0.000	0.000	0.001

104. Coastal Extension Dehydrator

Assumptions

Throughput Rate: 20 MMscf/day (As projected by Project Proponents)

Gas Composition: Muddy Ridge Sample

Inlet Gas Conditions: Inlet gas was assumed to be saturated at 700 psi and 80 F as reported by the project proponents

Calculations

Dehydrator emissions were simulated using GRI GlyCalc version 4.0 software

Emissions

Species	Emissions (lbs/hr)	Emissions (tons/year)
VOC	0.905	3.964
Benzene	0.046	0.203
Toluene	0.000	0.000
Ethylbenzene	0.000	0.000
Xylenes	0.000	0.000
n-Hexane	0.002	0.010
Total HAPs	0.048	0.212

Note: See Muddy Ridge GRI GlyCalc report for Coastal Extension emissions

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81. Coastal Extension Central Facility Heater Emissions

Assumptions

Separator Size:	600	MBTU/hr (Reported by Project Proponents)
Dehydrator Size:	700	MBTU/hr (Reported by Project Proponents)
Total Heater Capacity:	1300	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour for entire year (Est.from fuel usage reported by Proponents)
	4380	hours/year
Net Low Fuel Gas Heat Content	1170	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * \text{1,000 (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * \text{1,000,000 (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{\text{2,000 (lbs/ton)} * \text{1,000 (Btu/scf - Standard Fuel Heating Value)}}$$

$$\text{VOC Emissions (tons/yr)} = \text{TOC Emissions (tons/yr)} * \text{VOC wt. fraction}$$

Species	Total Heater Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx [a]	100	0.065	0.285
CO [a]	84	0.055	0.239
TOC [c]	11	0.007	0.031
VOC	N.A.	0.002	0.008
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.005	0.022
PM10 [c]	7.6	0.005	0.022
PM2.5 [c]	7.6	0.005	0.022
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.001	0.005
Formaldehyde [d]	0.075	0.000	0.000

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

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75. Coastal Extension Compression and Processing

Assumptions:

Total Power Requirement: 2700 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	5.95	26.1
CO [1]		2.0	11.90	52.1
VOC [1]		1.0	5.95	26.1
PM10 [2, 5]	0.0194	0.070	0.42	1.8
PM2.5 [2,5]	0.0194	0.070	0.42	1.8
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.03	0.1
Toluene [2]	0.000558	0.00203	0.01	0.1
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.00	0.0
Formaldehyde [1]		0.07	0.42	1.8

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

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23. Completion Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0	miles (Estimated from project area and existing road system)
Hours of Operation	155	hours per site (Weighted average for all areas - Project Proponents)
Number of Heavy Diesel Truck Trips	147	(Weighted average for all areas - Project Proponents)
Number of Pickup Trips	132	(Weighted average for all areas - Project Proponents)
Diesel Fuel sulfur content	0.05	% (Typical value)
Diesel Fuel density	7.08	lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10	miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile)} * \text{\# Trips} * \text{Trip Distance (miles)}}{453.6 \text{ (g/lb)} * 2000 \text{ (lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal)} * 453.6 \text{ (g/lb)} * \text{Fuel Sulfur Content} * 2 \text{ (S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Completion Vehicles	Heavy Haul Trucks			Heavy Duty Pickups			Total [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.510	0.040	3.03	0.171	0.013	0.681	1.688
CO	17.09	1.072	0.083	33.64	1.895	0.147	2.967	7.357
VOC [c]	4.83	0.303	0.023	1.84	0.104	0.008	0.407	1.008
SO2	0.32	0.020	0.002	0.21	0.012	0.001	0.032	0.080

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate and a 50% success rate in Sand Mesa and Coastal

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76. Compression Summary

Pollutant	South Pavillion (tons/yr)	Pavillion Plant (tons/yr)	Muddy Ridge (tons/yr)	Hidden Valley (tons/yr)	Shoshoni Booster (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NO_x [1]	31.87	16.42	43.45	16.42	36.69	99.46	46.35	26.07	316.72
CO [1]	63.73	32.83	86.90	32.83	73.39	198.92	92.70	52.14	633.44
VOC [1]	31.87	16.42	43.45	16.42	36.69	99.46	46.35	26.07	316.72
PM10 [2, 5]	2.25	1.16	3.06	1.16	2.59	7.01	3.27	1.84	22.33
PM2.5 [2,5]	2.25	1.16	3.06	1.16	2.59	7.01	3.27	1.84	22.33
SO_2 [3]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzene [2]	0.18	0.09	0.25	0.09	0.21	0.57	0.27	0.15	1.82
Toluene [2]	0.06	0.03	0.09	0.03	0.07	0.20	0.09	0.05	0.64
Ethylbenzene [2]	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.03
Xylenes [2]	0.02	0.01	0.03	0.01	0.03	0.07	0.03	0.02	0.22
Formaldehyde [1]	2.23	1.15	3.04	1.15	2.57	6.96	3.24	1.83	22.17

6. Construction Equipment Fugitive Dust Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
TSP	4.188	4.151	2.768	1.038	0.346	12.491
PM15	1.872	1.706	1.137	0.427	0.142	5.284
PM10	1.404	1.280	0.853	0.320	0.107	3.963
PM2.5	0.440	0.436	0.291	0.109	0.036	1.312

40. Construction Emissions Summary

Pavillion

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		1.601	0.234	7.983		9.818
CO		8.088	0.056	1.830		9.974
VOC		0.958	0.011	0.235	55.606	56.810
SO2		0.080	0.007	0.135		0.221
TSP	317.820		0.018	0.133		317.971
PM10	84.585		0.018	0.133		84.737
PM2.5	13.083		0.018	0.129		13.231
Formaldehyde			0.0048			0.005
Benzene					0.007	0.007
Toluene					0.037	0.037
Ethylbenzene					0.009	0.009
Xylenes					0.005	0.005
n-Hexane					0.045	0.045

Muddy Ridge

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		1.372	0.729	62.208		64.309
CO		6.933	0.197	14.256		21.386
VOC		0.821	0.034	1.827	42.667	45.349
SO2		0.068	0.020	1.048		1.137
TSP	815.52		0.048	1.040		816.602
PM10	220.03		0.048	1.040		221.121
PM2.5	33.34		0.048	1.009		34.400
Formaldehyde			0.019			0.019
Benzene					0.006	0.006
Toluene					0.000	0.000
Ethylbenzene					0.000	0.000
Xylenes					0.000	0.000
n-Hexane					0.034	0.034

Sand Mesa

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		0.915	0.486	69.120		70.520
CO		4.622	0.131	15.840		20.593
VOC		0.547	0.022	2.030	14.222	16.822
SO2		0.045	0.013	1.165		1.224
TSP	644.752		0.032	1.155		645.939
PM10	176.217		0.032	1.155		177.404
PM2.5	26.431		0.032	1.121		27.584
Formaldehyde			0.012			0.012
Benzene					0.002	0.002
Toluene					0.000	0.000
Ethylbenzene					0.000	0.000
Xylenes					0.000	0.000
n-Hexane					0.011	0.011

41. Construction Emissions Summary Continued

Sand Mesa South

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		0.343	0.182	25.920		26.445
CO		1.733	0.049	5.940		7.722
VOC		0.205	0.008	0.761	5.333	6.308
SO2		0.017	0.005	0.437		0.459
TSP	243.161		0.012	0.433		243.606
PM10	66.771		0.012	0.433		67.216
PM2.5	10.187		0.012	0.420		10.620
Formaldehyde			0.005			0.005
Benzene					0.001	0.001
Toluene					0.000	0.000
Ethylbenzene					0.000	0.000
Xylenes					0.000	0.000
n-Hexane					0.004	0.004

Coastal Extension

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		0.114	0.061	8.640		8.815
CO		0.578	0.016	1.980		2.574
VOC		0.068	0.003	0.254	1.778	2.103
SO2		0.006	0.002	0.146		0.153
TSP	81.439		0.004	0.144		81.587
PM10	22.450		0.004	0.144		22.598
PM2.5	3.473		0.004	0.140		3.617
Formaldehyde			0.002			0.002
Benzene					0.000	0.000
Toluene					0.000	0.000
Ethylbenzene					0.000	0.000
Xylenes					0.000	0.000
n-Hexane					0.001	0.001

Total Construction

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		4.344	1.692	173.871		179.908
CO		21.954	0.449	39.846		62.249
VOC		2.600	0.079	5.107	119.607	127.392
SO2		0.216	0.047	2.930		3.194
TSP	2102.686		0.114	2.906		2105.706
PM10	570.056		0.114	2.906		573.076
PM2.5	86.518		0.114	2.820		89.452
Formaldehyde			0.042			0.042
Benzene					0.016	0.016
Toluene					0.037	0.037
Ethylbenzene					0.009	0.009
Xylenes					0.005	0.005
n-Hexane					0.096	0.096

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21. Construction Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0	miles (Estimated from project area and existing road system)
Hours of Construction	22	hours per site (Project proponents - Weighted average for all areas)
Number of Heavy Diesel Truck Trips	3	(Project proponents - Weighted average for all areas)
Number of Pickup Trips	3	(Project proponents - Weighted average for all areas)
Diesel Fuel sulfur content	0.05	% (Typical value)
Diesel Fuel density	7.08	lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10	miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile)} * \text{Number of Trips} * \text{Trip Distance (miles)}}{453.6\ \text{(g/lb)} * 2000\ \text{(lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal)} * 453.6\ \text{(g/lb)} * \text{Fuel Sulfur Content} * 2\ \text{(S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Construction Vehicles	Heavy Haul Trucks			Heavy Duty Pickups			Total [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.073	0.001	3.03	0.027	0.000	0.101	0.042
CO	17.09	0.154	0.002	33.64	0.303	0.003	0.458	0.191
VOC [c]	4.83	0.044	0.000	1.84	0.017	0.000	0.060	0.025
SO2	0.32	0.003	0.000	0.21	0.002	0.000	0.005	0.002

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate

105. Central Dehydrator Summary

Species	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
VOC	3.964	10.902	5.154	3.964	23.984
Benzene	0.203	0.557	0.263	0.203	1.225
Toluene	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	0.000	0.000	0.000	0.000	0.000
Xylenes	0.000	0.000	0.000	0.000	0.000
n-Hexane	0.010	0.027	0.013	0.010	0.059
Total HAPs	0.212	0.584	0.276	0.212	1.285

39. Well Development Venting Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
VOC	55.606	42.667	14.222	5.333	1.778	119.607
Benzene	0.007	0.006	0.002	0.001	0.000	0.016
Toluene	0.037	0.000	0.000	0.000	0.000	0.037
Ethylbenzene	0.009	0.000	0.000	0.000	0.000	0.009
Xylenes	0.005	0.000	0.000	0.000	0.000	0.005
n-Hexane	0.045	0.034	0.011	0.004	0.001	0.096

Note: Assumes a 50% success rate for Sand Mesa and Coastal

24. Development & Reclamation Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0	miles (Estimated from project area and existing road system)
Hours of Operation	20	hours per site (Weighted average for all areas - Project Proponents)
Number of Heavy Diesel Truck Trips	3	(Weighted average for all areas - Project Proponents)
Number of Pickup Trips	10	(Weighted average for all areas - Project Proponents)
Diesel Fuel sulfur content	0.05	% (Typical value)
Diesel Fuel density	7.08	lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10	miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile)} * \text{\# Trips} * \text{Trip Distance (miles)}}{453.6 \text{ (g/lb)} * 2000 \text{ (lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal)} * 453.6 \text{ (g/lb)} * \text{Fuel Sulfur Content} * 2 \text{ (S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Development Vehicles	Heavy Haul Trucks			Heavy Duty Pickups			Total [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.081	0.001	3.03	0.100	0.001	0.181	0.069
CO	17.09	0.170	0.002	33.64	1.112	0.011	1.282	0.487
VOC [c]	4.83	0.048	0.000	1.84	0.061	0.001	0.109	0.041
SO2	0.32	0.003	0.000	0.21	0.007	0.000	0.010	0.004

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate

32. Drill Rig Emissions Summary

Assumptions: 2 to 4 rigs will be in operation at any one time
1 rig will operate part of the year in Pavillion
1 rig will operate full time in Muddy Ridge
1or 2 rigs will operate full time in Sand Mesa, Sand Mesa South or Coastal Extension

Short-Term Emissions (lbs/hr)

Species	Pavillion	Muddy Ridge	Sand Mesa	Sand Mesa South	Coastal Extension	Maximum (lbs/hr)
NOx	5.28	14.40	14.40	*	*	14.40
CO	1.21	3.30	3.30	*	*	3.30
VOC [b]	0.16	0.42	0.42	*	*	0.42
PM10 [c]	0.09	0.24	0.24	*	*	0.24
PM2.5 [d]	0.09	0.23	0.23	*	*	0.23
SO2	0.09	0.24	0.24	*	*	0.24

* Identical to Sand Mesa - One or two rigs covers all three areas

Annual Emissions (tons/yr)

Species	Pavillion	Muddy Ridge	Sand Mesa	Sand Mesa South	Coastal Extension	Total (tons/yr)
NOx	7.983	62.208	69.120	25.920	8.640	173.871
CO	1.830	14.256	15.840	5.940	1.980	39.846
VOC [b]	0.235	1.827	2.030	0.761	0.254	5.107
PM10 [c]	0.133	1.040	1.155	0.433	0.144	2.906
PM2.5 [d]	0.129	1.009	1.121	0.420	0.140	2.820
SO2	0.135	1.048	1.165	0.437	0.146	2.930

22. Drilling Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0	miles (Estimated from project area and existing road system)
Hours of Operation	650	hours per site (Time weighted average - project proponents)
Number of Heavy Diesel Truck Trips	156	(Area weighted average - project proponents)
Number of Pickup Trips	250	(Area weighted average - project proponents)
Diesel Fuel sulfur content	0.05	% (Typical value)
Diesel Fuel density	7.08	lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10	miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile)} * \text{\# Trips} * \text{Trip Distance (miles)}}{453.6\ \text{(g/lb)} * 2000\ \text{(lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal)} * 453.6\ \text{(g/lb)} * \text{Fuel Sulfur Content} * 2\ \text{(S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Drilling Vehicles	Heavy Haul Trucks			Heavy Duty Pickups			Total [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.129	0.042	3.03	0.077	0.025	0.206	2.546
CO	17.09	0.271	0.088	33.64	0.856	0.278	1.127	13.918
VOC [c]	4.83	0.077	0.025	1.84	0.047	0.015	0.123	1.525
SO2	0.32	0.005	0.002	0.21	0.005	0.002	0.011	0.130

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate

20. Fugitive Dust Summary

TSP Fugitive Dust Summary

Development Area	Construction lbs/hr	Construction tons/yr	Pipeline lbs/hr	Pipeline tons/yr	Reclamation lbs/hr	Reclamation tons/yr	Unpaved Road lbs/hr	Unpaved Road tons/yr	Wind Erosion tons/yr	Max lbs/hr	Total tons/yr
Pavillion	37.40	4.188	22.18	2.484	18.70	2.094	404.82	307.28	1.77	404.82	317.82
Muddy Ridge	24.71	4.151	22.18	2.129	14.69	2.116	230.56	801.72	5.40	230.56	815.52
Sand Mesa	24.71	2.768	22.18	0.710	14.69	1.410	279.10	636.83	3.03	279.10	644.75
Sand Mesa South	24.71	1.038	22.18	0.266	14.69	0.529	279.10	238.81	2.52	279.10	243.16
Coastal Extension	24.71	0.346	22.18	0.089	14.69	0.176	279.10	79.60	1.22	279.10	81.44
Maximum/Total	**37.40**	**12.491**	**22.18**	**5.679**	**18.70**	**6.326**	**404.82**	**2064.25**	**13.94**	**404.82**	**2102.69**

PM10 Fugitive Dust Summary

Development Area	Construction lbs/hr	Construction tons/yr	Pipeline lbs/hr	Pipeline tons/yr	Reclamation lbs/hr	Reclamation tons/yr	Unpaved Road lbs/hr	Unpaved Road tons/yr	Wind Erosion tons/yr	Max lbs/hr	Total tons/yr
Pavillion	12.54	1.404	7.14	0.799	6.27	0.702	104.64	80.79	0.89	104.64	84.58
Muddy Ridge	7.62	1.280	7.14	0.685	4.53	0.652	60.33	214.72	2.70	60.33	220.03
Sand Mesa	7.62	0.853	7.14	0.228	4.53	0.435	73.46	173.19	1.51	73.46	176.22
Sand Mesa South	7.62	0.320	7.14	0.086	4.53	0.163	73.46	64.94	1.26	73.46	66.77
Coastal Extension	7.62	0.107	7.14	0.029	4.53	0.054	73.46	21.65	0.61	73.46	22.45
Maximum/Total	**12.54**	**3.963**	**7.14**	**1.827**	**6.27**	**2.006**	**104.64**	**555.29**	**6.97**	**104.64**	**570.06**

PM2.5 Fugitive Dust Summary

Development Area	Construction lbs/hr	Construction tons/yr	Pipeline lbs/hr	Pipeline tons/yr	Reclamation lbs/hr	Reclamation tons/yr	Unpaved Road lbs/hr	Unpaved Road tons/yr	Wind Erosion tons/yr	Max lbs/hr	Total tons/yr
Pavillion	3.93	0.440	2.33	0.261	1.96	0.220	15.29	11.81	0.35	15.29	13.08
Muddy Ridge	2.59	0.436	2.33	0.224	1.54	0.222	8.82	31.38	1.08	8.82	33.34
Sand Mesa	2.59	0.291	2.33	0.075	1.54	0.148	10.74	25.31	0.61	10.74	26.43
Sand Mesa South	2.59	0.109	2.33	0.028	1.54	0.056	10.74	9.49	0.50	10.74	10.19
Coastal Extension	2.59	0.036	2.33	0.009	1.54	0.019	10.74	3.16	0.24	10.74	3.47
Maximum/Total	**3.93**	**1.312**	**2.33**	**0.596**	**1.96**	**0.664**	**15.29**	**81.16**	**2.79**	**15.29**	**86.52**

45. Production Heater Summary

Pollutant	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx [a]	8.49	4.11	5.48	0.66	0.44	19.16
CO [a]	7.13	3.45	4.60	0.55	0.37	16.10
TOC [c]	0.93	0.45	0.60	0.07	0.05	2.11
VOC	0.25	0.11	0.15	0.02	0.01	0.55
SOx [b]	0.00	0.00	0.00	0.00	0.00	0.00
TSP [c]	0.64	0.31	0.42	0.05	0.03	1.46
PM10 [c]	0.64	0.31	0.42	0.05	0.03	1.46
PM2.5 [c]	0.64	0.31	0.42	0.05	0.03	1.46
Benzene [d]	0.00	0.00	0.00	0.00	0.00	0.00
Toluene [d]	0.00	0.00	0.00	0.00	0.00	0.00
Hexane [d]	0.15	0.07	0.10	0.01	0.01	0.34
Formaldehyde [d]	0.01	0.00	0.00	0.00	0.00	0.01

28. Heavy Equipment Tailpipe Emissions Summary

Development Area	NOx (tons/year)	CO (tons/year)	VOC (tons/year)	PM10 (tons/year)	PM2.5 (tons/year)	SO2 (tons/year)	Formaldehyde (tons/year)
Pavillion	0.234	0.056	0.011	0.018	0.018	0.007	0.005
Muddy Ridge	0.729	0.197	0.034	0.048	0.048	0.020	0.019
Sand Mesa	0.486	0.131	0.022	0.032	0.032	0.013	0.012
Sand Mesa South	0.182	0.049	0.008	0.012	0.012	0.005	0.005
Coastal Extension	0.061	0.016	0.003	0.004	0.004	0.002	0.002
Total	1.692	0.449	0.079	0.114	0.114	0.047	0.042

71. Hidden Valley Compression and Processing

Assumptions:

Total Power Requirement: 1700 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	3.75	16.4
CO [1]		2.0	7.50	32.8
VOC [1]		1.0	3.75	16.4
PM10 [2, 5]	0.0194	0.070	0.26	1.2
PM2.5 [2,5]	0.0194	0.070	0.26	1.2
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.02	0.1
Toluene [2]	0.000558	0.00203	0.01	0.0
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.00	0.0
Formaldehyde [1]		0.07	0.26	1.1

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

27. Muddy Ridge, Sand Mesa and Coastal Construction Heavy Equipment Tailpipe Emissions

Assumptions:

Hours of Operation	28	hours/site (Project Proponents)
Development Rate	24	wells per year
Load Factor	0.5	(Assumed typical value)
Backhoe Size	84	hp (Contractor)
Backhoe Utilization	10	percent
Motor Grader Size	170	hp (Contractor)
Motor Grader Utilization	50	percent
Scraper Size	330	hp (Contractor)
Scraper Utilization	75	percent
D8 Dozer Size	305	hp (Contractor)
D8 Dozer Utilization	50	percent

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Rated Hp (hp)} * \text{Operating Hours (hrs)} * \text{Load Factor (Dimensionless)} * \text{Utilization}}{453.6\ \text{(g/lb)} * 2000\ \text{(lb/tons)}}$$

Heavy Const. Vehicles	Backhoe			Grader			Scraper		
	E. Factor [a] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)	E. Factor [b] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)	E. Factor [a] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)
NOx	8.15	0.075	0.025	7.14	0.669	0.225	8.15	2.223	0.747
CO	2.28	0.021	0.007	1.54	0.144	0.048	2.28	0.622	0.209
VOC [c]	0.37	0.003	0.001	0.36	0.034	0.011	0.37	0.101	0.034
PM10 [d]	0.5	0.005	0.002	0.63	0.059	0.020	0.5	0.136	0.046
PM2.5 [d]	0.5	0.005	0.002	0.63	0.059	0.020	0.5	0.136	0.046
SO2	0.22	0.002	0.001	0.22	0.021	0.007	0.22	0.060	0.020
Formaldehyde	0.22	0.002	0.001	0.12	0.011	0.004	0.22	0.060	0.020

Heavy Const. Vehicles	D8 Dozer			Total	
	E. Factor [a] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)
NOx	8.15	1.370	0.460	4.338	1.458
CO	2.28	0.383	0.129	1.171	0.393
VOC [c]	0.37	0.062	0.021	0.200	0.067
PM10 [d]	0.5	0.084	0.028	0.284	0.095
PM2.5 [d]	0.5	0.084	0.028	0.284	0.095
SO2	0.22	0.037	0.012	0.120	0.040
Formaldehyde	0.22	0.037	0.012	0.110	0.037

a AP-42 Volume II, Mobile Sources, Nonroad Vehicles, Table 11-7.1 Off-highway truck
b AP-42 Volume II, Mobile Sources, Nonroad Vehicles, Table 11-7.1 Motor Grader
c Emission Factor represents total Hydrocarbon Emissions
d All emitted particulate matter assumed to be PM2.5
e Assumes a proponet specified maximum development rate

87. Muddy Ridge Dehydrator Emissions Calculation Continued

```
                         Ethane 1.05e+001 6.90e+003
                        Propane 3.93e+000 3.80e+003
                      Isobutane 1.46e+000 1.86e+003
                       n-Butane 1.07e+000 1.36e+003
                     Isopentane 1.14e+000 1.80e+003
                      n-Pentane 7.59e-001 1.20e+003
                       n-Hexane 5.00e-003 9.46e+000
                  Other Hexanes 8.65e-001 1.64e+003
                       Heptanes 7.99e-002 1.76e+002
                        Benzene 9.71e-004 1.67e+000
    ------------------------------ --------- ---------
               Total Components    100.00 4.74e+004
LEAN GLYCOL STREAM
------------------------------------------------------------
    Temperature:     80.00 deg. F
    Flow Rate:   7.24e-001 gpm
                  Component           Conc.    Loading
                                      (wt%)    (lb/hr)
    ------------------------------ --------- ---------
                            TEG 9.85e+001 4.02e+002
                          Water 1.50e+000 6.12e+000
                 Carbon Dioxide 3.43e-012 1.40e-011
                       Nitrogen 2.75e-013 1.12e-012
                        Methane 6.39e-018 2.61e-017
                         Ethane 6.95e-008 2.84e-007
                        Propane 5.96e-009 2.43e-008
                      Isobutane 2.99e-009 1.22e-008
                       n-Butane 2.42e-009 9.89e-009
                     Isopentane 6.49e-004 2.65e-003
                      n-Pentane 5.66e-004 2.31e-003
                       n-Hexane 7.19e-006 2.93e-005
                  Other Hexanes 1.89e-003 7.71e-003
                       Heptanes 2.44e-004 9.94e-004
                        Benzene 6.32e-004 2.58e-003
    ------------------------------ --------- ---------
               Total Components    100.00 4.08e+002

RICH GLYCOL AND PUMP GAS STREAM
------------------------------------------------------------
    Temperature:     80.00 deg. F
    Pressure:       714.70 psia
    Flow Rate:   8.05e-001 gpm
    NOTE: Stream has more than one phase.
                  Component           Conc.    Loading
                                      (wt%)    (lb/hr)
    ------------------------------ --------- ---------
                            TEG 8.97e+001 4.01e+002
                          Water 8.16e+000 3.65e+001
                 Carbon Dioxide 3.79e-002 1.69e-001
                       Nitrogen 1.03e-002 4.59e-002
                        Methane 7.55e-001 3.38e+000
                         Ethane 2.78e-001 1.24e+000
                        Propane 2.13e-001 9.52e-001
                      Isobutane 1.29e-001 5.79e-001
                       n-Butane 1.18e-001 5.26e-001
                     Isopentane 1.56e-001 6.97e-001
                      n-Pentane 1.28e-001 5.74e-001
                       n-Hexane 1.51e-003 6.75e-003
                  Other Hexanes 2.06e-001 9.23e-001
                       Heptanes 4.81e-002 2.15e-001
                        Benzene 1.16e-002 5.17e-002
    ------------------------------ --------- ---------
               Total Components    100.00 4.47e+002
```

88. Muddy Ridge Dehydrator Emissions Calculation Continued

FLASH TANK OFF GAS STREAM

Temperature: 120.00 deg. F
Pressure: 44.70 psia
Flow Rate: 1.19e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.76e-001	4.39e-002
Carbon Dioxide	1.06e+000	1.46e-001
Nitrogen	5.16e-001	4.54e-002
Methane	6.63e+001	3.34e+000
Ethane	1.27e+001	1.20e+000
Propane	6.24e+000	8.64e-001
Isobutane	2.76e+000	5.03e-001
n-Butane	2.40e+000	4.38e-001
Isopentane	2.51e+000	5.68e-001
n-Pentane	1.97e+000	4.46e-001
n-Hexane	1.66e-002	4.49e-003
Other Hexanes	2.47e+000	6.68e-001
Heptanes	3.43e-001	1.08e-001
Benzene	1.19e-002	2.93e-003
Total Components	100.00	8.37e+000

FLASH TANK GLYCOL STREAM

Temperature: 120.00 deg. F
Flow Rate: 7.86e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.15e+001	4.01e+002
Water	8.31e+000	3.65e+001
Carbon Dioxide	5.28e-003	2.32e-002
Nitrogen	1.12e-004	4.92e-004
Methane	9.14e-003	4.01e-002
Ethane	1.06e-002	4.65e-002
Propane	2.00e-002	8.76e-002
Isobutane	1.73e-002	7.58e-002
n-Butane	1.99e-002	8.74e-002
Isopentane	2.94e-002	1.29e-001
n-Pentane	2.91e-002	1.28e-001
n-Hexane	5.16e-004	2.26e-003
Other Hexanes	5.82e-002	2.55e-001
Heptanes	2.44e-002	1.07e-001
Benzene	1.11e-002	4.88e-002
Total Components	100.00	4.39e+002

89. Muddy Ridge Dehydrator Emissions Calculation Continued

```
REGENERATOR OVERHEADS STREAM
-------------------------------------------------------------
    Temperature:    212.00 deg. F
    Pressure:        14.70 psia
    Flow Rate:   6.46e+002 scfh

                  Component           Conc.    Loading
                                     (vol%)    (lb/hr)
    ------------------------------- --------- ---------
                              Water 9.90e+001 3.04e+001
                     Carbon Dioxide 3.09e-002 2.32e-002
                           Nitrogen 1.03e-003 4.92e-004
                            Methane 1.47e-001 4.01e-002
                             Ethane 9.08e-002 4.65e-002
                            Propane 1.17e-001 8.76e-002
                          Isobutane 7.66e-002 7.58e-002
                           n-Butane 8.83e-002 8.74e-002
                         Isopentane 1.03e-001 1.27e-001
                          n-Pentane 1.02e-001 1.25e-001
                           n-Hexane 1.52e-003 2.23e-003
                      Other Hexanes 1.69e-001 2.48e-001
                           Heptanes 6.23e-002 1.06e-001
                            Benzene 3.48e-002 4.62e-002

    ------------------------------- --------- ---------
                   Total Components    100.00 3.14e+001
```

37. Muddy Ridge Well Development Venting

Assumptions: Following Completion, Wells are Vented prior to connnection to the gathering pipeline

Venting Period 24 hours (Project Proponents)

Amount of Vented Gas: 0.5 MMscf (Average Volume Estimated by Proponents)

Development Rate: 12 Wells per year (Project Proponents)

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/day)	COMPONENT FLOW RATE (lb/hr)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	79.318	12.725	0.590	396.590	698.579	100.595
Ethane	30.07	10.453	3.143	0.146	52.265	172.557	24.848
Propane	44.097	3.927	1.732	0.080	19.635	95.067	13.690
i-Butane	58.123	1.456	0.846	0.039	7.280	46.459	6.690
n-Butane	58.123	1.069	0.621	0.029	5.345	34.110	4.912
i-Pentane	72.15	1.136	0.820	0.038	5.680	44.996	6.479
n-Pentane	72.15	0.759	0.548	0.025	3.795	30.063	4.329
Hexanes	86.177	0.865	0.745	0.035	4.325	40.923	5.893
Heptanes	100.204	0.080	0.080	0.004	0.400	4.401	0.634
Octanes	114.231	0.000	0.000	0.000	0.000	0.000	0.000
Nonanes	128.258	0.000	0.000	0.000	0.000	0.000	0.000
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.005	0.043	0.006
Toluene	92.13	0.000	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	106.16	0.000	0.000	0.000	0.000	0.000	0.000
Xylenes	106.16	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	86.177	0.005	0.004	0.000	0.025	0.237	0.034
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	0.605	0.169	0.008	3.025	9.304	1.340
Carbon Dioxide	44.01	0.328	0.144	0.007	1.640	7.925	1.141
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**9.298**	**5.397**	**0.250**	**46.490**	**296.298**	**42.667**
HAP SUBTOTAL		**0.006**	**0.005**	**0.000**	**0.030**	**0.279**	**0.040**
TOTAL		**100**	**21.579**	**1.000**	**500**	**1184.663**	**170.592**

30. Muddy Ridge Drill Rig Engine Emissions

Assumptions:

Hours of Operation	720	hours/well (30 days on average @ 24 hrs/day - Project Proponents)
Development Rate	12	wells/year
Load Factor	0.4	(Assumed typical value)
Rig Size	1500	hp (Drilling Contractor)
Diesel Fuel Sulfur Content	0.05	% (typical value)

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (lb/hp-hr)} * \text{Rated Horsepower (hp)} * \text{Operating Hours (hrs)} * \text{Load Factor (Dimensionless)}}{\text{2000 (lb/tons)}}$$

SO2 E. Factor (lb/hp-hr) = Fuel sulfur content * 0.00809

Species	Drill Rig Emissions			
	E. Factor [d] (lb/MMBtu)	E. Factor [a] (lb/hp-hr)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx		0.024	14.400	62.21
CO		0.0055	3.300	14.26
VOC [b]		0.000705	0.423	1.83
PM10 [c]	0.0573	0.0004011	0.241	1.04
PM2.5 [d]	0.0556	0.0003892	0.234	1.01
SO2		0.0004045	0.243	1.05

a AP-42 Volume I, Large Stationary Diesel Engines Table 3.4-1, 10/96
b Emission Factor represents total Hydrocarbon Emissions
c PM10 Emission Factor determined from Table 3.4-2, 10/96
d PM2.5 Emission Factor estimated as PM3.0 (filterable + condensable) from Table 3.4-2, 10/96
e Conversion from lb/MMBtu to lb/hp-hr assumes a BSFC of 7,000 BTU/hp-hr (Table 3.4-1, 10/96)
f Assumes a Development rate as stated by the proponents (Summarized in page 1)

51. Muddy Ridge E&P Tank Flash Emissions Calculation

```
*******************************************************************************     Project Setup Information
*
*******************************************************************************
Project File              : C:\DATA\Clients\Tom Brown\Wind River EIS\Project Emission Inventory\muddy ridge flash.ept
Flowsheet Selection       : Oil Tank with Separator
Calculation Method        : RVP Distillation
Control Efficiency        : 100.0%
Known Separator Stream    : Low Pressure Oil
Entering Air Composition  : No

Filed Name                : Muddy Ridge
Well Name                 : Wind River EIS
Well ID                   : Average Condensate Analysis
Date                      : 2003.11.26


*******************************************************************************
*     Data Input                                                                          *
*******************************************************************************

Separator Pressure        : 200.00[psig]
Separator Temperature     : 130.00[F]
Ambient Pressure          : 12.00[psia]
Ambient Temperature       : 44.00[F]
C10+ SG                   : 0.8990
C10+ MW                   : 166.00

-- Low Pressure Oil ------------------------------------------------------------
   No.    Component              mol %
   1      H2S                    0.0000
   2      O2                     0.0000
   3      CO2                    0.2540
   4      N2                     0.0020
   5      C1                     5.8580
   6      C2                     3.1040
   7      C3                     3.6140
   8      i-C4                   2.7740
   9      n-C4                   3.2210
   10     i-C5                   4.0590
   11     n-C5                   3.0110
   12     C6                     6.3710
   13     C7                    23.8500
   14     C8                     9.6440
   15     C9                     6.4100
   16     C10+                  14.7580
   17     Benzene                0.7100
   18     Toluene                3.7630
   19     E-Benzene              0.4510
   20     Xylenes                4.9730
   21     n-C6                   3.1710
   22     224Trimethylp          0.0000

-- Sales Oil -------------------------------------------------------------------
Production Rate           : 85[bbl/day]
Days of Annual Operation  : 365 [days/year]
API Gravity               : 46.0
Reid Vapor Pressure       : 7.70[psia]
```

52. Muddyr Ridge E&P Tank Flash Emissions Calculation Continued

```
******************************************************************************
*      Calculation Results
*
******************************************************************************

-- Emission Summary ----------------------------------------------------------
Item                 Uncontrolled   Uncontrolled
                     [ton/yr]       [lb/hr]
Total HAPs           2.460          0.562
Total HC             206.599        47.169
VOCs, C2+            163.971        37.436
VOCs, C3+            121.710        27.788

Uncontrolled Recovery Info.
       Vapor         13.3600        [MSCFD]
       HC Vapor      13.1200        [MSCFD]
       GOR           157.18         [SCF/bbl]

-- Emission Composition ------------------------------------------------------
No  Component        Uncontrolled   Uncontrolled
                     [ton/yr]       [lb/hr]
1   H2S              0.000          0.000
2   O2               0.000          0.000
3   CO2              5.070          1.158
4   N2               0.025          0.006
5   C1               42.628         9.732
6   C2               42.261         9.649
7   C3               53.631         12.245
8   i-C4             21.980         5.018
9   n-C4             17.422         3.978
10  i-C5             10.328         2.358
11  n-C5             5.383          1.229
12  C6               4.242          0.968
13  C7               5.402          1.233
14  C8               0.693          0.158
15  C9               0.158          0.036
16  C10+             0.009          0.002
17  Benzene          0.269          0.061
18  Toluene          0.407          0.093
19  E-Benzene        0.016          0.004
20  Xylenes          0.153          0.035
21  n-C6             1.617          0.369
22  224Trimethylp    0.000          0.000
    Total            211.694        48.332
```

53. Muddyr Ridge E&P Tank Flash Emissions Calculation Continued

- Stream Data --

No.	Component	MW	LP Oil mol %	Flash Oil mol %	Sale Oil mol %	Flash Gas mol %	W&S Gas mol %	Total Emissions mol %
1	H2S	34.80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	44.01	0.2540	0.0326	0.0000	1.9249	1.1595	1.7910
4	N2	28.01	0.0020	0.0000	0.0000	0.0170	0.0007	0.0141
5	C1	16.04	5.8580	0.2361	0.0000	48.2851	8.4020	41.3076
6	C2	30.07	3.1040	0.7696	0.0063	20.7214	27.1665	21.8489
7	C3	44.10	3.6140	2.2275	1.0869	14.0777	41.6829	18.9072
8	i-C4	58.12	2.7740	2.4382	2.2610	5.3090	8.5659	5.8788
9	n-C4	58.12	3.2210	3.0723	2.9834	4.3440	6.1486	4.6597
10	i-C5	72.15	4.0590	4.3154	4.3622	2.1246	2.6997	2.2253
11	n-C5	72.15	3.0110	3.2633	3.3170	1.1073	1.4076	1.1598
12	C6	86.16	6.3710	7.1164	7.2942	0.7471	0.9647	0.7851
13	C7	100.20	23.8500	26.9026	27.6488	0.8173	1.0942	0.8658
14	C8	114.23	9.6440	10.9101	11.2219	0.0907	0.1268	0.0970
15	C9	128.28	6.4100	7.2571	7.4661	0.0181	0.0284	0.0199
16	C10+	166.00	14.7580	16.7138	17.1970	0.0008	0.0013	0.0009
17	Benzene	78.11	0.7100	0.7974	0.8185	0.0507	0.0670	0.0536
18	Toluene	92.13	3.7630	4.2532	4.3736	0.0644	0.0891	0.0687
19	E-Benzene	106.17	0.4510	0.5105	0.5251	0.0022	0.0032	0.0024
20	Xylenes	106.17	4.9730	5.6293	5.7912	0.0208	0.0302	0.0224
21	n-C6	86.18	3.1710	3.5546	3.6469	0.2769	0.3618	0.2918
22	224Trimethylp	114.24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	MW		96.25	104.91	106.72	30.89	42.46	32.91
	Stream Mole Ratio		1.0000	0.8830	0.8582	0.1170	0.0248	0.1418
	Heating Value	[BTU/SCF]				1756.74	2397.13	1868.77
	Gas Gravity	[Gas/Air]				1.07	1.47	1.14
	Bubble Pt. @ 100F	[psia]	230.76	23.29	8.38			
	RVP @ 100F	[psia]	57.37	13.43	7.66			
	Spec. Gravity @ 100F		0.711	0.726	0.729			

Buys & Associates, Inc. **Environmental Consultants**	Project: Wind River Proposed Action Inventory Date: 7/8/2004

34. Muddy Ridge Produced Gas Characteristics (MR 24-42)

Gas Heat Value (wet): 1267 Btu/scf

C1-C2 Wt. Fraction:	0.735
VOC Wt. Fraction:	0.250
Non-HC Wt. Fraction:	0.015
Total:	1.000

COMPONENT	MOLE PERCENT	COMPONENT MOLE WEIGHT (lb/lb-mole)	NET MOLE WEIGHT (lb/lb-mole)	WEIGHT FRACTION	GROSS HEATING VALUE (BTU/scf)	NET DRY HEATING VALUE (BTU/scf)	LOWER HEATING VALUE (BTU/scf)	NET LOW HEATING VALUE (BTU/scf)
Methane	79.318	16.043	12.725	0.590	1010.000	801.112	910.000	721.794
Ethane	10.453	30.070	3.143	0.146	1769.800	184.997	1618.000	169.130
Propane	3.927	44.097	1.732	0.080	2516.200	98.811	2316.000	90.949
i-Butane	1.456	58.123	0.846	0.039	3252.100	47.351	3005.000	43.753
n-Butane	1.069	58.123	0.621	0.029	3262.400	34.875	3013.000	32.209
i-Pentane	1.136	72.150	0.820	0.038	4000.900	45.450	3698.000	42.009
n-Pentane	0.759	72.150	0.548	0.025	4008.800	30.427	3708.000	28.144
Hexanes+	0.865	86.177	0.745	0.035	4756.200	41.141	4404.000	38.095
Heptanes	0.080	100.204	0.080	0.004	5502.500	4.402	5100.000	4.080
Octanes	0.000	114.231	0.000	0.000	6249.100	0.000		0.000
Nonanes	0.000	128.258	0.000	0.000	6996.400	0.000		0.000
Decanes	0.000	142.285	0.000	0.000	7743.200	0.000		0.000
Benzene	0.001	78.120	0.001	0.000	3715.500	0.037		0.000
Toluene	0.000	92.130	0.000	0.000	4444.600	0.000		0.000
Ethylbenzene	0.000	106.160	0.000	0.000	5191.500	0.000		0.000
Xylenes	0.000	106.160	0.000	0.000	5183.500	0.000		0.000
n-Hexane	0.005	86.177	0.004	0.000	4756.200	0.238		0.000
Helium	0.000	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	0.605	28.013	0.169	0.008	0.000	0.000	0.000	0.000
Carbon Dioxide	0.328	44.010	0.144	0.007	0.000	0.000	0.000	0.000
Oxygen	0.000	32.000	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	0.000	34.080	0.000	0.000	637.100	0.000	588.000	0.000
TOTAL	100.000		21.579	1.000		1288.841		1170.162

Relative Mole Weight (lb/lb-mole) = [Mole Percent * Molecular weight (lb/lb-mole)] / 100

Weight Fraction = Net Mole Weight / Total Mole Weight

84. Muddy Ridge Dehydrator Emissions Calculation

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT
Case Name: Wind River EIS
File Name: muddy ridge dehy.ddf
Date: December 04, 2003

DESCRIPTION:
Description: Proposed Action
Muddy Ridge and
Coastal Extension
Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0401	0.963	0.1757
Ethane	0.0465	1.116	0.2037
Propane	0.0876	2.102	0.3836
Isobutane	0.0758	1.819	0.3320
n-Butane	0.0874	2.097	0.3827
Isopentane	0.1265	3.037	0.5543
n-Pentane	0.1254	3.009	0.5491
n-Hexane	0.0022	0.054	0.0098
Other Hexanes	0.2477	5.944	1.0848
Heptanes	0.1063	2.550	0.4654
Benzene	0.0462	1.110	0.2025
Total Emissions	0.9917	23.801	4.3436
Total Hydrocarbon Emissions	0.9917	23.801	4.3436
Total VOC Emissions	0.9051	21.722	3.9643
Total HAP Emissions	0.0485	1.163	0.2123
Total BTEX Emissions	0.0462	1.110	0.2025

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	3.3387	80.129	14.6235
Ethane	1.1973	28.735	5.2442
Propane	0.8642	20.741	3.7853
Isobutane	0.5032	12.076	2.2039
n-Butane	0.4384	10.522	1.9202
Isopentane	0.5682	13.637	2.4888
n-Pentane	0.4461	10.706	1.9538
n-Hexane	0.0045	0.108	0.0196
Other Hexanes	0.6677	16.024	2.9243
Heptanes	0.1080	2.591	0.4728
Benzene	0.0029	0.070	0.0128
Total Emissions	8.1391	195.339	35.6493
Total Hydrocarbon Emissions	8.1391	195.339	35.6493
Total VOC Emissions	3.6031	86.474	15.7816
Total HAP Emissions	0.0074	0.178	0.0325
Total BTEX Emissions	0.0029	0.070	0.0128

85. Muddy Ridge Dehydrator Emissions Calculation Continued

EQUIPMENT REPORTS:

ABSORBER

NOTE: Because the Calculated Absorber Stages was below the minimum allowed, GRI-GLYCalc has set the number of Absorber Stages to 1.25 and has calculated a revised Dry Gas Dew Point.

Calculated Absorber Stages:	1.25
Calculated Dry Gas Dew Point:	5.32 lbs. H2O/MMSCF
Temperature:	80.0 deg. F
Pressure:	700.0 psig
Dry Gas Flow Rate:	20.0000 MMSCF/day
Glycol Losses with Dry Gas:	0.1104 lb/hr
Wet Gas Water Content:	Saturated
Calculated Wet Gas Water Content:	41.76 lbs. H2O/MMSCF
Specified Lean Glycol Recirc. Ratio:	1.50 gal/lb H2O

Component	Remaining in Dry Gas	Absorbed in Glycol
Water	12.74%	87.26%
Carbon Dioxide	99.96%	0.04%
Nitrogen	100.00%	0.00%
Methane	100.00%	0.00%
Ethane	99.99%	0.01%
Propane	99.98%	0.02%
Isobutane	99.98%	0.02%
n-Butane	99.97%	0.03%
Isopentane	99.97%	0.03%
n-Pentane	99.96%	0.04%
n-Hexane	99.94%	0.06%
Other Hexanes	99.95%	0.05%
Heptanes	99.89%	0.11%
Benzene	97.14%	2.86%

FLASH TANK

Flash Control:	Vented to atmosphere
Flash Temperature:	120.0 deg. F
Flash Pressure:	30.0 psig

Component	Left in Glycol	Removed in Flash Gas
Water	99.88%	0.12%
Carbon Dioxide	13.67%	86.33%
Nitrogen	1.07%	98.93%
Methane	1.19%	98.81%
Ethane	3.74%	96.26%
Propane	9.20%	90.80%
Isobutane	13.09%	86.91%
n-Butane	16.62%	83.38%
Isopentane	18.52%	81.48%
n-Pentane	22.25%	77.75%
n-Hexane	33.55%	66.45%
Other Hexanes	27.67%	72.33%
Heptanes	49.84%	50.16%
Benzene	94.34%	5.66%

86. Muddy Ridge Dehydrator Emissions Calculation Continued

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	16.77%	83.23%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	2.05%	97.95%
n-Pentane	1.81%	98.19%
n-Hexane	1.30%	98.70%
Other Hexanes	3.02%	96.98%
Heptanes	0.93%	99.07%
Benzene	5.28%	94.72%

STREAM REPORTS:

WET GAS STREAM

Temperature: 80.00 deg. F
Pressure: 714.70 psia
Flow Rate: 8.34e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.80e-002	3.48e+001
Carbon Dioxide	3.28e-001	3.17e+002
Nitrogen	6.04e-001	3.72e+002
Methane	7.92e+001	2.79e+004
Ethane	1.04e+001	6.90e+003
Propane	3.92e+000	3.80e+003
Isobutane	1.45e+000	1.86e+003
n-Butane	1.07e+000	1.36e+003
Isopentane	1.13e+000	1.80e+003
n-Pentane	7.58e-001	1.20e+003
n-Hexane	5.00e-003	9.46e+000
Other Hexanes	8.64e-001	1.64e+003
Heptanes	7.99e-002	1.76e+002
Benzene	9.99e-004	1.72e+000
Total Components	100.00	4.74e+004

DRY GAS STREAM

Temperature: 80.00 deg. F
Pressure: 714.70 psia
Flow Rate: 8.33e+005 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.12e-002	4.44e+000
Carbon Dioxide	3.28e-001	3.17e+002
Nitrogen	6.05e-001	3.72e+002
Methane	7.93e+001	2.79e+004

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Proposed Action Inventory Date: 7/8/2004

43. Muddy Ridge Production Heater Emissions

Assumptions

Number of new producing wells 50 (Reported by Project Proponents)

Separator Size 750 MBTU/hr (Reported by Project Proponents)

Firing Rate 30 Minutes/hour (Est.from fuel usage reported by Proponents)
6 months/year (Nov. thru April - Project Proponents)
2190 hours/year

Net Low Fuel Gas Heat Content 1267 Btu/scf (Gas Analyses from Existing Wells)

Fuel Gas VOC Content 0.250 by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * 1{,}000 \text{ (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * 1{,}000{,}000 \text{ (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{2{,}000 \text{ (lbs/ton)} * 1{,}000 \text{ (Btu/scf - Standard Fuel Heating Value)}}$$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Pollutant	Separator Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr/well)	Emissions [e] (tons/yr)
NOx [a]	100	0.019	4.106
CO [a]	84	0.016	3.449
TOC [c]	11	0.002	0.452
VOC	N.A.	0.001	0.113
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.001	0.312
PM10 [c]	7.6	0.001	0.312
PM2.5 [c]	7.6	0.001	0.312
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.074
Formaldehyde [d]	0.075	0.000	0.003

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

50. Muddy Ridge Condensate Storage Tank Emissions

Assumptions:

Average Condensate Production Rate :	1.7 bbls per day (Average production for existing wells - WOGCC)
Expected Successful Producting Wells:	50
Predicted Condensate Production:	85 bbls/day
Separator Conditions :	200 psi and 130 F (Specified by Proponent)
Condensate Composition:	Average of 4 samples from Muddy Ridge wells

Calculations:

Stock tank flash emissions estimated with E&P Tanks software

Emissions:

Component	Flash Emissions (tons/yr)
Benzene	0.269
Toluene	0.407
Ethylbenzene	0.016
Xylenes	0.153
n-Hexane	1.617
Total HAPS	2.462
Total VOC	121.71

4. Muddy Ridge, Sand Mesa and Coastal Construction Fugitive Dust Emissions

Assumptions:

Hours of Construction	3.5	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	28	hours per well pad
Pieces of Equipment	4	- 1 Grader @ 50% utilization (Project Proponent)
		- 1 Backhoe @ 10% utilization
		- 1 Scraper @ 75% utilization
		- 1 D8 Dozer @ 50% utilization
Equivalent Equipment Utilization	1.85	
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	34	percent (Composit well pad soil sample analysis)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 13.36 lbs TSP/hour/piece of equipment

Emissions = 5.49 lbs PM15/hour/piece of equipment

Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	24.71	0.3459	8.303
PM15	10.16	0.1422	3.412
PM10	7.62	0.1066	2.559
PM2.5	2.59	0.0363	0.872

a Assumes Proponent specified equipment utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

10. Muddy Ridge, Sand Mesa and Coastal Reclamation Fugitive Dust Emissions

Assumptions:

Hours of Construction	3	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	24	hours per well pad
Pieces of Equipment	1	Grader @ 50% utilization (Project Proponent)
	1	Backhoe @ 10% utilization
	1	Dozer @ 50% utilization
Equivalent Equipment Utilization	1.1	
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	34	percent (Composit soil sample)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 13.36 lbs TSP/hour/piece of equipment

Emissions = 5.49 lbs PM15/hour/piece of equipment

Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	14.69	0.1763	4.231
PM15	6.04	0.0725	1.739
PM10	4.53	0.0543	1.304
PM2.5	1.54	0.0185	0.444

a Assumes Proponent specified equipment utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

Buys & Associates, Inc. Environmental Consultants	Project: Wind River EIS Emission Inventory Date: 7/8/2004

77. Muddy Ridge Central Facility Heater Emissions

Assumptions

Separator Size:	0	MBTU/hr (Reported by Project Proponents)
Dehydrator Size:	1050	MBTU/hr (Reported by Project Proponents)
Total Heater Capacity:	1050	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour for entire year (Est.from fuel usage reported by Proponents)
	4380	hours/year
Net Low Fuel Gas Heat Content	1170	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr) * 1,000 (Btu/MBtu) * Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf) * 1,000,000 (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf) * Fuel Consumption (MMscf/yr) * Fuel heating Value (Btu/scf)}}{\text{2,000 (lbs/ton) * 1,000 (Btu/scf - Standard Fuel Heating Value)}}$$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Species	Total Heater Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx [a]	100	0.053	0.230
CO [a]	84	0.044	0.193
TOC [c]	11	0.006	0.025
VOC	N.A.	0.001	0.006
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.004	0.017
PM10 [c]	7.6	0.004	0.017
PM2.5 [c]	7.6	0.004	0.017
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.001	0.004
Formaldehyde [d]	0.075	0.000	0.000

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

83. Muddy Ridge Dehydrator

Assumptions

Throughput Rate: 20 MMscf/day (As projected by Project Proponents)

Gas Composition: Muddy Ridge Sample

Inlet Gas Conditions: Inlet gas was assumed to be saturated at 700 psi and 80 F as reported by the project proponents

Calculations

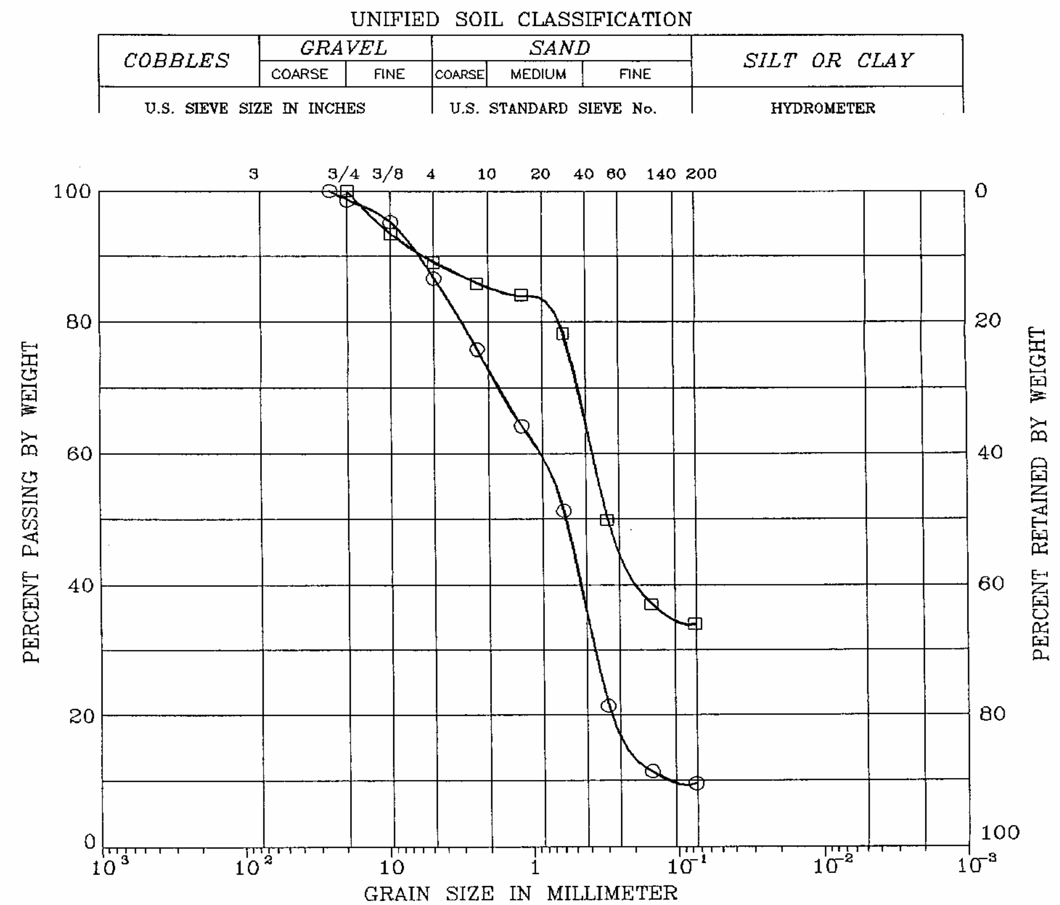
Dehydrator emissions were simulated using GRI GlyCalc version 4.0 software

Emissions

Species	Emissions (lbs/hr)	Emissions (tons/year)
VOC	0.905	3.964
Benzene	0.046	0.203
Toluene	0.000	0.000
Ethylbenzene	0.000	0.000
Xylenes	0.000	0.000
n-Hexane	0.002	0.010
Total HAPs	0.048	0.212

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Proposed Action Inventory Date: 7/8/2004

5. Muddy Ridge Road and Pad Silt Content



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
O	Road	–			Well-Graded Sand (SW) 13% grvl, 77% sand, 10% silt
□	Pad	–			Silty Sand (SM) 11% grvl, 55% sand, 34% silt

GRAIN SIZE DISTRIBUTION

Muddy Ridge Field, Wyoming

Project No.
For Buys & Assoc.

Resource Engineering, Inc.

Buys & Associates, Inc.
Environmental Consultants

Project: Wind River Proposed Action Inventory
Date: 7/8/2004

70. Muddy Ridge Compression and Processing

Assumptions:

Total Power Requirement: 4500 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	9.92	43.5
CO [1]		2.0	19.84	86.9
VOC [1]		1.0	9.92	43.5
PM10 [2, 5]	0.0194	0.070	0.70	3.1
PM2.5 [2,5]	0.0194	0.070	0.70	3.1
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.06	0.2
Toluene [2]	0.000558	0.00203	0.02	0.1
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.01	0.0
Formaldehyde [1]		0.07	0.69	3.0

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

Buys & Associates, Inc.
Environmental Consultants

Project: Wind River Proposed Action Inventory
Date: 7/8/2004

14. Muddy Ridge Unpaved Road Fugitive Dust Emissions

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity
Const. & Drilling Activities				
Semi: Rig Transport	60,000	15		
Haul Truck: Water/fuel	20,000	83		
Haul Truck: Other	48,000	48		
HD Pickup Truck: Misc.	7,000	295		
Total Const. & Drilling	15,712	441	20	720

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	7.09	86.89	31.28	375.4
PM10	1.95	23.85	8.59	103.0
PM2.5	0.28	3.49	1.25	15.1

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity
Completion Activities				
Haul Truck: Water	20,000	40		
Haul Truck: Other	48,000	159		
HD Pickup Truck: Misc.	7,000	185		
Total Completion	25,331	384	20	300

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	9.01	230.56	34.58	415.0
PM10	2.36	60.33	9.05	108.6
PM2.5	0.34	8.82	1.32	15.9

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity
Development & Reclamation				
Haul Truck: Water	20,000	0		
Haul Truck: Other	48,000	3		
HD Pickup Truck: Misc.	7,000	10		
Total Dev. & Reclamation	16,462	13	20	30

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	7.26	62.92	0.94	11.3
PM10	1.98	17.19	0.26	3.1
PM2.5	0.29	2.51	0.04	0.5

* Const. & Drilling Assumes 30 24-hr days
Completion assumes 30 10-hr days
Development & Reclamation assumes 3 10-hr days

Muddy Ridge Total

Particulate Matter Scale	Emission Factor (lbs/VMT)	Max Emissions (lbs/hr)	Total Emissions (Tons/well)	Total Emissions (Tons/year)
TSP		230.56	66.81	801.7
PM10		60.33	17.89	214.7
PM2.5		8.82	2.62	31.4

61. Muddy Ridge Well Blowdown Emissions

Assumptions: During Production, a percentage of the wells are periodically blown down to unload fluids

# of New Producing Wells	50	
% Wells Requiring Blowdown	20	% (Estimated by Project Proponents)
# of Blowdown wells	10	Wells
Blowdown Frequency	1	per week for a period of 1 hour each (Project Proponents)
Blowdown Volume	15	Mscf/event (Estimated from Production Data)
Annual Blowdown Volume	7.8	MMscf/year

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/hr)	COMPONENT FLOW RATE (lb/hr/well)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	79.318	12.725	0.590	11.898	502.977	130.774
Ethane	30.07	10.453	3.143	0.146	1.568	124.241	32.303
Propane	44.097	3.927	1.732	0.080	0.589	68.448	17.796
i-Butane	58.123	1.456	0.846	0.039	0.218	33.450	8.697
n-Butane	58.123	1.069	0.621	0.029	0.160	24.559	6.385
i-Pentane	72.15	1.136	0.820	0.038	0.170	32.397	8.423
n-Pentane	72.15	0.759	0.548	0.025	0.114	21.646	5.628
Hexanes	86.177	0.865	0.745	0.035	0.130	29.464	7.661
Heptanes	100.204	0.080	0.080	0.004	0.012	3.169	0.824
Octanes	114.231	0.000	0.000	0.000	0.000	0.000	0.000
Nonanes	128.258	0.000	0.000	0.000	0.000	0.000	0.000
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.000	0.031	0.008
Toluene	92.13	0.000	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	106.16	0.000	0.000	0.000	0.000	0.000	0.000
Xylenes	106.16	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	86.177	0.005	0.004	0.000	0.001	0.170	0.044
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	0.605	0.169	0.008	0.091	6.699	1.742
Carbon Dioxide	44.01	0.328	0.144	0.007	0.049	5.706	1.484
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**9.298**	**5.397**	**0.250**	**1.395**	**213.335**	**55.467**
HAP SUBTOTAL		**0.006**	**0.005**	**0.000**	**0.001**	**0.201**	**0.052**
TOTAL		**100.002**	**21.579**	**1.000**	**15**	**852.958**	**221.769**

17. Wind Erosion Fugitive Dust Emissions From Well & Facility Pads

Assumptions

Threshold Friction Velocity U_t^*	1.02	m/s (2.28 mph) for well pads (AP-42 Table 13.2.5-2 Overburden - Western Surface Coal Mine)
Exposed Surface Type	Flat	
Fastest Mile Wind Speed U_{10}^+	23.2	meters/sec (52 mph) reported as fastest 2-minute wind speed for Lander, WY (2002)
Number soil of disturbances	2	for well and facility pads (disturbance at construction and reclamation)

Equations

Friction Velocity $U^* = 0.053\ U_{10}^+$

Erosion Potential P $(g/m^2/period) = 58*(U^*-U_t^*)^2 + 25*(U^*-U_t^*)$ for $U^*>U_t^*$, P = 0 for $U^*< U_t^*$

$$\text{Emissions (tons/year)} = \frac{\text{Erosion Potential}(g/m^2/\text{period})*\text{Disturbed Area}(m^2)*\text{Disturbances/year}*(k)*\text{ Number of Wells/year}}{(453.6\ g/lb)*2000\ lbs/ton/\text{Develop Period}*\text{Total Number of Wells}}$$

Particle Size Multiplier (k)		
30 um	**<10 um**	**<2.5 um**
1.0	0.5	0.2

Maxium U_{10}^+ Wind Speed (m/s)	Maximum U^* Friction Velocity m/s	Well/Pipeline U_t^* Threshold Velocity[a] m/s	Erosion Potential g/m^2
23.20	1.23	1.02	7.79

Wind Erosion Emissions

Development Area	Disturbance (Acres)	Disturbance (meters^2)	TSP Emissions (tons/year)	PM10 Emissions (tons/year)	PM2.5 Emissions (tons/year)
Pavillion	195	789,136	1.20	0.60	0.24
Muddy Ridge	131	530,137	2.14	1.07	0.43
Sand Mesa	261	1,056,228	1.42	0.71	0.28
Sand Mesa S.	33	133,546	0.56	0.28	0.11
Coastal	22	89,031	0.19	0.09	0.04
Total	**642**	**2,598,078**	**5.5**	**2.8**	**1.1**

36. Pavillion Well Development Venting

Assumptions: Following Completion, Wells are Vented prior to connnection to the gathering pipeline

Venting Period 24 hours (Project Proponents)

Amount of Vented Gas: 0.5 MMscf (Average Volume Estimated by Proponents)

Development Rate: 14 Wells per year (Project Proponents)

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/day)	COMPONENT FLOW RATE (lb/hr)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	81.960	13.149	0.589	409.800	721.848	121.271
Ethane	30.07	9.165	2.756	0.123	45.825	151.295	25.418
Propane	44.097	1.654	0.729	0.033	8.270	40.041	6.727
i-Butane	58.123	0.703	0.409	0.018	3.515	22.432	3.769
n-Butane	58.123	0.426	0.248	0.011	2.130	13.593	2.284
i-Pentane	72.15	0.377	0.272	0.012	1.885	14.933	2.509
n-Pentane	72.15	0.180	0.130	0.006	0.900	7.130	1.198
Hexanes	86.177	1.164	1.003	0.045	5.820	55.068	9.251
Heptanes	100.204	1.832	1.836	0.082	9.160	100.779	16.931
Octanes	114.231	0.813	0.929	0.042	4.065	50.984	8.565
Nonanes	128.258	0.361	0.463	0.021	1.805	25.419	4.270
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.005	0.043	0.007
Toluene	92.13	0.004	0.004	0.000	0.022	0.217	0.037
Ethylbenzene	106.16	0.001	0.001	0.000	0.005	0.052	0.009
Xylenes	106.16	0.001	0.001	0.000	0.003	0.029	0.005
n-Hexane	86.177	0.006	0.005	0.000	0.029	0.270	0.045
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	1.200	0.336	0.015	6.000	18.454	3.100
Carbon Dioxide	44.01	0.153	0.067	0.003	0.765	3.697	0.621
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**7.5224**	**6.029**	**0.270**	**37.612**	**330.989**	**55.606**
HAP SUBTOTAL		**0.0124**	**0.011**	**0.000**	**0.062**	**0.612**	**0.103**
TOTAL		**100.000**	**22.337**	**1.000**	**500**	**1226.283**	**206.016**

29. Pavillion Drill Rig Engine Emissions

Assumptions:

Hours of Operation 216 hours/well (9 days on average @ 24 hrs/day - Project Proponents)

Development Rate 14 wells/year (Project Proponents)

Load Factor 0.4 (Assumed typical value)

Rig Size 550 hp (Drilling Contractor)

Diesel Fuel Sulfur Content 0.05 % (typical value)

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (lb/hp-hr) * Rated Horsepower (hp)* Operating Hours (hrs) * Load Factor (Dimensionless)}}{\text{2000 (lb/tons)}}$$

SO2 E. Factor (lb/hp-hr) = Fuel sulfur content * 0.00809

Species	Drill Rig Emissions			
	E. Factor [d] (lb/MMBtu)	E. Factor [a] (lb/hp-hr)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx		0.024	5.280	7.98
CO		0.0055	1.210	1.83
VOC [b]		0.000705	0.155	0.23
PM10 [c]	0.0573	0.0004011	0.088	0.13
PM2.5 [d]	0.0556	0.0003892	0.086	0.13
SO2		0.0004045	0.089	0.13

a AP-42 Volume I, Large Stationary Diesel Engines Table 3.4-1, 10/96
b Emission Factor represents total Hydrocarbon Emissions
c PM10 Emission Factor determined from Table 3.4-2, 10/96
d PM2.5 Emission Factor estimated as PM3.0 (filterable + condensable) from Table 3.4-2, 10/96
e Conversion from lb/MMBtu to lb/hp-hr assumes a BSFC of 7,000 BTU/hp-hr (Table 3.4-1, 10/96)
f Assumes a Development rate as stated by the proponents (Summarized in page 1)

47. Pavillion E&P Tank Flash Emissions Calculation

```
********************************************************************************
*     Project Setup Information                                                *
********************************************************************************
Project File               : C:\DATA\Clients\Tom Brown\Wind River EIS\Project Emission
Inventory\pavillion flash.ept
Flowsheet Selection        : Oil Tank with Separator
Calculation Method         : RVP Distillation
Control Efficiency         : 100.0%
Known Separator Stream     : Low Pressure Oil
Entering Air Composition   : No

Filed Name                 : Pavillion
Well Name                  : Wind River EIS
Well ID                    : Average Condensate Analysis
Date                       : 2003.11.26


********************************************************************************
*     Data Input                                                               *
********************************************************************************

Separator Pressure         : 200.00[psig]
Separator Temperature      : 130.00[F]
Ambient Pressure           : 12.00[psia]
Ambient Temperature        : 44.00[F]
C10+ SG                    : 0.8990
C10+ MW                    : 166.00

-- Low Pressure Oil ------------------------------------------------------------
   No.    Component             mol %
   1      H2S                    0.0000
   2      O2                     0.0000
   3      CO2                    0.0320
   4      N2                     0.0100
   5      C1                     1.3910
   6      C2                     1.1180
   7      C3                     0.7100
   8      i-C4                   0.6480
   9      n-C4                   0.5220
   10     i-C5                   1.0820
   11     n-C5                   0.6340
   12     C6                     2.5470
   13     C7                    17.0570
   14     C8                    10.5300
   15     C9                    11.8740
   16     C10+                  45.4700
   17     Benzene                0.1750
   18     Toluene                1.1330
   19     E-Benzene              0.5820
   20     Xylenes                3.5040
   21     n-C6                   0.9810
   22     224Trimethylp          0.0000

-- Sales Oil -------------------------------------------------------------------
Production Rate            : 38.8[bbl/day]
Days of Annual Operation   : 365 [days/year]
API Gravity                : 46.0
```

48. Pavillion E&P Tank Flash Emissions Calculation Continued

```
******************************************************************************
*     Calculation Results
*
******************************************************************************

-- Emission Summary -----------------------------------------------------------
Item                Uncontrolled   Uncontrolled
                    [ton/yr]       [lb/hr]
Total HAPs          0.040          0.009
Total HC            6.502          1.484
VOCs, C2+           3.795          0.866
VOCs, C3+           1.806          0.412

Uncontrolled Recovery Info.
       Vapor        561.2300 x1E-3 [MSCFD]
       HC Vapor     552.8100 x1E-3 [MSCFD]
       GOR          14.48          [SCF/bbl]

-- Emission Composition -------------------------------------------------------
----------
No  Component       Uncontrolled   Uncontrolled
                    [ton/yr]       [lb/hr]
1   H2S             0.000          0.000
2   O2              0.000          0.000
3   CO2             0.117          0.027
4   N2              0.039          0.009
5   C1              2.707          0.618
6   C2              1.989          0.454
7   C3              0.674          0.154
8   i-C4            0.325          0.074
9   n-C4            0.175          0.040
10  i-C5            0.165          0.038
11  n-C5            0.067          0.015
12  C6              0.088          0.020
13  C7              0.209          0.048
14  C8              0.043          0.010
15  C9              0.017          0.004
16  C10+            0.001          0.000
17  Benzene         0.003          0.001
18  Toluene         0.006          0.001
19  E-Benzene       0.001          0.000
20  Xylenes         0.005          0.001
21  n-C6            0.026          0.006
22  224Trimethylp   0.000          0.000
    Total           6.657          1.520
```

49. Pavillion E&P Tank Flash Emissions Calculation Continued

-- Stream Data --

No.	Component	MW	LP Oil mol %	Flash Oil mol %	Sale Oil mol %	Flash Gas mol %	W&S Gas mol %	Total Emissions mol %
1	H2S	34.80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	44.01	0.0320	0.0143	0.0143	0.9811	0.0000	0.9811
4	N2	28.01	0.0100	0.0005	0.0005	0.5197	0.0000	0.5197
5	C1	16.04	1.3910	0.2497	0.2497	62.4419	0.0000	62.4419
6	C2	30.07	1.1180	0.6813	0.6813	24.4760	0.0000	24.4760
7	C3	44.10	0.7100	0.6176	0.6176	5.6542	0.0000	5.6542
8	i-C4	58.12	0.6480	0.6214	0.6214	2.0692	0.0000	2.0692
9	n-C4	58.12	0.5220	0.5110	0.5110	1.1109	0.0000	1.1109
10	i-C5	72.15	1.0820	1.0864	1.0864	0.8448	0.0000	0.8448
11	n-C5	72.15	0.6340	0.6394	0.6394	0.3458	0.0000	0.3458
12	C6	86.16	2.5470	2.5873	2.5873	0.3893	0.0000	0.3893
13	C7	100.20	17.0570	17.3610	17.3610	0.7968	0.0000	0.7968
14	C8	114.23	10.5300	10.7242	10.7242	0.1426	0.0000	0.1426
15	C9	128.28	11.8740	12.0950	12.0950	0.0510	0.0000	0.0510
16	C10+	166.00	45.4700	46.3200	46.3200	0.0032	0.0000	0.0032
17	Benzene	78.11	0.1750	0.1780	0.1780	0.0146	0.0000	0.0146
18	Toluene	92.13	1.1330	1.1537	1.1537	0.0237	0.0000	0.0237
19	E-Benzene	106.17	0.5820	0.5928	0.5928	0.0037	0.0000	0.0037
20	Xylenes	106.17	3.5040	3.5692	3.5692	0.0190	0.0000	0.0190
21	n-C6	86.18	0.9810	0.9972	0.9972	0.1125	0.0000	0.1125
22	224Trimethylp	114.24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	MW		129.63	131.59	131.59	24.64	0.00	24.64
	Stream Mole Ratio		1.0000	0.9816	0.9816	0.0184	0.0000	0.0184
	Heating Value	[BTU/SCF]				1438.80	0.00	1438.80
	Gas Gravity	[Gas/Air]				0.85	0.00	0.85
	Bubble Pt. @ 100F	[psia]	65.18	17.74	17.74			
	RVP @ 100F	[psia]	14.38	6.58	6.58			
	Spec. Gravity @ 100F		0.800	0.803	0.803			

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33. Pavillion Produced Gas Characteristics (Pavillion 11-10)

Gas Heat Value (wet): 1301 Btu/scf

C1-C2 Wt. Fraction:	0.712
VOC Wt. Fraction:	0.270
Non-HC Wt. Fraction:	0.018
Total:	1.000

COMPONENT	MOLE PERCENT	COMPONENT MOLE WEIGHT (lb/lb-mole)	NET MOLE WEIGHT (lb/lb-mole)	WEIGHT FRACTION	GROSS HEATING VALUE (BTU/scf)	NET DRY HEATING VALUE (BTU/scf)	LOWER HEATING VALUE (BTU/scf)	NET LOW HEATING VALUE (BTU/scf)
Methane	81.960	16.043	13.149	0.589	1010.000	827.796	910.000	745.836
Ethane	9.165	30.070	2.756	0.123	1769.800	162.202	1618.000	148.290
Propane	1.654	44.097	0.729	0.033	2516.200	41.618	2316.000	38.307
i-Butane	0.703	58.123	0.409	0.018	3252.100	22.862	3005.000	21.125
n-Butane	0.426	58.123	0.248	0.011	3262.400	13.898	3013.000	12.835
i-Pentane	0.377	72.150	0.272	0.012	4000.900	15.083	3698.000	13.941
n-Pentane	0.180	72.150	0.130	0.006	4008.800	7.216	3708.000	6.674
Hexanes+	1.164	86.177	1.003	0.045	4756.200	55.362	4404.000	51.263
Heptanes	1.832	100.204	1.836	0.082	5502.500	100.806	5100.000	93.432
Octanes	0.813	114.231	0.929	0.042	6249.100	50.805		0.000
Nonanes	0.361	128.258	0.463	0.021	6996.400	25.257		0.000
Decanes	0.000	142.285	0.000	0.000	7743.200	0.000		0.000
Benzene	0.001	78.120	0.001	0.000	3715.500	0.037		0.000
Toluene	0.004	92.130	0.004	0.000	4444.600	0.191		0.000
Ethylbenzene	0.001	106.160	0.001	0.000	5191.500	0.047		0.000
Xylenes	0.001	106.160	0.001	0.000	5183.500	0.026		0.000
n-Hexane	0.006	86.177	0.005	0.000	4756.200	0.271		0.000
Helium	0.000	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	1.200	28.013	0.336	0.015	0.000	0.000	0.000	0.000
Carbon Dioxide	0.153	44.010	0.067	0.003	0.000	0.000	0.000	0.000
Oxygen	0.000	32.000	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	0.000	34.080	0.000	0.000	637.100	0.000	588.000	0.000
TOTAL	100.000		22.337	1.000		1323.478		1131.703

Relative Mole Weight (lb/lb-mole) = [Mole Percent * Molecular weight (lb/lb-mole)] / 100

Weight Fraction = Net Mole Weight / Total Mole Weight

42. Pavillion Production Heater Emissions

Assumptions

Number of new producing wells	155	(Reported by Project Proponents)
Separator Size	500	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour (Est.from fuel usage reported by Proponents)
	6	months/year (Nov. thru April - Project Proponents)
	2190	hours/year
Net Low Fuel Gas Heat Content	1132	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.270	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * \text{1,000 (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * \text{1,000,000 (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{\text{2,000 (lbs/ton)} * \text{1,000 (Btu/scf - Standard Fuel Heating Value)}}$$

$$\text{VOC Emissions (tons/yr)} = \text{TOC Emissions (tons/yr)} * \text{VOC wt. fraction}$$

Species	Separator Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr/well)	Emissions [e] (tons/yr)
NOx [a]	100	0.013	8.486
CO [a]	84	0.011	7.128
TOC [c]	11	0.001	0.933
VOC	N.A.	0.000	0.252
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.001	0.645
PM10 [c]	7.6	0.001	0.645
PM2.5 [c]	7.6	0.001	0.645
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.153
Formaldehyde [d]	0.075	0.000	0.006

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

Buys & Associates, Inc.
Environmental Consultants

Project: Wind River Proposed Action Inventory
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26. Pavillion Construction Heavy Equipment Tailpipe Emissions

Assumptions:

Hours of Operation	16	hours/site (Project Proponents)
Development Rate	14	wells per year
Load Factor	0.5	(Assumed typical value)
Backhoe Size	84	hp (Contractor)
Backhoe Utilization	100	percent
Motor Grader Size	170	hp (Contractor)
Motor Grader Utilization	100	percent

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/hp-hr) * Rated Hp (hp)* Operating Hours (hrs) * Load Factor (Dimensionless) * Utilization}}{\text{453.6 (g/lb) * 2000 (lb/tons)}}$$

Heavy Const. Vehicles	Backhoe			Grader		
	E. Factor [a] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)	E. Factor [b] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)
NOx	8.15	0.755	0.085	7.14	1.338	0.150
CO	2.28	0.211	0.024	1.54	0.289	0.032
VOC [c]	0.37	0.034	0.004	0.36	0.067	0.008
PM10 [d]	0.5	0.046	0.005	0.63	0.118	0.013
PM2.5 [d]	0.5	0.046	0.005	0.63	0.118	0.013
SO2	0.22	0.020	0.002	0.22	0.041	0.005
Formaldehyde	0.22	0.020	0.002	0.12	0.022	0.003

Heavy Const. Vehicles	Total	
	Emissions (lb/hr/well)	Emissions[e] (tons/yr)
NOx	2.093	0.234
CO	0.500	0.056
VOC [c]	0.102	0.011
PM10 [d]	0.164	0.018
PM2.5 [d]	0.164	0.018
SO2	0.062	0.007
Formaldehyde	0.043	0.005

a AP-42 Volume II, Mobile Sources, Nonroad Vehicles, Table 11-7.1 Off-highway truck
b AP-42 Volume II, Mobile Sources, Nonroad Vehicles, Table 11-7.1 Motor Grader
c Emission Factor represents total Hydrocarbon Emissions
d All emitted particulate matter assumed to be PM2.5
e Assumes a proponet specified maximum development rate

46. Pavillion Condensate Storage Tank Emissions

Assumptions:

Average Condensate Production Rate :	0.25	bbls per day (Average production for existing wells - WOGCC)
Expected Successful Producting Wells:	155	
Predicted Condensate Production:	38.75	bbls/day
Separator Conditions :		200 psi and 130 F (Specified by Proponent)
Condensate Composition:		Analysis from Pavillion 11-10 well

Calculations:

Stock tank flash emissions estimated with E&P Tanks software

Emissions:

Component	Flash Emissions (tons/yr)
Benzene	0.003
Toluene	0.006
Ethylbenzene	0.001
Xylenes	0.005
n-Hexane	0.026
Total HAPS	0.041
Total VOC	1.806

2. Pavillion Construction Fugitive Dust Emissions

Assumptions:

Hours of Construction	2	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	16	hours per well pad
Pieces of Equipment	2	- 1 Backhoe & 1 Grader each @ 100% utilization (Project Proponent)
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	45	percent (Composit Soil Sample from Pavillion Well Pads)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 18.70 lbs TSP/hour/piece of equipment

Emissions = 8.36 lbs PM15/hour/piece of equipment

Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	37.40	0.2992	4.188
PM15	16.72	0.1337	1.872
PM10	12.54	0.1003	1.404
PM2.5	3.93	0.0314	0.440

a Assumes 100% utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

69. Pavillion Plant Compression and Processing

Assumptions:

Total Power Requirement: 1700 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6\ \text{(g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	3.75	16.4
CO [1]		2.0	7.50	32.8
VOC [1]		1.0	3.75	16.4
PM10 [2, 5]	0.0194	0.070	0.26	1.2
PM2.5 [2,5]	0.0194	0.070	0.26	1.2
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.02	0.1
Toluene [2]	0.000558	0.00203	0.01	0.0
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.00	0.0
Formaldehyde [1]		0.07	0.26	1.1

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

9. Pavillion Reclamation Fugitive Dust Emissions

Assumptions:

Hours of Construction	2	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	16	hours per well pad
Pieces of Equipment	1	- 1 Grader @ 100% utilization (Project Proponent)
Equivalent Equipment Utilization	1	
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	45	percent (Composite soil sample)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 18.70 lbs TSP/hour/piece of equipment

Emissions = 8.36 lbs PM15/hour/piece of equipment

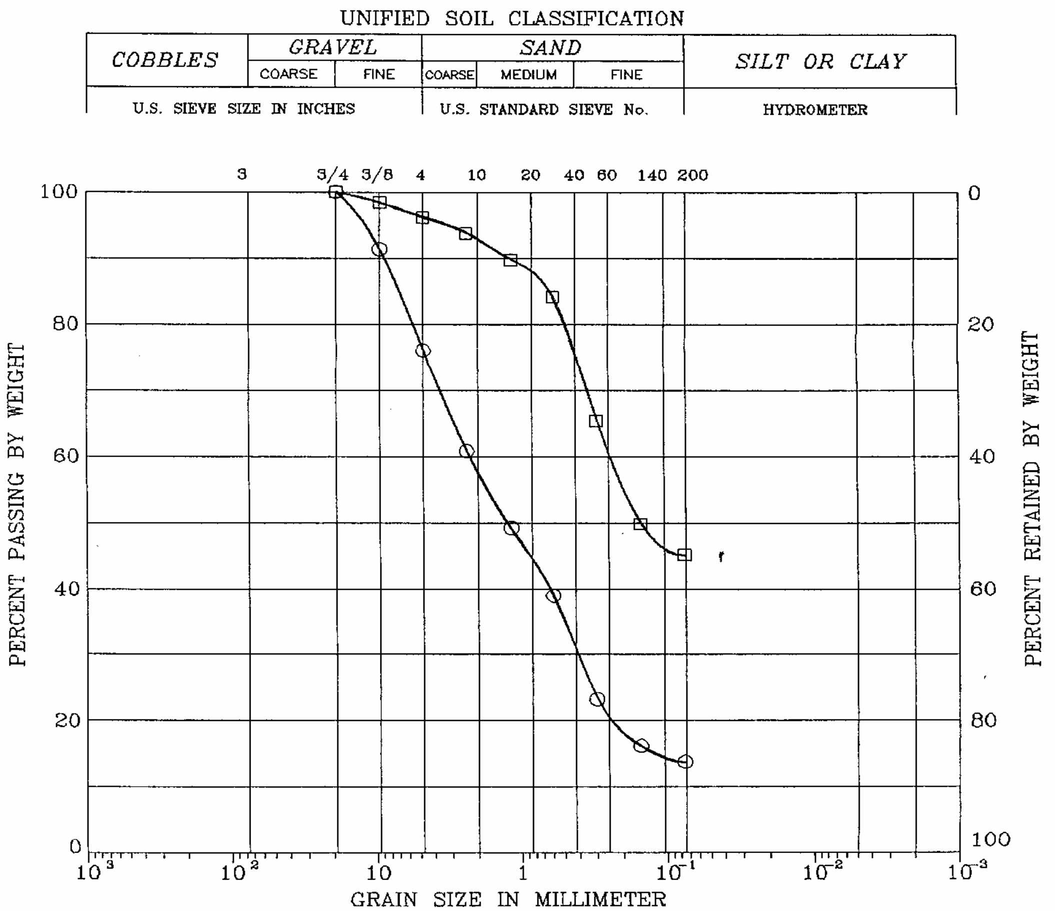
Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	18.70	0.1496	2.094
PM15	8.36	0.0669	0.936
PM10	6.27	0.0501	0.702
PM2.5	1.96	0.0157	0.220

a Assumes Proponent specified equipment utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Proposed Action Inventory Date: 7/8/2004

3. Pavillion Road and Pad Silt Content



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION	
○	Road	–			Silty Sand (SM)	24% grvl, 62% sand, 14% silt
□	Pad	–			Very Silty Sand (SM)	4% grvl, 51% sand, 45% silt

GRAIN SIZE DISTRIBUTION

Pavillion Field, Wyoming

Project No.
For Buys & Assoc.

Resource Engineering, Inc.

Buys & Associates, Inc.
Environmental Consultants

Project: Wind River Proposed Action Inventory
Date: 7/8/2004

13. Pavillion Unpaved Road Fugitive Dust Emissions

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity*
Const. & Drilling Activities				
Semi: Rig Transport	60,000	10		
Haul Truck: Water/Fuel	20,000	29		
Haul Truck: Other	48,000	34		
HD Pickup Truck: Misc.	7,000	94		
Total Const. & Drilling	20,778	167	15	240

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	8.16	85.14	10.22	143.0
PM10	2.18	22.72	2.73	38.2
PM2.5	0.32	3.32	0.40	5.6

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity*
Completion Activities				
Haul Truck: Water	20,000	12		
Haul Truck: Other	48,000	78		
HD Pickup Truck: Misc.	7,000	65		
Total Completion	28,639	155	15	55

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	9.58	404.82	11.13	155.9
PM10	2.48	104.64	2.88	40.3
PM2.5	0.36	15.29	0.42	5.9

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity*
Development & Reclamation				
Haul Truck: Water	20,000	0		
Haul Truck: Other	48,000	2		
HD Pickup Truck: Misc.	7,000	10		
Total Dev. & Reclamation	13,833	12	15	30

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	6.66	39.93	0.60	8.4
PM10	1.85	11.10	0.17	2.3
PM2.5	0.27	1.62	0.02	0.3

Pavillion Total

Particulate Matter Scale	Emission Factor (lbs/VMT)	Max Emissions (lbs/hr)	Total Emissions (Tons/well)	Total Emissions (Tons/year)
TSP		404.82	21.95	307.3
PM10		104.64	5.77	80.8
PM2.5		15.29	0.84	11.8

* Const. & Drilling Assumes 10 24-hr days
Completion assumes 5.5 10-hr days
Development & Reclamation assumes 3 10-hr days

60. Pavillion Well Blowdown Emissions

Assumptions: During Production, a percentage of the wells are periodically blown down to unload fluids

# of New Producing Wells	155	
% Wells Requiring Blowdown	20	% (Estimated by Project Proponents)
# of Blowdown wells	31	Wells
Blowdown Frequency	1	per week for a period of 1 hour each (Project Proponents)
Blowdown Volume	14	Mscf/event (Estimated from Production Data)
Annual Blowdown Volume	22.6	MMscf/year

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/hr)	COMPONENT FLOW RATE (lb/hr/well)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	81.960	13.149	0.589	11.474	485.082	390.976
Ethane	30.07	9.165	2.756	0.123	1.283	101.670	81.946
Propane	44.097	1.654	0.729	0.033	0.232	26.907	21.687
i-Butane	58.123	0.703	0.409	0.018	0.098	15.074	12.150
n-Butane	58.123	0.426	0.248	0.011	0.060	9.135	7.362
i-Pentane	72.15	0.377	0.272	0.012	0.053	10.035	8.088
n-Pentane	72.15	0.180	0.130	0.006	0.025	4.791	3.862
Hexanes	86.177	1.164	1.003	0.045	0.163	37.006	29.827
Heptanes	100.204	1.832	1.836	0.082	0.256	67.723	54.585
Octanes	114.231	0.813	0.929	0.042	0.114	34.261	27.615
Nonanes	128.258	0.361	0.463	0.021	0.051	17.081	13.767
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.000	0.029	0.023
Toluene	92.13	0.004	0.004	0.000	0.001	0.146	0.118
Ethylbenzene	106.16	0.001	0.001	0.000	0.000	0.035	0.028
Xylenes	106.16	0.001	0.001	0.000	0.000	0.020	0.016
n-Hexane	86.177	0.006	0.005	0.000	0.001	0.181	0.146
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	1.200	0.336	0.015	0.168	12.401	9.995
Carbon Dioxide	44.01	0.153	0.067	0.003	0.021	2.484	2.002
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**7.5224**	**6.029**	**0.270**	**1.053**	**222.425**	**179.274**
HAP SUBTOTAL		**0.0124**	**0.011**	**0.000**	**0.002**	**0.411**	**0.331**
TOTAL		**100.000**	**22.337**	**1.000**	**14**	**824.062**	**664.194**

7. Pipeline Construction Fugitive Dust Emissions

Assumptions:

Number of Completed Wells/Year	32	Assumes 100% success rate in Pavillion & Muddy Ridge, 50% success rate in Sand Mesa and Coastal
Hours of Construction	2	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	16	hours per well pad
Pieces of Equipment	3	- 1 Grader @ 30% utilization (Project Sub-Contractor) - 1 Backhoe @ 50% utilization - 1 Trencher @ 60% utilization
Equivalent Equipment Utilization	1.4	
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	39.2	percent (Weighted soil sample analysis)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 15.84 lbs TSP/hour/piece of equipment

Emissions = 6.80 lbs PM15/hour/piece of equipment

Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	22.18	0.1775	5.679
PM15	9.51	0.0761	2.436
PM10	7.14	0.0571	1.827
PM2.5	2.33	0.0186	0.596

a Assumes Proponent specified equipment utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

8. Pipeline Fugitive Dust Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
TSP	2.484	2.129	0.710	0.266	0.089	5.679
PM15	1.066	0.913	0.304	0.114	0.038	2.436
PM10	0.799	0.685	0.228	0.086	0.029	1.827
PM2.5	0.261	0.224	0.075	0.028	0.009	0.596

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Proposed Action Inventory Date: 7/8/2004

18. Wind Erosion Fugitive Dust Emissions From Pipeline ROWs

Assumptions

Threshold Friction Velocity U_t* 1.02 m/s (2.28 mph) for well pads (AP-42 Table 13.2.5-2 Overburden - Western Surface Coal Mine

Exposed Surface Type Flat

Fastest Mile Wind Speed U_{10}^+ 23.2 meters/sec (52 mph) reported as fastest 2-minute wind speed for Lander, WY (2002)

Number soil of disturbances 2 for well and facility pads (disturbance at construction and reclamation)

Equations

Friction Velocity $U^* = 0.053\ U_{10}^+$

Erosion Potential P (g/m^2/period) = $58*(U^*-U_t^*)^2 + 25*(U^*-U_t^*)$ for $U^*>U_t^*$, P = 0 for $U^*< U_t^*$

$$\text{Emissions (tons/year)} = \frac{\text{Erosion Potential(g/m}^2\text{/period)*Disturbed Area(m}^2\text{)*Disturbances/year*(k)* Number of Wells/year}}{\text{(453.6 g/lb)*2000 lbs/ton/Develop Period*Total Number of Wells}}$$

Particle Size Multiplier (k)		
30 um	<10 um	<2.5 um
1.0	0.5	0.2

Maxium U_{10}^+ Wind Speed (m/s)	Maximum U* Friction Velocity m/s	Well/Pipeline U_t* Threshold Velocity[a] m/s	Erosion Potential g/m^2
23.20	1.23	1.02	7.79

Wind Erosion Emissions

Development Area	Disturbance (Acres)	Disturbance (meters^2)	TSP Emissions (tons/year)	PM10 Emissions (tons/year)	PM2.5 Emissions (tons/year)
Pavillion	94	380,404	0.58	0.29	0.12
Muddy Ridge	200	809,370	3.26	1.63	0.65
Sand Mesa	296	1,197,868	1.61	0.80	0.32
Sand Mesa S.	115	465,388	1.95	0.98	0.39
Coastal	122	493,716	1.04	0.52	0.21
Total	**827**	**3,346,745**	**8.4**	**4.2**	**1.7**

110. Central Facility Locations and Stack Parameters

Facility	UTM Easting (meters)	UTM Northing (meters)	UTM Zone	Lambert Easting (km)	Lambert Northing (km)	Ground Elevation (meters)
South Pavillion	696600	4790560	12	-2.236	74.561	1615.1
Pavillion Plant	699450	4792200	12	0.564	76.065	1613.9
Muddy Ridge	697950	4794950	12	-0.807	78.764	1654.8
Hidden Valley	722050	4782150	12	22.114	65.718	1549.0
Shoshoni Booster	734850	4788000	12	34.644	71.009	1499.0
Sand Mesa	715975	4798000	12	16.692	81.201	1514.9
Sand Mesa South	715125	4795469	12	15.800	78.780	1501.2
Coastal Extension	705976	4799569	12	7.078	83.000	1550.2

Note: Proposed locations for Shoshoni, Sand Mesa South, and Coastal facilities estimated from pipeline routes

Measurement System	Stack Height (ft or m)	Stack Diameter (ft or m)	Exhaust Velocity (ft/sec or m/s)	Exhaust Temp. (F or K)
Imperial	30	1	114.8	1000
Metric	9.144	0.3048	35	811

64. Production Emissions Summary

Pavillion

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	8.486		0.293		8.779
CO	7.128		3.253		10.382
VOC	0.252	1.806	0.178	179.274	181.510
SO2	0.000		0.021		0.021
TSP	0.645				0.645
PM10	0.645				0.645
PM2.5	0.645				0.645
Formaldehyde	0.006				0.006
Benzene	0.000	0.003		0.023	0.026
Toluene	0.000	0.006		0.118	0.124
Ethylbenzene		0.001		0.028	0.029
Xylenes		0.005		0.016	0.021
n-Hexane	0.153	0.026		0.146	0.325

Muddy Ridge

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	4.106		0.095		4.201
CO	3.449		1.049		4.499
VOC	0.113	121.710	0.057	55.467	177.347
SO2	0.000		0.007		0.007
TSP	0.312				0.312
PM10	0.312				0.312
PM2.5	0.312				0.312
Formaldehyde	0.003				0.003
Benzene	0.000	0.269		0.008	0.277
Toluene	0.000	0.407		0.000	0.407
Ethylbenzene		0.016		0.000	0.016
Xylenes		0.153		0.000	0.153
n-Hexane	0.074	1.617		0.044	1.735

Sand Mesa

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	5.475		0.095		5.570
CO	4.599		1.049		5.648
VOC	0.151	6.769	0.057	59.165	66.142
SO2	0.000		0.007		0.007
TSP	0.416				0.416
PM10	0.416				0.416
PM2.5	0.416				0.416
Formaldehyde	0.004				0.004
Benzene	0.000	0.023		0.009	0.031
Toluene	0.000	0.053		0.000	0.053
Ethylbenzene		0.003		0.000	0.003
Xylenes		0.028		0.000	0.028
n-Hexane	0.099	0.173		0.047	0.318

65. Production Emissions Summary Continued

Sand Mesa South

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	0.657		0.011		0.668
CO	0.552		0.126		0.678
VOC	0.018	0.812	0.007	7.100	7.937
SO2	0.000		0.001		0.001
TSP	0.050				0.050
PM10	0.050				0.050
PM2.5	0.050				0.050
Formaldehyde	0.000				0.000
Benzene	0.000	0.003		0.001	0.004
Toluene	0.000	0.006		0.000	0.006
Ethylbenzene		0.000		0.000	0.000
Xylenes		0.003		0.000	0.003
n-Hexane	0.012	0.021		0.006	0.038

Coastal Extension

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	0.438		0.008		0.446
CO	0.368		0.084		0.452
VOC	0.012	0.542	0.005	4.733	5.291
SO2	0.000		0.001		0.001
TSP	0.033				0.033
PM10	0.033				0.033
PM2.5	0.033				0.033
Formaldehyde	0.000				0.000
Benzene	0.000	0.002		0.001	0.002
Toluene	0.000	0.004		0.000	0.004
Ethylbenzene		0.000		0.000	0.000
Xylenes		0.002		0.000	0.002
n-Hexane	0.008	0.014		0.004	0.025

Total Production

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	19.163		0.501		19.663
CO	16.097		5.562		21.659
VOC	0.546	131.639	0.304	305.739	438.228
SO2	0.000		0.035		0.035
TSP	1.456				1.456
PM10	1.456				1.456
PM2.5	1.456				1.456
Formaldehyde	0.014				0.014
Benzene	0.000	0.299		0.042	0.341
Toluene	0.001	0.476		0.118	0.594
Ethylbenzene		0.020		0.028	0.048
Xylenes		0.191		0.016	0.207
n-Hexane	0.345	1.850		0.247	2.442

1. Proposed Action Development Summary

Well Development

Field	Total Wells To Be Drilled	Wells Drilled Per Year	Total Producing Wells	Pad Disturbance (acres)	Pipeline Distrubance (acres)	Development Area Size (acres)
Pavillion	155	14	155	195	94	11,774
Muddy Ridge	50	12	50	131	200	7,550
Sand Mesa	100	8	50	261	296	9,572
Sand Mesa South	12	3	6	33	115	3,820
Coastal Extension	8	1	4	22	122	5220
Total	**325**	**38**	**265**	**642**	**827**	**37,936**

Additional Compression/Treatment/Generation Capacity (hp)

Facility	Compression	Treatment	Generation	Total
South Pavillion	3,300	0	0	**3,300**
Pavillion Plant	1,700	0	0	**1,700**
Muddy Ridge	4,500	0	0	**4,500**
Hidden Valley	1,700	0	0	**1,700**
Shoshoni Booster	3,300	0	500	**3,800**
Sand Mesa	6,500	3,300	500	**10,300**
Sand Mesa South	3,300	1,000	500	**4,800**
Coastal Extension	2,200	0	500	**2,700**
Total	**26,500**	**4,300**	**2,000**	**32,800**

Additional Facility Heater Capacity (MMbtu)

Facility	Dehydration	Separation	Total
South Pavillion			**0**
Pavillion Plant			**0**
Muddy Ridge	1.05		**1.05**
Hidden Valley			**0**
Shoshoni Booster		0.3	**0.3**
Sand Mesa	1.75	1.2	**2.95**
Sand Mesa South	1.05	0.6	**1.65**
Coastal Extension	0.7	0.6	**1.3**
Total	**4.55**	**2.7**	**7.25**

59. Pumper Tailpipe Emissions

Assumptions:

Number of New Pumpers:	5	(Estimated by Project Proponent for full development)
Pumper Mileage:	2,500	miles/pumper/month (Project Proponents)
Total Annual New Pumper Mileage:	150,000	miles/year
Hours of Pumper Operation:	8	hours per day (Project Proponents)
Hours of Pumper Operation:	2080	hours per year
Fuel sulfur content	0.05	% (Typical value)
Fuel density	7.08	lbs/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile)} * \text{Vehicle Miles Traveled (miles/yr)}}{453.6\ \text{(g/lb)} * 2000\ \text{(lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal)} * 453.6\ \text{(g/lb)} * \text{Fuel Sulfur Content} * 2\ \text{(S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Pumper Vehicles	Heavy Duty Pickups E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	3.03	0.482	0.501
CO	33.64	5.348	5.562
VOC [b]	1.84	0.293	0.304
SO2	0.21	0.034	0.035

a AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
b Emission factor is for total Hydrocarbons.

Pumper Vehicles	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx	0.293	0.095	0.095	0.011	0.008	0.501
CO	3.253	1.049	1.049	0.126	0.084	5.562
VOC	0.178	0.057	0.057	0.007	0.005	0.304
SO2	0.021	0.007	0.007	0.001	0.001	0.035

11. Reclamation Fugitive Dust Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
TSP	2.094	2.116	1.410	0.529	0.176	6.326
PM15	0.936	0.869	0.580	0.217	0.072	2.675
PM10	0.702	0.652	0.435	0.163	0.054	2.006
PM2.5	0.220	0.222	0.148	0.056	0.019	0.664

12. Vehicle Unpaved Road Fugitive Dust Emissions

Assumptions:

Precipitation	73	days per year (NCDC data for Lander, WY - 2002)
Road Silt Content	12	percent (Average value of composit samples)
Road Moisture	0.9	percent (Average value of composit samples)

Equation: From AP-42 13.2.2, Unpaved Roads, 9/98

$$E \text{ Size Spec. Factor (lb/VMT)} = \frac{k * (s/12)^a * (W/3)^b * [(365-p)/365]}{(M/0.2)^c}$$

Where k, a, b, and c are empirical constants listed below and

E = particle size specific emission factor (lbs/VMT)
s = surface material silt content (%)
W = mean vehicle weight (tons)
M = surface material moisture content (%)
p = number of days with at least 0.01 in of precipitation per year

Empirical Constants			
Constant	**PM2.5**	**PM10**	**PM30/TSP**
k	0.38	2.6	10.0
a	0.8	0.8	0.8
b	0.4	0.4	0.5
c	0.3	0.3	0.4

Emission Factor Constant K S/12^a [(365-p)/365]/M/.02^c

PM2.5	**PM10**	**PM30/TSP**
0.194	1.325	4.383

Buys & Associates, Inc. **Environmental Consultants**	Project: Wind River Proposed Action Inventory Date: 7/8/2004

15. Sand Mesa & Coastal Unpaved Road Fugitive Dust Emissions

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity
Const. & Drilling Activities				
Semi: Rig Transport	60,000	20		
Haul Truck: Water	20,000	138		
Haul Truck: Other	48,000	64		
HD Pickup Truck: Misc.	7,000	434		
Total Const. & Drilling	15,351	656	25	1200

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	7.01	95.82	57.49	689.9
PM10	1.93	26.36	15.82	189.8
PM2.5	0.28	3.85	2.31	27.7

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity
Completion Activities				
Haul Truck: Water	20,000	40		
Haul Truck: Other	48,000	145		
HD Pickup Truck: Misc.	7,000	198		
Total Completion	23,880	383	25	300

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	8.74	279.10	41.87	251.2
PM10	2.30	73.46	11.02	66.1
PM2.5	0.34	10.74	1.61	9.7

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity
Development & Reclamation				
Haul Truck: Water	20,000	0		
Haul Truck: Other	48,000	3		
HD Pickup Truck: Misc.	7,000	10		
Total Dev. & Reclamation	16,462	13	25	30

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	7.26	78.66	1.18	14.2
PM10	1.98	21.49	0.32	3.9
PM2.5	0.29	3.14	0.05	0.6

* Const. & Drilling Assumes 50 24-hr days
Completion assumes 30 10-hr days
Development & Reclamation assumes 3 10-hr days

50% success rate assumed for completion operations

Sand Mesa and Coastal Total

Particulate Matter Scale	Emission Factor (lbs/VMT)	Max Emissions (lbs/hr)	Total Emissions (Tons/well)	Total Emissions (Tons/year)
TSP		279.10	100.54	955.3
PM10		73.46	27.16	259.8
PM2.5		10.74	3.97	38.0

Buys & Associates, Inc. **Environmental Consultants**	Project: Wind River EIS Emission Inventory Date: 7/8/2004

79. Sand Mesa Central Facility Heater Emissions

Assumptions

Separator Size:	1200	MBTU/hr (Reported by Project Proponents)
Dehydrator Size:	1750	MBTU/hr (Reported by Project Proponents)
Total Heater Capacity:	2950	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour for entire year (Est.from fuel usage reported by Proponents)
	4380	hours/year
Net Low Fuel Gas Heat Content	1170	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

Fuel Consumption (MMscf/yr) = $\frac{\text{Heater Size (MBtu/hr) * 1,000 (Btu/MBtu) * Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf) * 1,000,000 (scf/MMscf)}}$

NOx/CO/TOC Emissions (tons/yr) = $\frac{\text{AP-42 E.Factor (lbs/MMscf) * Fuel Consumption (MMscf/yr) * Fuel heating Value (Btu/scf)}}{\text{2,000 (lbs/ton) * 1,000 (Btu/scf - Standard Fuel Heating Value)}}$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Species	Total Heater Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx [a]	100	0.148	0.646
CO [a]	84	0.124	0.543
TOC [c]	11	0.016	0.071
VOC	N.A.	0.004	0.018
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.011	0.049
PM10 [c]	7.6	0.011	0.049
PM2.5 [c]	7.6	0.011	0.049
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.003	0.012
Formaldehyde [d]	0.075	0.000	0.000

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

73. Sand Mesa Compression and Processing

Assumptions:

Total Power Requirement: 10300 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	22.71	99.5
CO [1]		2.0	45.41	198.9
VOC [1]		1.0	22.71	99.5
PM10 [2, 5]	0.0194	0.070	1.60	7.0
PM2.5 [2,5]	0.0194	0.070	1.60	7.0
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.13	0.6
Toluene [2]	0.000558	0.00203	0.05	0.2
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.02	0.1
Formaldehyde [1]		0.07	1.59	7.0

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

90. Sand Mesa Dehydrator

Assumptions

Throughput Rate: 55 MMscf/day (As projected by Project Proponents)

Gas Composition: Muddy Ridge Sample

Inlet Gas Conditions: Inlet gas was assumed to be saturated at 700 psi and 80 F as reported by the project proponents

Calculations

Dehydrator emissions were simulated using GRI GlyCalc version 4.0 software

Emissions

Species	Emissions (lbs/hr)	Emissions (tons/year)
VOC	2.489	10.902
Benzene	0.127	0.557
Toluene	0.000	0.000
Ethylbenzene	0.000	0.000
Xylenes	0.000	0.000
n-Hexane	0.006	0.027
Total HAPs	0.133	0.584

74. Sand Mesa South Compression and Processing

Assumptions:

Total Power Requirement: 4800 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6\ \text{(g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	10.58	46.3
CO [1]		2.0	21.16	92.7
VOC [1]		1.0	10.58	46.3
PM10 [2, 5]	0.0194	0.070	0.75	3.3
PM2.5 [2,5]	0.0194	0.070	0.75	3.3
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.06	0.3
Toluene [2]	0.000558	0.00203	0.02	0.1
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.01	0.0
Formaldehyde [1]		0.07	0.74	3.2

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

97. Sand Mesa South Dehydrator

Assumptions

Throughput Rate: 26 MMscf/day (As projected by Project Proponents)

Gas Composition: Muddy Ridge Sample

Inlet Gas Conditions: Inlet gas was assumed to be saturated at 700 psi and 80 F as reported by the project proponents

Calculations

Dehydrator emissions were simulated using GRI GlyCalc version 4.0 software

Emissions

Species	Emissions (lbs/hr)	Emissions (tons/year)
VOC	1.177	5.154
Benzene	0.060	0.263
Toluene	0.000	0.000
Ethylbenzene	0.000	0.000
Xylenes	0.000	0.000
n-Hexane	0.003	0.013
Total HAPs	0.063	0.276

62. Sand Mesa and Coastal Well Blowdown Emissions

Assumptions: During Production, a percentage of the wells are periodically blown down to unload fluids

# of New Producing Wells	60	
% Wells Requiring Blowdown	20	% (Estimated by Project Proponents)
# of Blowdown wells	12	Wells
Blowdown Frequency	1	per week for a period of 1 hour each (Project Proponents)
Blowdown Volume	16	Mscf/event (Estimated from Production Data)
Annual Blowdown Volume	10.0	MMscf/year

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/hr)	COMPONENT FLOW RATE (lb/hr/well)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	79.318	12.725	0.590	12.691	536.509	167.391
Ethane	30.07	10.453	3.143	0.146	1.672	132.524	41.347
Propane	44.097	3.927	1.732	0.080	0.628	73.011	22.779
i-Butane	58.123	1.456	0.846	0.039	0.233	35.680	11.132
n-Butane	58.123	1.069	0.621	0.029	0.171	26.197	8.173
i-Pentane	72.15	1.136	0.820	0.038	0.182	34.557	10.782
n-Pentane	72.15	0.759	0.548	0.025	0.121	23.089	7.204
Hexanes	86.177	0.865	0.745	0.035	0.138	31.429	9.806
Heptanes	100.204	0.080	0.080	0.004	0.013	3.380	1.055
Octanes	114.231	0.000	0.000	0.000	0.000	0.000	0.000
Nonanes	128.258	0.000	0.000	0.000	0.000	0.000	0.000
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.000	0.033	0.010
Toluene	92.13	0.000	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	106.16	0.000	0.000	0.000	0.000	0.000	0.000
Xylenes	106.16	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	86.177	0.005	0.004	0.000	0.001	0.182	0.057
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	0.605	0.169	0.008	0.097	7.146	2.229
Carbon Dioxide	44.01	0.328	0.144	0.007	0.052	6.086	1.899
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**9.298**	**5.397**	**0.250**	**1.488**	**227.557**	**70.998**
HAP SUBTOTAL		**0.006**	**0.005**	**0.000**	**0.001**	**0.215**	**0.067**
TOTAL		**100.002**	**21.579**	**1.000**	**16**	**909.821**	**283.864**

Buys & Associates, Inc.
Environmental Consultants

Project: Wind River Proposed Action Inventory
Date: 7/8/2004

72. Shoshoni Booster Compression and Processing

Assumptions:

Total Power Requirement: 3800 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	8.38	36.7
CO [1]		2.0	16.75	73.4
VOC [1]		1.0	8.38	36.7
PM10 [2, 5]	0.0194	0.070	0.59	2.6
PM2.5 [2,5]	0.0194	0.070	0.59	2.6
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.05	0.2
Toluene [2]	0.000558	0.00203	0.02	0.1
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.01	0.0
Formaldehyde [1]		0.07	0.59	2.6

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

78. Shoshoni Booster Central Facility Heater Emissions

Assumptions

Separator Size: 300 MBTU/hr (Reported by Project Proponents)
Dehydrator Size: 0 MBTU/hr (Reported by Project Proponents)
Total Heater Capacity: 300 MBTU/hr (Reported by Project Proponents)

Firing Rate 30 Minutes/hour for entire year (Est.from fuel usage reported by Proponents)
4380 hours/year

Net Low Fuel Gas Heat Content 1170 Btu/scf (Gas Analyses from Existing Wells)

Fuel Gas VOC Content 0.250 by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * 1{,}000\ \text{(Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * 1{,}000{,}000\ \text{(scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{2{,}000\ \text{(lbs/ton)} * 1{,}000\ \text{(Btu/scf - Standard Fuel Heating Value)}}$$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Species	Total Heater Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx [a]	100	0.015	0.066
CO [a]	84	0.013	0.055
TOC [c]	11	0.002	0.007
VOC	N.A.	0.000	0.002
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.001	0.005
PM10 [c]	7.6	0.001	0.005
PM2.5 [c]	7.6	0.001	0.005
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.001
Formaldehyde [d]	0.075	0.000	0.000

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Proposed Action Inventory Date: 7/8/2004

31. Sand Mesa and Coastal Drill Rig Engine Emissions

Assumptions:

Hours of Operation	1200	hours/well (50 days on average @ 24 hrs/day - Project Proponents)
Development Rate	12	wells/year
Load Factor	0.4	(Assumed typical value)
Rig Size	1500	hp (Drilling Contractor)
Diesel Fuel Sulfur Content	0.05	% (typical value)

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (lb/hp-hr) * Rated Horsepower (hp)* Operating Hours (hrs) * Load Factor (Dimensionless)}}{\text{2000 (lb/tons)}}$$

SO2 E. Factor (lb/hp-hr) = Fuel sulfur content * 0.00809

Total Emissions Summary

Species	Drill Rig Emissions: E. Factor [d] (lb/MMBtu)	E. Factor [a] (lb/hp-hr)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx		0.024	14.40	103.68
CO		0.0055	3.30	23.76
VOC [b]		0.000705	0.42	3.05
PM10 [c]	0.0573	0.0004011	0.24	1.73
PM2.5 [d]	0.0556	0.0003892	0.23	1.68
SO2		0.0004045	0.24	1.75

Development Area	Wells per Year
Sand Mesa	8
Sand Mesa South	3
Coastal Extension	1
Total	**12**

a AP-42 Volume I, Large Stationary Diesel Engines Table 3.4-1, 10/96
b Emission Factor represents total Hydrocarbon Emissions
c PM10 Emission Factor determined from Table 3.4-2, 10/96
d PM2.5 Emission Factor estimated as PM3.0 (filterable + condensable) from Table 3.4-2, 10/96
e Conversion from lb/MMBtu to lb/hp-hr assumes a BSFC of 7,000 BTU/hp-hr (Table 3.4-1, 10/96)
f Assumes a Development rate as stated by the proponents (Summarized in page 1)

Area Summary

Species	Emissions (tons/year): Sand Mesa	Sand Mesa South	Coastal Extension	Total
NOx	69.12	25.92	8.64	103.68
CO	15.84	5.94	1.98	23.76
VOC [b]	2.03	0.76	0.25	3.05
PM10 [c]	1.16	0.43	0.14	1.73
PM2.5 [d]	1.12	0.42	0.14	1.68
SO2	1.16	0.44	0.15	1.75

91. Sand Mesa Dehydrator Emissions Calculation

```
GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT
Case Name: Wind River EIS
File Name: sand mesa.ddf
     Date: December 04, 2003
 DESCRIPTION:
    Description: Proposed Action
                 Sand Mesa Dehy
                 55 MMscf/day
    Annual Hours of Operation:    8760.0 hours/yr

 EMISSIONS REPORTS:
 --------------------------------------------------------------------
 UNCONTROLLED REGENERATOR EMISSIONS
 --------------------------------------------------------------------
            Component               lbs/hr     lbs/day     tons/yr
 ------------------------------- ----------- ----------- -----------
                         Methane      0.1103       2.647      0.4831
                          Ethane      0.1279       3.069      0.5602
                         Propane      0.2408       5.780      1.0549
                       Isobutane      0.2084       5.003      0.9130
                        n-Butane      0.2403       5.767      1.0525
                      Isopentane      0.3480       8.352      1.5243
                       n-Pentane      0.3448       8.274      1.5100
                        n-Hexane      0.0061       0.148      0.0269
                   Other Hexanes      0.6811      16.347      2.9833
                        Heptanes      0.2922       7.013      1.2799
                         Benzene      0.1272       3.052      0.5570
 ------------------------------- ----------- ----------- -----------
                 Total Emissions      2.7272      65.452     11.9449
     Total Hydrocarbon Emissions      2.7272      65.452     11.9449
             Total VOC Emissions      2.4890      59.735     10.9017
             Total HAP Emissions      0.1333       3.199      0.5839
            Total BTEX Emissions      0.1272       3.052      0.5570

 FLASH TANK OFF GAS
 --------------------------------------------------------------------
            Component               lbs/hr     lbs/day     tons/yr
 ------------------------------- ----------- ----------- -----------
                         Methane      9.1814     220.354     40.2147
                          Ethane      3.2926      79.022     14.4216

                         Propane      2.3766      57.039     10.4096
                       Isobutane      1.3837      33.209      6.0606
                        n-Butane      1.2056      28.934      5.2805
                      Isopentane      1.5626      37.502      6.8441
                       n-Pentane      1.2267      29.440      5.3729
                        n-Hexane      0.0123       0.296      0.0540
                   Other Hexanes      1.8361      44.066      8.0420
                        Heptanes      0.2969       7.125      1.3003
                         Benzene      0.0081       0.193      0.0353
 ------------------------------- ----------- ----------- -----------
                 Total Emissions     22.3825     537.181     98.0356
     Total Hydrocarbon Emissions     22.3825     537.181     98.0356
             Total VOC Emissions      9.9085     237.804     43.3993
             Total HAP Emissions      0.0204       0.489      0.0893
            Total BTEX Emissions      0.0081       0.193      0.0353
```

92. Sand Mesa Dehydrator Emissions Calculation Continued

```
EQUIPMENT REPORTS:
 -------------------------------------------------------------------
 ABSORBER
 -------------------------------------------------------------------

NOTE: Because the Calculated Absorber Stages was below the minimum
allowed, GRI-GLYCalc has set the number of Absorber Stages to 1.25
and has calculated a revised Dry Gas Dew Point.

             Calculated Absorber Stages:      1.25
           Calculated Dry Gas Dew Point:      5.32 lbs. H2O/MMSCF
                            Temperature:      80.0 deg. F
                               Pressure:     700.0 psig
                      Dry Gas Flow Rate:   55.0000 MMSCF/day
             Glycol Losses with Dry Gas:    0.3036 lb/hr
                  Wet Gas Water Content: Saturated
       Calculated Wet Gas Water Content:     41.76 lbs. H2O/MMSCF
    Specified Lean Glycol Recirc. Ratio:      1.50 gal/lb H2O

                                      Remaining   Absorbed
                Component             in Dry Gas  in Glycol
     ------------------------------- ----------- -----------
                               Water      12.74%      87.26%
                      Carbon Dioxide      99.96%       0.04%
                            Nitrogen     100.00%       0.00%
                             Methane     100.00%       0.00%
                              Ethane      99.99%       0.01%
                             Propane      99.98%       0.02%
                           Isobutane      99.98%       0.02%
                            n-Butane      99.97%       0.03%
                          Isopentane      99.97%       0.03%
                           n-Pentane      99.96%       0.04%
                            n-Hexane      99.94%       0.06%
                       Other Hexanes      99.95%       0.05%
                            Heptanes      99.89%       0.11%
                             Benzene      97.14%       2.86%

 FLASH TANK
 -------------------------------------------------------------------
                          Flash Control: Vented to atmosphere
                      Flash Temperature:     120.0 deg. F
                         Flash Pressure:      30.0 psig

                                       Left in    Removed in
                Component                Glycol   Flash Gas
     ------------------------------- ----------- -----------
                               Water      99.88%       0.12%
                      Carbon Dioxide      13.67%      86.33%
                            Nitrogen       1.07%      98.93%
                             Methane       1.19%      98.81%
                              Ethane       3.74%      96.26%
                             Propane       9.20%      90.80%
                           Isobutane      13.09%      86.91%
                            n-Butane      16.62%      83.38%
                          Isopentane      18.52%      81.48%
                           n-Pentane      22.25%      77.75%
                            n-Hexane      33.55%      66.45%
                       Other Hexanes      27.67%      72.33%
                            Heptanes      49.84%      50.16%
                             Benzene      94.34%       5.66%
```

93. Sand Mesa Dehydrator Emissions Calculation Continued

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	16.77%	83.23%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	2.05%	97.95%
n-Pentane	1.81%	98.19%
n-Hexane	1.30%	98.70%
Other Hexanes	3.02%	96.98%
Heptanes	0.93%	99.07%
Benzene	5.28%	94.72%

STREAM REPORTS:

WET GAS STREAM

Temperature: 80.00 deg. F
Pressure: 714.70 psia
Flow Rate: 2.29e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.80e-002	9.58e+001
Carbon Dioxide	3.28e-001	8.72e+002
Nitrogen	6.04e-001	1.02e+003
Methane	7.92e+001	7.68e+004
Ethane	1.04e+001	1.90e+004
Propane	3.92e+000	1.05e+004
Isobutane	1.45e+000	5.11e+003
n-Butane	1.07e+000	3.75e+003
Isopentane	1.13e+000	4.95e+003
n-Pentane	7.58e-001	3.31e+003
n-Hexane	5.00e-003	2.60e+001
Other Hexanes	8.64e-001	4.50e+003
Heptanes	7.99e-002	4.84e+002
Benzene	9.99e-004	4.72e+000
Total Components	100.00	1.30e+005

DRY GAS STREAM

Temperature: 80.00 deg. F
Pressure: 714.70 psia
Flow Rate: 2.29e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.12e-002	1.22e+001
Carbon Dioxide	3.28e-001	8.71e+002
Nitrogen	6.05e-001	1.02e+003
Methane	7.93e+001	7.68e+004

94. Sand Mesa Dehydrator Emissions Calculation Continued

```
                         Ethane 1.05e+001 1.90e+004
                        Propane 3.93e+000 1.05e+004
                      Isobutane 1.46e+000 5.11e+003
                       n-Butane 1.07e+000 3.75e+003
                     Isopentane 1.14e+000 4.95e+003
                      n-Pentane 7.59e-001 3.31e+003
                       n-Hexane 5.00e-003 2.60e+001
                  Other Hexanes 8.65e-001 4.50e+003
                       Heptanes 7.99e-002 4.84e+002
                        Benzene 9.71e-004 4.58e+000
    ------------------------------ --------- ---------
               Total Components    100.00 1.30e+005
LEAN GLYCOL STREAM
-------------------------------------------------------------
    Temperature:     80.00 deg. F
    Flow Rate:   1.99e+000 gpm
                  Component           Conc.    Loading
                                      (wt%)    (lb/hr)
    ------------------------------ --------- ---------
                            TEG 9.85e+001 1.10e+003
                          Water 1.50e+000 1.68e+001
                 Carbon Dioxide 3.43e-012 3.85e-011
                       Nitrogen 2.75e-013 3.09e-012
                        Methane 6.39e-018 7.17e-017
                         Ethane 6.95e-008 7.80e-007
                        Propane 5.96e-009 6.69e-008
                      Isobutane 2.99e-009 3.35e-008
                       n-Butane 2.42e-009 2.72e-008
                     Isopentane 6.49e-004 7.28e-003
                      n-Pentane 5.66e-004 6.35e-003
                       n-Hexane 7.19e-006 8.07e-005
                  Other Hexanes 1.89e-003 2.12e-002
                       Heptanes 2.44e-004 2.73e-003
                        Benzene 6.32e-004 7.09e-003
    ------------------------------ --------- ---------

               Total Components    100.00 1.12e+003
RICH GLYCOL AND PUMP GAS STREAM
-------------------------------------------------------------
    Temperature:     80.00 deg. F
    Pressure:       714.70 psia
    Flow Rate:   2.21e+000 gpm
    NOTE: Stream has more than one phase.
                  Component           Conc.    Loading
                                      (wt%)    (lb/hr)
    ------------------------------ --------- ---------
                            TEG 8.97e+001 1.10e+003
                          Water 8.16e+000 1.00e+002
                 Carbon Dioxide 3.79e-002 4.66e-001
                       Nitrogen 1.03e-002 1.26e-001
                        Methane 7.55e-001 9.29e+000
                         Ethane 2.78e-001 3.42e+000
                        Propane 2.13e-001 2.62e+000
                      Isobutane 1.29e-001 1.59e+000
                       n-Butane 1.18e-001 1.45e+000
                     Isopentane 1.56e-001 1.92e+000
                      n-Pentane 1.28e-001 1.58e+000
                       n-Hexane 1.51e-003 1.86e-002
                  Other Hexanes 2.06e-001 2.54e+000
                       Heptanes 4.81e-002 5.92e-001
                        Benzene 1.16e-002 1.42e-001
    ------------------------------ --------- ---------
               Total Components    100.00 1.23e+003
```

95. Sand Mesa Dehydrator Emissions Calculation Continued

FLASH TANK OFF GAS STREAM

Temperature: 120.00 deg. F
Pressure: 44.70 psia
Flow Rate: 3.28e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.76e-001	1.21e-001
Carbon Dioxide	1.06e+000	4.02e-001
Nitrogen	5.16e-001	1.25e-001
Methane	6.63e+001	9.18e+000
Ethane	1.27e+001	3.29e+000
Propane	6.24e+000	2.38e+000
Isobutane	2.76e+000	1.38e+000
n-Butane	2.40e+000	1.21e+000
Isopentane	2.51e+000	1.56e+000
n-Pentane	1.97e+000	1.23e+000
n-Hexane	1.66e-002	1.23e-002
Other Hexanes	2.47e+000	1.84e+000
Heptanes	3.43e-001	2.97e-001
Benzene	1.19e-002	8.05e-003
Total Components	100.00	2.30e+001

FLASH TANK GLYCOL STREAM

Temperature: 120.00 deg. F
Flow Rate: 2.16e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.15e+001	1.10e+003
Water	8.31e+000	1.00e+002
Carbon Dioxide	5.28e-003	6.37e-002
Nitrogen	1.12e-004	1.35e-003
Methane	9.14e-003	1.10e-001
Ethane	1.06e-002	1.28e-001
Propane	2.00e-002	2.41e-001
Isobutane	1.73e-002	2.08e-001
n-Butane	1.99e-002	2.40e-001
Isopentane	2.94e-002	3.55e-001
n-Pentane	2.91e-002	3.51e-001
n-Hexane	5.16e-004	6.23e-003
Other Hexanes	5.82e-002	7.02e-001
Heptanes	2.44e-002	2.95e-001
Benzene	1.11e-002	1.34e-001
Total Components	100.00	1.21e+003

96. Sand Mesa Dehydrator Emissions Calculation Continued

```
REGENERATOR OVERHEADS STREAM
-------------------------------------------------------------
    Temperature:    212.00 deg. F
    Pressure:        14.70 psia
    Flow Rate:   1.78e+003 scfh

                  Component           Conc.    Loading
                                     (vol%)    (lb/hr)
    -------------------------------- --------- ---------
                               Water 9.90e+001 8.35e+001
                      Carbon Dioxide 3.09e-002 6.37e-002
                            Nitrogen 1.03e-003 1.35e-003
                             Methane 1.47e-001 1.10e-001
                              Ethane 9.08e-002 1.28e-001
                             Propane 1.17e-001 2.41e-001
                           Isobutane 7.66e-002 2.08e-001
                            n-Butane 8.83e-002 2.40e-001
                          Isopentane 1.03e-001 3.48e-001
                           n-Pentane 1.02e-001 3.45e-001
                            n-Hexane 1.52e-003 6.15e-003
                       Other Hexanes 1.69e-001 6.81e-001
                            Heptanes 6.23e-002 2.92e-001
                             Benzene 3.48e-002 1.27e-001
    -------------------------------- --------- ---------
                    Total Components    100.00 8.63e+001
```

38. Sand Mesa and Coastal Well Development Venting

Assumptions: Following Completion, Wells are Vented prior to connnection to the gathering pipeline

Venting Period 24 hours (Project Proponents)

Amount of Vented Gas: 0.5 MMscf (Average Volume Estimated by Proponents)

Development Rate: 6 Wells per year (Project Proponents - Assumes a 50% success rate)

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/day)	COMPONENT FLOW RATE (lb/hr)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	79.318	12.725	0.590	396.590	698.579	50.298
Ethane	30.07	10.453	3.143	0.146	52.265	172.557	12.424
Propane	44.097	3.927	1.732	0.080	19.635	95.067	6.845
i-Butane	58.123	1.456	0.846	0.039	7.280	46.459	3.345
n-Butane	58.123	1.069	0.621	0.029	5.345	34.110	2.456
i-Pentane	72.15	1.136	0.820	0.038	5.680	44.996	3.240
n-Pentane	72.15	0.759	0.548	0.025	3.795	30.063	2.165
Hexanes	86.177	0.865	0.745	0.035	4.325	40.923	2.946
Heptanes	100.204	0.080	0.080	0.004	0.400	4.401	0.317
Octanes	114.231	0.000	0.000	0.000	0.000	0.000	0.000
Nonanes	128.258	0.000	0.000	0.000	0.000	0.000	0.000
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.005	0.043	0.003
Toluene	92.13	0.000	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	106.16	0.000	0.000	0.000	0.000	0.000	0.000
Xylenes	106.16	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	86.177	0.005	0.004	0.000	0.025	0.237	0.017
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	0.605	0.169	0.008	3.025	9.304	0.670
Carbon Dioxide	44.01	0.328	0.144	0.007	1.640	7.925	0.571
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**9.298**	**5.397**	**0.250**	**46.490**	**296.298**	**21.333**
HAP SUBTOTAL		**0.006**	**0.005**	**0.000**	**0.030**	**0.279**	**0.020**
TOTAL		**100**	**21.579**	**1.000**	**500**	**1184.663**	**85.296**

56. Sand Mesa and Coastal E&P Tank Flash Emissions Calculation Continued

```
******************************************************************************
*     Calculation Results
******************************************************************************

-- Emission Summary -----------------------------------------------------------
Item                Uncontrolled   Uncontrolled
                    [ton/yr]       [lb/hr]
Total HAPs          0.330          0.075
Total HC            13.352         3.048
VOCs, C2+           10.669         2.436
VOCs, C3+           8.123          1.855

Uncontrolled Recovery Info.
       Vapor        904.3000 x1E-3 [MSCFD]
       HC Vapor     819.5200 x1E-3 [MSCFD]
       GOR          47.10          [SCF/bbl]

-- Emission Composition -------------------------------------------------------
No  Component       Uncontrolled   Uncontrolled
                    [ton/yr]       [lb/hr]
1   H2S             0.000          0.000
2   O2              0.000          0.000
3   CO2             1.797          0.410
4   N2              0.000          0.000
5   C1              2.683          0.613
6   C2              2.546          0.581
7   C3              3.088          0.705
8   i-C4            1.144          0.261
9   n-C4            1.218          0.278
10  i-C5            0.649          0.148
11  n-C5            0.485          0.111
12  C6              0.266          0.061
13  C7              0.758          0.173
14  C8              0.131          0.030
15  C9              0.044          0.010
16  C10+            0.005          0.001
17  Benzene         0.027          0.006
18  Toluene         0.063          0.014
19  E-Benzene       0.003          0.001
20  Xylenes         0.033          0.008
21  n-C6            0.207          0.047
22  224Trimethylp   0.000          0.000
    Total           15.147         3.458
```

Buys & Associates, Inc.
Environmental Consultants

Project: Wind River Proposed Action Inventory
Date: 7/8/2004

57. Sand Mesa and Coastal E&P Tank Flash Emissions Calculation Continued

-- Stream Data ---

No.	Component	MW	LP Oil mol %	Flash Oil mol %	Sale Oil mol %	Flash Gas mol %	W&S Gas mol %	Total Emissions mol %
1	H2S	34.80	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2	O2	32.00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
3	CO2	44.01	0.5430	0.1527	0.0690	9.9800	7.2341	9.3754
4	N2	28.01	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
5	C1	16.04	1.9990	0.1971	0.0455	45.5666	13.0303	38.4027
6	C2	30.07	1.3370	0.5961	0.3651	19.2517	20.1409	19.4475
7	C3	44.10	2.1840	1.7085	1.4383	13.6807	24.5802	16.0806
8	i-C4	58.12	1.3150	1.2249	1.1431	3.4921	8.1552	4.5188
9	n-C4	58.12	1.9850	1.9192	1.8332	3.5747	9.2030	4.8140
10	i-C5	72.15	2.0990	2.1273	2.1007	1.4136	4.3799	2.0667
11	n-C5	72.15	2.1510	2.1980	2.1836	1.0151	3.4147	1.5435
12	C6	86.16	3.0330	3.1405	3.1568	0.4325	1.7651	0.7260
13	C7	100.20	22.1390	23.0149	23.2304	0.9542	4.7756	1.7956
14	C8	114.23	10.3120	10.7331	10.8507	0.1270	0.7846	0.2718
15	C9	128.28	8.7860	9.1479	9.2529	0.0339	0.2558	0.0827
16	C10+	166.00	28.2390	29.4065	29.7537	0.0019	0.0272	0.0075
17	Benzene	78.11	0.5630	0.5844	0.5889	0.0461	0.2027	0.0805
18	Toluene	92.13	3.8550	4.0112	4.0534	0.0784	0.4337	0.1567
19	E-Benzene	106.17	0.5240	0.5455	0.5517	0.0032	0.0213	0.0072
20	Xylenes	106.17	5.9710	6.2166	6.2875	0.0310	0.2152	0.0715
21	n-C6	86.18	2.9660	3.0755	3.0955	0.3171	1.3806	0.5513
22	224Trimethylp	114.24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	MW		113.50	116.90	117.73	31.28	47.23	34.79
	Stream Mole Ratio		1.0000	0.9603	0.9491	0.0397	0.0112	0.0509
	Heating Value	[BTU/SCF]				1576.04	2489.46	1777.16
	Gas Gravity	[Gas/Air]				1.08	1.63	1.20
	Bubble Pt. @ 100F	[psia]	94.66	20.27	11.77			
	RVP @ 100F	[psia]	24.94	10.17	7.70			
	Spec. Gravity @ 100F		0.761	0.766	0.767			

55. Sand Mesa and Coastal E&P Tank Flash Emissions Calculation

```
******************************************************************************
*     Project Setup Information
******************************************************************************
Project File              : C:\Data\Clients\Tom Brown\Wind River EIS\sand mesa
flash revised.ept
Flowsheet Selection       : Oil Tank with Separator
Calculation Method        : RVP Distillation
Control Efficiency        : 100.0%
Known Separator Stream    : Low Pressure Oil
Entering Air Composition  : No

Filed Name                : Sand Mesa
Well Name                 : Wind River EIS
Well ID                   : Average Condensate Analysis
Date                      : 2003.11.26

******************************************************************************
*     Data Input
******************************************************************************
Separator Pressure        : 200.00[psig]
Separator Temperature     : 130.00[F]
Ambient Pressure          : 12.00[psia]
Ambient Temperature       : 44.00[F]
C10+ SG                   : 0.8990
C10+ MW                   : 166.00

-- Low Pressure Oil ----------------------------------------------------------
   No.    Component            mol %
   1      H2S                   0.0000
   2      O2                    0.0000
   3      CO2                   0.5430
   4      N2                    0.0000
   5      C1                    1.9990
   6      C2                    1.3370
   7      C3                    2.1840
   8      i-C4                  1.3150
   9      n-C4                  1.9850
   10     i-C5                  2.0990
   11     n-C5                  2.1510
   12     C6                    3.0330
   13     C7                   22.1390
   14     C8                   10.3120
   15     C9                    8.7860
   16     C10+                 28.2390
   17     Benzene               0.5630
   18     Toluene               3.8550
   19     E-Benzene             0.5240
   20     Xylenes               5.9710
   21     n-C6                  2.9660
   22     224Trimethylp         0.0000

-- Sales Oil -----------------------------------------------------------------
Production Rate           : 19.2[bbl/day]
Days of Annual Operation  : 365 [days/year]
API Gravity               : 46.0
Reid Vapor Pressure       : 7.70[psia]
```

54. Sand Meas and Coastal Condensate Storage Tank Emissions

Assumptions:

Average Condensate Production Rate :	0.32	bbls per day (Average production for existing wells - WOGCC)
Expected Successful Producting Wells:	60	
Predicted Condensate Production:	19.2	bbls/day
Separator Conditions :		200 psi and 130 F (Specified by Proponent)
Condensate Composition:		Sample from Grayling 29-33

Calculations:

Stock tank flash emissions estimated with E&P Tanks software

Emissions:

Component	Flash Emissions (tons/yr)
Benzene	0.027
Toluene	0.063
Ethylbenzene	0.003
Xylenes	0.033
n-Hexane	0.207
Total HAPS	0.333
Total VOC	8.123

44. Sand Mesa and Coastal Production Heater Emissions

Assumptions

Number of new producing wells	60	(Reported by Project Proponents)
Separator Size	1,000	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour (Est.from fuel usage reported by Proponents)
	6	months/year (Nov. thru April - Project Proponents)
	2190	hours/year
Net Low Fuel Gas Heat Content	1267	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * 1{,}000\text{ (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * 1{,}000{,}000\text{ (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{2{,}000\text{ (lbs/ton)} * 1{,}000\text{ (Btu/scf - Standard Fuel Heating Value)}}$$

$$\text{VOC Emissions (tons/yr)} = \text{TOC Emissions (tons/yr)} * \text{VOC wt. fraction}$$

Pollutant	Separator Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr/well)	Emissions [e] (tons/yr)
NOx [a]	100	0.025	6.570
CO [a]	84	0.021	5.519
TOC [c]	11	0.003	0.723
VOC	N.A.	0.001	0.181
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.002	0.499
PM10 [c]	7.6	0.002	0.499
PM2.5 [c]	7.6	0.002	0.499
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.118
Formaldehyde [d]	0.075	0.000	0.005

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

Buys & Associates, Inc. Environmental Consultants	Project: Wind River EIS Emission Inventory Date: 7/8/2004

80. Sand Mesa South Central Facility Heater Emissions

Assumptions

Separator Size:	600	MBTU/hr (Reported by Project Proponents)
Dehydrator Size:	1050	MBTU/hr (Reported by Project Proponents)
Total Heater Capacity:	1650	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour for entire year (Est.from fuel usage reported by Proponents)
	4380	hours/year
Net Low Fuel Gas Heat Content	1170	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr) * 1,000 (Btu/MBtu) * Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf) * 1,000,000 (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf) * Fuel Consumption (MMscf/yr) * Fuel heating Value (Btu/scf)}}{\text{2,000 (lbs/ton) * 1,000 (Btu/scf - Standard Fuel Heating Value)}}$$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Species	Total Heater Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx [a]	100	0.083	0.361
CO [a]	84	0.069	0.304
TOC [c]	11	0.009	0.040
VOC	N.A.	0.002	0.010
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.006	0.027
PM10 [c]	7.6	0.006	0.027
PM2.5 [c]	7.6	0.006	0.027
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.001	0.007
Formaldehyde [d]	0.075	0.000	0.000

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

98. Sand Mesa South Dehydrator Emissions Calculation

GRI-GLYCalc VERSION 4.0 - AGGREGATE CALCULATIONS REPORT
Case Name: Wind River EIS
File Name: sand mesa south.ddf
Date: December 04, 2003

DESCRIPTION:

Description: Proposed Action
Sand Mesa South
26 MMscf/day

Annual Hours of Operation: 8760.0 hours/yr

EMISSIONS REPORTS:

UNCONTROLLED REGENERATOR EMISSIONS

Component	lbs/hr	lbs/day	tons/yr
Methane	0.0521	1.251	0.2284
Ethane	0.0605	1.451	0.2648
Propane	0.1139	2.733	0.4987
Isobutane	0.0985	2.365	0.4316
n-Butane	0.1136	2.726	0.4975
Isopentane	0.1645	3.948	0.7206
n-Pentane	0.1630	3.911	0.7138
n-Hexane	0.0029	0.070	0.0127
Other Hexanes	0.3220	7.728	1.4103
Heptanes	0.1381	3.315	0.6050
Benzene	0.0601	1.443	0.2633
Total Emissions	1.2892	30.941	5.6467
Total Hydrocarbon Emissions	1.2892	30.941	5.6467
Total VOC Emissions	1.1766	28.239	5.1535
Total HAP Emissions	0.0630	1.512	0.2760
Total BTEX Emissions	0.0601	1.443	0.2633

FLASH TANK OFF GAS

Component	lbs/hr	lbs/day	tons/yr
Methane	4.3403	104.168	19.0106
Ethane	1.5565	37.356	6.8175
Propane	1.1235	26.964	4.9209
Isobutane	0.6541	15.699	2.8650
n-Butane	0.5699	13.678	2.4962
Isopentane	0.7387	17.728	3.2354
n-Pentane	0.5799	13.917	2.5399
n-Hexane	0.0058	0.140	0.0255
Other Hexanes	0.8680	20.831	3.8017
Heptanes	0.1403	3.368	0.6147
Benzene	0.0038	0.091	0.0167
Total Emissions	10.5808	253.940	46.3441
Total Hydrocarbon Emissions	10.5808	253.940	46.3441
Total VOC Emissions	4.6840	112.417	20.5160
Total HAP Emissions	0.0096	0.231	0.0422
Total BTEX Emissions	0.0038	0.091	0.0167

99. Sand Mesa South Dehydrator Emissions Calculation Continued

```
EQUIPMENT REPORTS:
 -------------------------------------------------------------------

 ABSORBER
 -------------------------------------------------------------------

NOTE: Because the Calculated Absorber Stages was below the minimum
allowed, GRI-GLYCalc has set the number of Absorber Stages to 1.25
and has calculated a revised Dry Gas Dew Point.
             Calculated Absorber Stages:      1.25
           Calculated Dry Gas Dew Point:      5.32 lbs. H2O/MMSCF
                            Temperature:      80.0 deg. F
                               Pressure:     700.0 psig
                      Dry Gas Flow Rate:   26.0000 MMSCF/day
             Glycol Losses with Dry Gas:    0.1435 lb/hr
                  Wet Gas Water Content: Saturated
       Calculated Wet Gas Water Content:     41.76 lbs. H2O/MMSCF
    Specified Lean Glycol Recirc. Ratio:      1.50 gal/lb H2O

                                         Remaining   Absorbed
                  Component              in Dry Gas  in Glycol
     ------------------------------ ----------- -----------
                              Water      12.74%      87.26%
                     Carbon Dioxide      99.96%       0.04%
                           Nitrogen     100.00%       0.00%
                            Methane     100.00%       0.00%
                             Ethane      99.99%       0.01%
                            Propane      99.98%       0.02%
                          Isobutane      99.98%       0.02%
                           n-Butane      99.97%       0.03%
                         Isopentane      99.97%       0.03%
                          n-Pentane      99.96%       0.04%
                           n-Hexane      99.94%       0.06%
                      Other Hexanes      99.95%       0.05%
                           Heptanes      99.89%       0.11%
                            Benzene      97.14%       2.86%


 FLASH TANK
 -------------------------------------------------------------------
                          Flash Control: Vented to atmosphere
                      Flash Temperature:     120.0 deg. F
                         Flash Pressure:      30.0 psig

                                          Left in    Removed in
                  Component                Glycol    Flash Gas
     ------------------------------ ----------- -----------
                              Water      99.88%       0.12%
                     Carbon Dioxide      13.67%      86.33%
                           Nitrogen       1.07%      98.93%
                            Methane       1.19%      98.81%
                             Ethane       3.74%      96.26%
                            Propane       9.20%      90.80%
                          Isobutane      13.09%      86.91%
                           n-Butane      16.62%      83.38%
                         Isopentane      18.52%      81.48%
                          n-Pentane      22.25%      77.75%
                           n-Hexane      33.55%      66.45%
                      Other Hexanes      27.67%      72.33%
                           Heptanes      49.84%      50.16%
                            Benzene      94.34%       5.66%
```

100. Sand Mesa South Dehydrator Emissions Calculation Continued

REGENERATOR

No Stripping Gas used in regenerator.

Component	Remaining in Glycol	Distilled Overhead
Water	16.77%	83.23%
Carbon Dioxide	0.00%	100.00%
Nitrogen	0.00%	100.00%
Methane	0.00%	100.00%
Ethane	0.00%	100.00%
Propane	0.00%	100.00%
Isobutane	0.00%	100.00%
n-Butane	0.00%	100.00%
Isopentane	2.05%	97.95%
n-Pentane	1.81%	98.19%
n-Hexane	1.30%	98.70%
Other Hexanes	3.02%	96.98%
Heptanes	0.93%	99.07%
Benzene	5.28%	94.72%

STREAM REPORTS:

WET GAS STREAM

Temperature: 80.00 deg. F
Pressure: 714.70 psia
Flow Rate: 1.08e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	8.80e-002	4.53e+001
Carbon Dioxide	3.28e-001	4.12e+002
Nitrogen	6.04e-001	4.84e+002
Methane	7.92e+001	3.63e+004
Ethane	1.04e+001	8.97e+003
Propane	3.92e+000	4.94e+003
Isobutane	1.45e+000	2.42e+003
n-Butane	1.07e+000	1.77e+003
Isopentane	1.13e+000	2.34e+003
n-Pentane	7.58e-001	1.56e+003
n-Hexane	5.00e-003	1.23e+001
Other Hexanes	8.64e-001	2.13e+003
Heptanes	7.99e-002	2.29e+002
Benzene	9.99e-004	2.23e+000
Total Components	100.00	6.17e+004

101. Sand Mesa South Dehydrator Emissions Calculation Continued

DRY GAS STREAM

Temperature: 80.00 deg. F
Pressure: 714.70 psia
Flow Rate: 1.08e+006 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	1.12e-002	5.77e+000
Carbon Dioxide	3.28e-001	4.12e+002
Nitrogen	6.05e-001	4.84e+002
Methane	7.93e+001	3.63e+004
Ethane	1.05e+001	8.97e+003
Propane	3.93e+000	4.94e+003
Isobutane	1.46e+000	2.42e+003
n-Butane	1.07e+000	1.77e+003
Isopentane	1.14e+000	2.34e+003
n-Pentane	7.59e-001	1.56e+003
n-Hexane	5.00e-003	1.23e+001
Other Hexanes	8.65e-001	2.13e+003
Heptanes	7.99e-002	2.29e+002
Benzene	9.71e-004	2.17e+000
Total Components	100.00	6.16e+004

LEAN GLYCOL STREAM

Temperature: 80.00 deg. F
Flow Rate: 9.42e-001 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.85e+001	5.22e+002
Water	1.50e+000	7.95e+000
Carbon Dioxide	3.43e-012	1.82e-011
Nitrogen	2.75e-013	1.46e-012
Methane	6.39e-018	3.39e-017
Ethane	6.95e-008	3.69e-007
Propane	5.96e-009	3.16e-008
Isobutane	2.99e-009	1.58e-008
n-Butane	2.42e-009	1.29e-008
Isopentane	6.49e-004	3.44e-003
n-Pentane	5.66e-004	3.00e-003
n-Hexane	7.19e-006	3.81e-005
Other Hexanes	1.89e-003	1.00e-002
Heptanes	2.44e-004	1.29e-003
Benzene	6.32e-004	3.35e-003
Total Components	100.00	5.30e+002

102. Sand Mesa South Dehydrator Emissions Calculation Continued

RICH GLYCOL AND PUMP GAS STREAM

Temperature: 80.00 deg. F
Pressure: 714.70 psia
Flow Rate: 1.05e+000 gpm
NOTE: Stream has more than one phase.

Component	Conc. (wt%)	Loading (lb/hr)
TEG	8.97e+001	5.22e+002
Water	8.16e+000	4.75e+001
Carbon Dioxide	3.79e-002	2.20e-001
Nitrogen	1.03e-002	5.97e-002
Methane	7.55e-001	4.39e+000
Ethane	2.78e-001	1.62e+000
Propane	2.13e-001	1.24e+000
Isobutane	1.29e-001	7.53e-001
n-Butane	1.18e-001	6.84e-001
Isopentane	1.56e-001	9.07e-001
n-Pentane	1.28e-001	7.46e-001
n-Hexane	1.51e-003	8.77e-003
Other Hexanes	2.06e-001	1.20e+000
Heptanes	4.81e-002	2.80e-001
Benzene	1.16e-002	6.73e-002
Total Components	100.00	5.81e+002

FLASH TANK OFF GAS STREAM

Temperature: 120.00 deg. F
Pressure: 44.70 psia
Flow Rate: 1.55e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	7.76e-001	5.70e-002
Carbon Dioxide	1.06e+000	1.90e-001
Nitrogen	5.16e-001	5.90e-002
Methane	6.63e+001	4.34e+000
Ethane	1.27e+001	1.56e+000
Propane	6.24e+000	1.12e+000
Isobutane	2.76e+000	6.54e-001
n-Butane	2.40e+000	5.70e-001
Isopentane	2.51e+000	7.39e-001
n-Pentane	1.97e+000	5.80e-001
n-Hexane	1.66e-002	5.83e-003
Other Hexanes	2.47e+000	8.68e-001
Heptanes	3.43e-001	1.40e-001
Benzene	1.19e-002	3.81e-003
Total Components	100.00	1.09e+001

103. Sand Mesa South Dehydrator Emissions Calculation Continued

FLASH TANK GLYCOL STREAM

Temperature: 120.00 deg. F
Flow Rate: 1.02e+000 gpm

Component	Conc. (wt%)	Loading (lb/hr)
TEG	9.15e+001	5.22e+002
Water	8.31e+000	4.74e+001
Carbon Dioxide	5.28e-003	3.01e-002
Nitrogen	1.12e-004	6.40e-004
Methane	9.14e-003	5.21e-002
Ethane	1.06e-002	6.05e-002
Propane	2.00e-002	1.14e-001
Isobutane	1.73e-002	9.85e-002
n-Butane	1.99e-002	1.14e-001
Isopentane	2.94e-002	1.68e-001
n-Pentane	2.91e-002	1.66e-001
n-Hexane	5.16e-004	2.94e-003
Other Hexanes	5.82e-002	3.32e-001
Heptanes	2.44e-002	1.39e-001
Benzene	1.11e-002	6.35e-002
Total Components	100.00	5.71e+002

REGENERATOR OVERHEADS STREAM

Temperature: 212.00 deg. F
Pressure: 14.70 psia
Flow Rate: 8.40e+002 scfh

Component	Conc. (vol%)	Loading (lb/hr)
Water	9.90e+001	3.95e+001
Carbon Dioxide	3.09e-002	3.01e-002
Nitrogen	1.03e-003	6.40e-004
Methane	1.47e-001	5.21e-002
Ethane	9.08e-002	6.05e-002
Propane	1.17e-001	1.14e-001
Isobutane	7.66e-002	9.85e-002
n-Butane	8.83e-002	1.14e-001
Isopentane	1.03e-001	1.65e-001
n-Pentane	1.02e-001	1.63e-001
n-Hexane	1.52e-003	2.91e-003
Other Hexanes	1.69e-001	3.22e-001
Heptanes	6.23e-002	1.38e-001
Benzene	3.48e-002	6.01e-002
Total Components	100.00	4.08e+001

68. South Pavillion Compression and Processing

Assumptions:

Total Power Requirement: 3300 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6\text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	7.28	31.9
CO [1]		2.0	14.55	63.7
VOC [1]		1.0	7.28	31.9
PM10 [2, 5]	0.0194	0.070	0.51	2.2
PM2.5 [2,5]	0.0194	0.070	0.51	2.2
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.04	0.2
Toluene [2]	0.000558	0.00203	0.01	0.1
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.01	0.0
Formaldehyde [1]		0.07	0.51	2.2

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average BSFC of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

58. Condensate Tank Emissions Summary

Component	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
Benzene	0.003	0.269	0.023	0.003	0.002	0.299
Toluene	0.006	0.407	0.053	0.006	0.004	0.476
Ethylbenzene	0.001	0.016	0.003	0.000	0.000	0.020
Xylenes	0.005	0.153	0.028	0.003	0.002	0.191
n-Hexane	0.026	1.617	0.173	0.021	0.014	1.850
Total HAPS	0.041	2.462	0.278	0.033	0.022	2.836
Total VOC	1.806	121.710	6.769	0.812	0.542	131.639

109. Total Emissions

Construction and Production Emissions

Species	Wellsite Emissions (tons/yr)	Facility Emissions (tons/yr)	Total Project Emissions (tons/yr)
NOx [a]	199.571	318.307	517.878
NO [b]	117.140	186.833	303.972
NO2 [c]	19.957	31.831	51.788
CO	83.908	634.773	718.680
VOC	565.620	340.747	906.367
SO2	3.229	0.000	3.229
TSP	2107.162	22.448	2129.611
PM10	574.532	22.448	596.981
PM2.5	90.908	22.448	113.357
Formaldehyde	0.056	22.172	22.228
Benzene	0.357	3.043	3.400
Toluene	0.631	0.642	1.273
Ethylbenzene	0.057	0.029	0.086
Xylenes	0.212	0.224	0.436
n-Hexane	2.538	0.088	2.626

Post-Construction Emissions

Species	Wellsite Emissions (tons/yr)	Facility Emissions (tons/yr)	Total Project Emissions (tons/yr)
NOx [a]	19.663	318.307	337.971
NO [b]	11.542	186.833	198.374
NO2 [c]	1.966	31.831	33.797
CO	21.659	634.773	656.432
VOC	438.228	340.747	778.975
SO2	0.035	0.000	0.035
TSP	1.456	22.448	23.905
PM10	1.456	22.448	23.905
PM2.5	1.456	22.448	23.905
Formaldehyde	0.014	22.172	22.186
Benzene	0.341	3.043	3.384
Toluene	0.594	0.642	1.236
Ethylbenzene	0.048	0.029	0.077
Xylenes	0.207	0.224	0.431
n-Hexane	2.442	0.088	2.530

NOTES

a NOx measured as NO_2
b Emitted NOx assumed to be 90% NO. Emissions corrected for the difference in molecular weights (30 mw NO/46 mw NO2)
c Emitted NOx assumed to be 10% NO_2.

67. Total Well Emissions Summary Continued

Sand Mesa South

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	26.445	0.668	27.114
CO	7.722	0.678	8.400
VOC	6.308	7.937	14.245
SO2	0.459	0.001	0.460
TSP	243.606	0.050	243.656
PM10	67.216	0.050	67.266
PM2.5	10.620	0.050	10.670
Formaldehyde	0.005	0.000	0.005
Benzene	0.001	0.004	0.005
Toluene	0.000	0.006	0.006
Ethylbenzene	0.000	0.000	0.000
Xylenes	0.000	0.003	0.003
n-Hexane	0.004	0.038	0.042

Coastal Extension

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	8.815	0.446	9.261
CO	2.574	0.452	3.026
VOC	2.103	5.291	7.394
SO2	0.153	0.001	0.154
TSP	81.587	0.033	81.621
PM10	22.598	0.033	22.631
PM2.5	3.617	0.033	3.650
Formaldehyde	0.002	0.000	0.002
Benzene	0.000	0.002	0.003
Toluene	0.000	0.004	0.004
Ethylbenzene	0.000	0.000	0.000
Xylenes	0.000	0.002	0.002
n-Hexane	0.001	0.025	0.027

Total Wellsite

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	179.908	19.663	199.571
CO	62.249	21.659	83.908
VOC	127.392	438.228	565.620
SO2	3.194	0.035	3.229
TSP	2105.706	1.456	2107.162
PM10	573.076	1.456	574.532
PM2.5	89.452	1.456	90.908
Formaldehyde	0.042	0.014	0.056
Benzene	0.016	0.341	0.357
Toluene	0.037	0.594	0.631
Ethylbenzene	0.009	0.048	0.057
Xylenes	0.005	0.207	0.212
n-Hexane	0.096	2.442	2.538

19. Total Wind Erosion (Pad and Pipeline)

Total Wind Erosion Emissions

Development Area	TSP Emissions (tons/year)	PM10 Emissions (tons/year)	PM2.5 Emissions (tons/year)
Pavillion	1.77	0.89	0.35
Muddy Ridge	5.40	2.70	1.08
Sand Mesa	3.03	1.51	0.61
Sand Mesa South	2.52	1.26	0.50
Coastal Extension	1.22	0.61	0.24
Total	**13.9**	**7.0**	**2.8**

25. Vehicle Tailpipe Emissions Summary

Pollutant	Construction		Drilling		Completion	
	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	0.101	0.042	0.206	2.546	0.681	1.688
CO	0.458	0.191	1.127	13.918	2.967	7.357
VOC	0.060	0.025	0.123	1.525	0.407	1.008
SO2	0.005	0.002	0.011	0.130	0.032	0.080

Pollutant	Development		Total	
	Emissions (lb/hr)	Emissions (tons/yr)	Max (lb/hr)	Emissions (tons/yr)
NOx	0.181	0.069	0.681	4.344
CO	1.282	0.487	2.967	21.954
VOC	0.109	0.041	0.407	2.600
SO2	0.010	0.004	0.032	0.216

Development Area	NOx (tons/year)	CO (tons/year)	VOC (tons/year)	SO2 (tons/year)
Pavillion	1.601	8.088	0.958	0.080
Muddy Ridge	1.372	6.933	0.821	0.068
Sand Mesa	0.915	4.622	0.547	0.045
Sand Mesa South	0.343	1.733	0.205	0.017
Coastal Extension	0.114	0.578	0.068	0.006
Total	4.344	21.954	2.600	0.216

79. Central Facility Summary

South Pavillion

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	44.901			44.901
NO [b]	26.355			26.355
NO2 [c]	4.490			4.490
CO	89.802			89.802
VOC	44.901			44.901
SO2	0.000			0.000
TSP	3.165			3.165
PM10	3.165			3.165
PM2.5	3.165			3.165
Formaldehyde	3.143			3.143
Benzene	0.258			0.258
Toluene	0.091			0.091
Ethylbenzene	0.004			0.004
Xylenes	0.032			0.032
n-Hexane				0.000

Pavillion Plant

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	23.175			23.175
NO [b]	13.602			13.602
NO2 [c]	2.317			2.317
CO	46.349			46.349
VOC	23.175			23.175
SO2	0.000			0.000
TSP	1.634			1.634
PM10	1.634			1.634
PM2.5	1.634			1.634
Formaldehyde	1.622			1.622
Benzene	0.133			0.133
Toluene	0.047			0.047
Ethylbenzene	0.002			0.002
Xylenes	0.016			0.016
n-Hexane				0.000

Muddy Ridge

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	60.833	0.329		61.162
NO [b]	35.707	0.193		35.899
NO2 [c]	6.083	0.033		6.116
CO	121.667	0.276		121.943
VOC	60.833	0.009	5.233	66.075
SO2	0.000	0.000		0.000
TSP	4.289	0.025		4.314
PM10	4.289	0.025		4.314
PM2.5	4.289	0.025		4.314
Formaldehyde	4.258	0.000		4.259
Benzene	0.349	0.000	0.267	0.616
Toluene	0.123	0.000	0.000	0.123
Ethylbenzene	0.005		0.000	0.005
Xylenes	0.043		0.000	0.043
n-Hexane		0.006	0.013	0.019

NOTES

1 NOx measured as NO_2
2 Emitted NOx assumed to be 90% NO. Emissions corrected for the difference in molecular weights (30 mw NO/46 mw NO2)
3 Emitted NOx assumed to be 10% NO_2.

80. Central Facility Summary Continued

Hidden Valley

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	23.175			23.175
NO [b]	13.602			13.602
NO2 [c]	2.317			2.317
CO	46.349			46.349
VOC	23.175			23.175
SO2	0.000			0.000
TSP	1.634			1.634
PM10	1.634			1.634
PM2.5	1.634			1.634
Formaldehyde	1.622			1.622
Benzene	0.133			0.133
Toluene	0.047			0.047
Ethylbenzene	0.002			0.002
Xylenes	0.016			0.016
n-Hexane				0.000

Shoshoni Booster

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	51.660	0.110		51.770
NO [b]	30.322	0.064		30.386
NO2 [c]	5.166	0.011		5.177
CO	103.320	0.092		103.412
VOC	51.660	0.003		51.663
SO2	0.000	0.000		0.000
TSP	3.642	0.008		3.650
PM10	3.642	0.008		3.650
PM2.5	3.642	0.008		3.650
Formaldehyde	3.616	0.000		3.616
Benzene	0.296	0.000		0.296
Toluene	0.105	0.000		0.105
Ethylbenzene	0.005			0.005
Xylenes	0.037			0.037
n-Hexane		0.002		0.002

Sand Mesa

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	139.048	0.931		139.978
NO [b]	81.615	0.546		82.161
NO2 [c]	13.905	0.093		13.998
CO	278.095	0.782		278.877
VOC	139.048	0.026	14.608	153.682
SO2	0.000	0.000		0.000
TSP	9.802	0.071		9.873
PM10	9.802	0.071		9.873
PM2.5	9.802	0.071		9.873
Formaldehyde	9.733	0.001		9.734
Benzene	0.798	0.000	0.747	1.545
Toluene	0.282	0.000	0.000	0.282
Ethylbenzene	0.013		0.000	0.013
Xylenes	0.098		0.000	0.098
n-Hexane		0.017	0.036	0.053

81. Central Facility Summary Continued

Sand Mesa South

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	65.179	0.548		65.726
NO [b]	38.257	0.321		38.578
NO2 [c]	6.518	0.055		6.573
CO	130.357	0.460		130.817
VOC	65.179	0.015	20.614	85.808
SO2	0.000	0.000		0.000
TSP	4.595	0.042		4.637
PM10	4.595	0.042		4.637
PM2.5	4.595	0.042		4.637
Formaldehyde	4.563	0.000		4.563
Benzene	0.374	0.000	1.053	1.427
Toluene	0.132	0.000	0.000	0.132
Ethylbenzene	0.006		0.000	0.006
Xylenes	0.046		0.000	0.046
n-Hexane		0.010	0.051	0.061

Coastal Extension

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	36.693	0.438		37.131
NO [b]	21.537	0.257		21.794
NO2 [c]	3.669	0.044		3.713
CO	73.386	0.368		73.754
VOC	36.693	0.012	5.947	42.652
SO2	0.000	0.000		0.000
TSP	2.587	0.033		2.620
PM10	2.587	0.033		2.620
PM2.5	2.587	0.033		2.620
Formaldehyde	2.569	0.000		2.569
Benzene	0.211	0.000	0.304	0.514
Toluene	0.074	0.000	0.000	0.074
Ethylbenzene	0.003		0.000	0.003
Xylenes	0.026		0.000	0.026
n-Hexane		0.008	0.014	0.022

Total Facility

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	444.663	2.354		447.017
NO [b]	260.998	1.382		262.380
NO2 [c]	44.466	0.235		44.702
CO	889.325	1.978		891.303
VOC	444.663	0.065	46.402	491.129
SO2	0.000	0.000		0.000
TSP	31.347	0.179		31.526
PM10	31.347	0.179		31.526
PM2.5	31.347	0.179		31.526
Formaldehyde	31.126	0.002		31.128
Benzene	2.552	0.000	2.370	4.922
Toluene	0.901	0.000	0.000	0.901
Ethylbenzene	0.040		0.000	0.040
Xylenes	0.315		0.000	0.315
n-Hexane		0.042	0.114	0.156

73. Central Facility Heater Summary

Species	Muddy Ridge (tons/yr)	Shoshoni Booster (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx [a]	0.329	0.110	0.931	0.548	0.438	2.354
CO [a]	0.276	0.092	0.782	0.460	0.368	1.978
TOC [c]	0.036	0.012	0.102	0.060	0.048	0.259
VOC	0.009	0.003	0.026	0.015	0.012	0.065
SOx [b]	0.000	0.000	0.000	0.000	0.000	0.000
TSP [c]	0.025	0.008	0.071	0.042	0.033	0.179
PM10 [c]	0.025	0.008	0.071	0.042	0.033	0.179
PM2.5 [c]	0.025	0.008	0.071	0.042	0.033	0.179
Benzene [d]	0.000	0.000	0.000	0.000	0.000	0.000
Toluene [d]	0.000	0.000	0.000	0.000	0.000	0.000
Hexane [d]	0.006	0.002	0.017	0.010	0.008	0.042
Formaldehyde [d]	0.000	0.000	0.001	0.000	0.000	0.002

77. Coastal Extension Dehydrator

Assumptions

Proposed Action Throughput Rate: 20 MMscf/day (As projected by Project Proponents)
Alternative A Throughput Rate: 30

Gas Composition: Muddy Ridge Sample

Inlet Gas Conditions: Inlet gas was assumed to be saturated at 700 psi and 80 F as reported by the project proponents

Calculations

Dehydrator emissions were simulated using GRI GlyCalc version 4.0 software

Emissions

Species	Emissions (lbs/hr)	Emissions (tons/year)
VOC	1.358	5.947
Benzene	0.069	0.304
Toluene	0.000	0.000
Ethylbenzene	0.000	0.000
Xylenes	0.000	0.000
n-Hexane	0.003	0.014
Total HAPs	0.073	0.318

Note: See Muddy Ridge GRI GlyCalc report for Coastal Extension emissions

72. Coastal Extension Central Facility Heater Emissions

Assumptions

Separator Size:	1000	MBTU/hr (Reported by Project Proponents)
Dehydrator Size:	1000	MBTU/hr (Reported by Project Proponents)
Total Heater Capacity:	2000	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour for entire year (Est.from fuel usage reported by Proponents)
	4380	hours/year
Net Low Fuel Gas Heat Content	1170	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * \text{1,000 (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * \text{1,000,000 (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{\text{2,000 (lbs/ton)} * \text{1,000 (Btu/scf - Standard Fuel Heating Value)}}$$

$$\text{VOC Emissions (tons/yr)} = \text{TOC Emissions (tons/yr)} * \text{VOC wt. fraction}$$

Species	Total Heater Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx [a]	100	0.100	0.438
CO [a]	84	0.084	0.368
TOC [c]	11	0.011	0.048
VOC	N.A.	0.003	0.012
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.008	0.033
PM10 [c]	7.6	0.008	0.033
PM2.5 [c]	7.6	0.008	0.033
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.002	0.008
Formaldehyde [d]	0.075	0.000	0.000

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

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66. Coastal Extension Compression and Processing

Assumptions:

Total Power Requirement: 3800 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	8.38	36.7
CO [1]		2.0	16.75	73.4
VOC [1]		1.0	8.38	36.7
PM10 [2, 5]	0.0194	0.070	0.59	2.6
PM2.5 [2,5]	0.0194	0.070	0.59	2.6
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.05	0.2
Toluene [2]	0.000558	0.00203	0.02	0.1
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.01	0.0
Formaldehyde [1]		0.07	0.59	2.6

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

23. Completion Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0	miles (Estimated from project area and existing road system)
Hours of Operation	155	hours per site (Weighted average for all areas - Project Proponents)
Number of Heavy Diesel Truck Trips	147	(Weighted average for all areas - Project Proponents)
Number of Pickup Trips	132	(Weighted average for all areas - Project Proponents)
Diesel Fuel sulfur content	0.05	% (Typical value)
Diesel Fuel density	7.08	lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10	miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile) * \# Trips * Trip Distance (miles)}}{\text{453.6 (g/lb) * 2000 (lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal) * 453.6 (g/lb) * Fuel Sulfur Content * 2 (S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Completion Vehicles	Heavy Haul Trucks			Heavy Duty Pickups			Total [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.510	0.040	3.03	0.171	0.013	0.681	1.714
CO	17.09	1.072	0.083	33.64	1.895	0.147	2.967	7.472
VOC [c]	4.83	0.303	0.023	1.84	0.104	0.008	0.407	1.024
SO2	0.32	0.020	0.002	0.21	0.012	0.001	0.032	0.081

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate and a 50% success rate in Sand Mesa and Coastal

67. Compression Summary

Pollutant	South Pavillion (tons/yr)	Pavillion Plant (tons/yr)	Muddy Ridge (tons/yr)	Hidden Valley (tons/yr)	Shoshoni Booster (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx [1]	44.90	23.17	60.83	23.17	51.66	139.05	65.18	36.69	444.66
CO [1]	89.80	46.35	121.67	46.35	103.32	278.10	130.36	73.39	889.33
VOC [1]	44.90	23.17	60.83	23.17	51.66	139.05	65.18	36.69	444.66
PM10 [2, 5]	3.17	1.63	4.29	1.63	3.64	9.80	4.59	2.59	31.35
PM2.5 [2,5]	3.17	1.63	4.29	1.63	3.64	9.80	4.59	2.59	31.35
SO2 [3]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzene [2]	0.26	0.13	0.35	0.13	0.30	0.80	0.37	0.21	2.55
Toluene [2]	0.09	0.05	0.12	0.05	0.10	0.28	0.13	0.07	0.90
Ethylbenzene [2]	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.04
Xylenes [2]	0.03	0.02	0.04	0.02	0.04	0.10	0.05	0.03	0.31
Formaldehyde [1]	3.14	1.62	4.26	1.62	3.62	9.73	4.56	2.57	31.13

6. Construction Equipment Fugitive Dust Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
TSP	4.188	4.151	2.768	1.038	0.692	12.837
PM15	1.872	1.706	1.137	0.427	0.284	5.426
PM10	1.404	1.280	0.853	0.320	0.213	4.070
PM2.5	0.440	0.436	0.291	0.109	0.073	1.348

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21. Construction Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0	miles (Estimated from project area and existing road system)
Hours of Construction	22	hours per site (Project proponents - Weighted average for all areas)
Number of Heavy Diesel Truck Trips	3	(Project proponents - Weighted average for all areas)
Number of Pickup Trips	3	(Project proponents - Weighted average for all areas)
Diesel Fuel sulfur content	0.05	% (Typical value)
Diesel Fuel density	7.08	lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10	miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile)} * \text{Number of Trips} * \text{Trip Distance (miles)}}{453.6 \text{ (g/lb)} * 2000 \text{ (lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal)} * 453.6 \text{ (g/lb)} * \text{Fuel Sulfur Content} * 2 \text{ (S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Construction Vehicles	Heavy Haul Trucks			Heavy Duty Pickups			Total [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.073	0.001	3.03	0.027	0.000	0.101	0.043
CO	17.09	0.154	0.002	33.64	0.303	0.003	0.458	0.196
VOC [c]	4.83	0.044	0.000	1.84	0.017	0.000	0.060	0.026
SO2	0.32	0.003	0.000	0.21	0.002	0.000	0.005	0.002

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate

40. Construction Emissions Summary

Pavillion

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		1.594	0.234	7.983		9.812
CO		8.060	0.056	1.830		9.946
VOC		0.954	0.011	0.235	55.606	56.806
SO2		0.079	0.007	0.135		0.221
TSP	317.840		0.018	0.133		317.992
PM10	84.595		0.018	0.133		84.747
PM2.5	13.088		0.018	0.129		13.236
Formaldehyde			0.0048			0.005
Benzene					0.007	0.007
Toluene					0.037	0.037
Ethylbenzene					0.009	0.009
Xylenes					0.005	0.005
n-Hexane					0.045	0.045

Muddy Ridge

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		1.366	0.729	62.208		64.303
CO		6.909	0.197	14.256		21.361
VOC		0.818	0.034	1.827	42.667	45.346
SO2		0.068	0.020	1.048		1.137
TSP	815.53		0.048	1.040		816.618
PM10	220.04		0.048	1.040		221.129
PM2.5	33.35		0.048	1.009		34.403
Formaldehyde			0.019			0.019
Benzene					0.006	0.006
Toluene					0.000	0.000
Ethylbenzene					0.000	0.000
Xylenes					0.000	0.000
n-Hexane					0.034	0.034

Sand Mesa

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		0.911	0.486	69.120		70.517
CO		4.606	0.131	15.840		20.577
VOC		0.545	0.022	2.030	14.222	16.820
SO2		0.045	0.013	1.165		1.224
TSP	644.744		0.032	1.155		645.931
PM10	176.213		0.032	1.155		177.400
PM2.5	26.429		0.032	1.121		27.582
Formaldehyde			0.012			0.012
Benzene					0.002	0.002
Toluene					0.000	0.000
Ethylbenzene					0.000	0.000
Xylenes					0.000	0.000
n-Hexane					0.011	0.011

41. Construction Emissions Summary Continued

Sand Mesa South

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		0.342	0.182	25.920		26.444
CO		1.727	0.049	5.940		7.716
VOC		0.204	0.008	0.761	5.333	6.308
SO2		0.017	0.005	0.437		0.459
TSP	243.222		0.012	0.433		243.667
PM10	66.786		0.012	0.433		67.231
PM2.5	10.191		0.012	0.420		10.623
Formaldehyde			0.005			0.005
Benzene					0.001	0.001
Toluene					0.000	0.000
Ethylbenzene					0.000	0.000
Xylenes					0.000	0.000
n-Hexane					0.004	0.004

Coastal Extension

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		0.228	0.121	17.280		17.629
CO		1.151	0.033	3.960		5.144
VOC		0.136	0.006	0.508	3.556	4.205
SO2		0.011	0.003	0.291		0.306
TSP	162.863		0.008	0.289		163.160
PM10	44.892		0.008	0.289		45.189
PM2.5	6.943		0.008	0.280		7.231
Formaldehyde			0.003			0.003
Benzene					0.001	0.001
Toluene					0.000	0.000
Ethylbenzene					0.000	0.000
Xylenes					0.000	0.000
n-Hexane					0.003	0.003

Total Construction

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		4.441	1.753	182.511		188.705
CO		22.453	0.466	41.826		64.744
VOC		2.657	0.081	5.361	121.384	129.484
SO2		0.221	0.049	3.076		3.346
TSP	2184.200		0.118	3.050		2187.369
PM10	592.527		0.118	3.050		595.695
PM2.5	89.998		0.118	2.960		93.075
Formaldehyde			0.043			0.043
Benzene					0.017	0.017
Toluene					0.037	0.037
Ethylbenzene					0.009	0.009
Xylenes					0.005	0.005
n-Hexane					0.098	0.098

78. Central Dehydrator Summary

Species	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
VOC	5.233	14.608	20.614	5.947	46.402
Benzene	0.267	0.747	1.053	0.304	2.370
Toluene	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	0.000	0.000	0.000	0.000	0.000
Xylenes	0.000	0.000	0.000	0.000	0.000
n-Hexane	0.013	0.036	0.051	0.014	0.114
Total HAPs	0.280	0.782	1.104	0.318	2.484

24. Development & Reclamation Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0	miles (Estimated from project area and existing road system)
Hours of Operation	20	hours per site (Weighted average for all areas - Project Proponents)
Number of Heavy Diesel Truck Trips	3	(Weighted average for all areas - Project Proponents)
Number of Pickup Trips	10	(Weighted average for all areas - Project Proponents)
Diesel Fuel sulfur content	0.05	% (Typical value)
Diesel Fuel density	7.08	lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10	miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile)} * \text{\# Trips} * \text{Trip Distance (miles)}}{453.6\ \text{(g/lb)} * 2000\ \text{(lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal)} * 453.6\ \text{(g/lb)} * \text{Fuel Sulfur Content} * 2\ \text{(S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Development Vehicles	Heavy Haul Trucks			Heavy Duty Pickups			Total [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.081	0.001	3.03	0.100	0.001	0.181	0.071
CO	17.09	0.170	0.002	33.64	1.112	0.011	1.282	0.500
VOC [c]	4.83	0.048	0.000	1.84	0.061	0.001	0.109	0.042
SO2	0.32	0.003	0.000	0.21	0.007	0.000	0.010	0.004

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate

39. Well Development Venting Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
VOC	55.606	42.667	14.222	5.333	3.556	121.384
Benzene	0.007	0.006	0.002	0.001	0.001	0.017
Toluene	0.037	0.000	0.000	0.000	0.000	0.037
Ethylbenzene	0.009	0.000	0.000	0.000	0.000	0.009
Xylenes	0.005	0.000	0.000	0.000	0.000	0.005
n-Hexane	0.045	0.034	0.011	0.004	0.003	0.098

Note: Assumes a 50% success rate for Sand Mesa and Coastal

32. Drill Rig Emissions Summary

Assumptions: 2 to 4 rigs will be in operation at any one time
1 rig will operate part of the year in Pavillion
1 rig will operate full time in Muddy Ridge
1or 2 rigs will operate full time in Sand Mesa, Sand Mesa South or Coastal Extension

Short-Term Emissions (lbs/hr)

Species	Pavillion	Muddy Ridge	Sand Mesa	Sand Mesa South	Coastal Extension	Maximum (lbs/hr)
NOx	5.28	14.40	14.40	*	*	14.40
CO	1.21	3.30	3.30	*	*	3.30
VOC [b]	0.16	0.42	0.42	*	*	0.42
PM10 [c]	0.09	0.24	0.24	*	*	0.24
PM2.5 [d]	0.09	0.23	0.23	*	*	0.23
SO2	0.09	0.24	0.24	*	*	0.24

* Identical to Sand Mesa - One or two rigs covers all three areas

Annual Emissions (tons/yr)

Species	Pavillion	Muddy Ridge	Sand Mesa	Sand Mesa South	Coastal Extension	Total (tons/yr)
NOx	7.983	62.208	69.120	25.920	17.280	182.511
CO	1.830	14.256	15.840	5.940	3.960	41.826
VOC [b]	0.235	1.827	2.030	0.761	0.508	5.361
PM10 [c]	0.133	1.040	1.155	0.433	0.289	3.050
PM2.5 [d]	0.129	1.009	1.121	0.420	0.280	2.960
SO2	0.135	1.048	1.165	0.437	0.291	3.076

22. Drilling Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0	miles (Estimated from project area and existing road system)
Hours of Operation	650	hours per site (Time weighted average - project proponents)
Number of Heavy Diesel Truck Trips	156	(Area weighted average - project proponents)
Number of Pickup Trips	250	(Area weighted average - project proponents)
Diesel Fuel sulfur content	0.05	% (Typical value)
Diesel Fuel density	7.08	lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10	miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile) * \# Trips * Trip Distance (miles)}}{\text{453.6 (g/lb) * 2000 (lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal) * 453.6 (g/lb) * Fuel Sulfur Content * 2 (S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Drilling Vehicles	Heavy Haul Trucks			Heavy Duty Pickups			Total [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.129	0.042	3.03	0.077	0.025	0.206	2.613
CO	17.09	0.271	0.088	33.64	0.856	0.278	1.127	14.285
VOC [c]	4.83	0.077	0.025	1.84	0.047	0.015	0.123	1.565
SO2	0.32	0.005	0.002	0.21	0.005	0.002	0.011	0.134

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate

20. Fugitive Dust Summary

TSP Fugitive Dust Summary

Development Area	Construction		Pipeline		Reclamation		Unpaved Road		Wind Erosion	Max	Total
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	tons/yr	lbs/hr	tons/yr
Pavillion	37.40	4.188	22.18	2.484	18.70	2.094	404.82	307.28	1.80	404.82	317.84
Muddy Ridge	24.71	4.151	22.18	2.129	14.69	2.116	230.56	801.72	5.42	230.56	815.53
Sand Mesa	24.71	2.768	22.18	0.710	14.69	1.410	279.10	636.83	3.02	279.10	644.74
Sand Mesa South	24.71	1.038	22.18	0.355	14.69	0.529	279.10	238.81	2.49	279.10	243.22
Coastal Extension	24.71	0.692	22.18	0.177	14.69	0.353	279.10	159.21	2.43	279.10	162.86
Maximum/Total	**37.40**	**12.837**	**22.18**	**5.856**	**18.70**	**6.502**	**404.82**	**2143.85**	**15.15**	**404.82**	**2184.20**

PM10 Fugitive Dust Summary

Development Area	Construction		Pipeline		Reclamation		Unpaved Road		Wind Erosion	Max	Total
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	tons/yr	lbs/hr	tons/yr
Pavillion	12.54	1.404	7.14	0.799	6.27	0.702	104.64	80.79	0.90	104.64	84.60
Muddy Ridge	7.62	1.280	7.14	0.685	4.53	0.652	60.33	214.72	2.71	60.33	220.04
Sand Mesa	7.62	0.853	7.14	0.228	4.53	0.435	73.46	173.19	1.51	73.46	176.21
Sand Mesa South	7.62	0.320	7.14	0.114	4.53	0.163	73.46	64.94	1.24	73.46	66.79
Coastal Extension	7.62	0.213	7.14	0.057	4.53	0.109	73.46	43.30	1.22	73.46	44.89
Maximum/Total	**12.54**	**4.070**	**7.14**	**1.884**	**6.27**	**2.061**	**104.64**	**576.94**	**7.58**	**104.64**	**592.53**

PM2.5 Fugitive Dust Summary

Development Area	Construction		Pipeline		Reclamation		Unpaved Road		Wind Erosion	Max	Total
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	tons/yr	lbs/hr	tons/yr
Pavillion	3.93	0.440	2.33	0.261	1.96	0.220	15.29	11.81	0.36	15.29	13.09
Muddy Ridge	2.59	0.436	2.33	0.224	1.54	0.222	8.82	31.38	1.08	8.82	33.35
Sand Mesa	2.59	0.291	2.33	0.075	1.54	0.148	10.74	25.31	0.60	10.74	26.43
Sand Mesa South	2.59	0.109	2.33	0.037	1.54	0.056	10.74	9.49	0.50	10.74	10.19
Coastal Extension	2.59	0.073	2.33	0.019	1.54	0.037	10.74	6.33	0.49	10.74	6.94
Maximum/Total	**3.93**	**1.348**	**2.33**	**0.615**	**1.96**	**0.683**	**15.29**	**84.32**	**3.03**	**15.29**	**90.00**

45. Production Heater Summary

Pollutant	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx [a]	11.28	5.42	7.34	2.63	0.66	27.32
CO [a]	9.47	4.55	6.16	2.21	0.55	22.95
TOC [c]	1.24	0.60	0.81	0.29	0.07	3.01
VOC	0.33	0.15	0.20	0.07	0.02	0.78
SOx [b]	0.00	0.00	0.00	0.00	0.00	0.00
TSP [c]	0.86	0.41	0.56	0.20	0.05	2.08
PM10 [c]	0.86	0.41	0.56	0.20	0.05	2.08
PM2.5 [c]	0.86	0.41	0.56	0.20	0.05	2.08
Benzene [d]	0.00	0.00	0.00	0.00	0.00	0.00
Toluene [d]	0.00	0.00	0.00	0.00	0.00	0.00
Hexane [d]	0.20	0.10	0.13	0.05	0.01	0.49
Formaldehyde [d]	0.01	0.00	0.01	0.00	0.00	0.02

28. Heavy Equipment Tailpipe Emissions Summary

Development Area	NOx (tons/year)	CO (tons/year)	VOC (tons/year)	PM10 (tons/year)	PM2.5 (tons/year)	SO2 (tons/year)	Formaldehyde (tons/year)
Pavillion	0.234	0.056	0.011	0.018	0.018	0.007	0.005
Muddy Ridge	0.729	0.197	0.034	0.048	0.048	0.020	0.019
Sand Mesa	0.486	0.131	0.022	0.032	0.032	0.013	0.012
Sand Mesa South	0.182	0.049	0.008	0.012	0.012	0.005	0.005
Coastal Extension	0.121	0.033	0.006	0.008	0.008	0.003	0.003
Total	1.753	0.466	0.081	0.118	0.118	0.049	0.043

Buys & Associates, Inc.
Environmental Consultants

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Date: 7/8/2004

62. Hidden Valley Compression and Processing

Assumptions:

Total Power Requirement: 2400 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	5.29	23.2
CO [1]		2.0	10.58	46.3
VOC [1]		1.0	5.29	23.2
PM10 [2, 5]	0.0194	0.070	0.37	1.6
PM2.5 [2,5]	0.0194	0.070	0.37	1.6
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.03	0.1
Toluene [2]	0.000558	0.00203	0.01	0.0
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.00	0.0
Formaldehyde [1]		0.07	0.37	1.6

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

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34. Muddy Ridge Produced Gas Characteristics (MR 24-42)

Gas Heat Value (wet): 1267 Btu/scf

C1-C2 Wt. Fraction:	0.735
VOC Wt. Fraction:	0.250
Non-HC Wt. Fraction:	0.015
Total:	1.000

COMPONENT	MOLE PERCENT	COMPONENT MOLE WEIGHT (lb/lb-mole)	NET MOLE WEIGHT (lb/lb-mole)	WEIGHT FRACTION	GROSS HEATING VALUE (BTU/scf)	NET DRY HEATING VALUE (BTU/scf)	LOWER HEATING VALUE (BTU/scf)	NET LOW HEATING VALUE (BTU/scf)
Methane	79.318	16.043	12.725	0.590	1010.000	801.112	910.000	721.794
Ethane	10.453	30.070	3.143	0.146	1769.800	184.997	1618.000	169.130
Propane	3.927	44.097	1.732	0.080	2516.200	98.811	2316.000	90.949
i-Butane	1.456	58.123	0.846	0.039	3252.100	47.351	3005.000	43.753
n-Butane	1.069	58.123	0.621	0.029	3262.400	34.875	3013.000	32.209
i-Pentane	1.136	72.150	0.820	0.038	4000.900	45.450	3698.000	42.009
n-Pentane	0.759	72.150	0.548	0.025	4008.800	30.427	3708.000	28.144
Hexanes+	0.865	86.177	0.745	0.035	4756.200	41.141	4404.000	38.095
Heptanes	0.080	100.204	0.080	0.004	5502.500	4.402	5100.000	4.080
Octanes	0.000	114.231	0.000	0.000	6249.100	0.000		0.000
Nonanes	0.000	128.258	0.000	0.000	6996.400	0.000		0.000
Decanes	0.000	142.285	0.000	0.000	7743.200	0.000		0.000
Benzene	0.001	78.120	0.001	0.000	3715.500	0.037		0.000
Toluene	0.000	92.130	0.000	0.000	4444.600	0.000		0.000
Ethylbenzene	0.000	106.160	0.000	0.000	5191.500	0.000		0.000
Xylenes	0.000	106.160	0.000	0.000	5183.500	0.000		0.000
n-Hexane	0.005	86.177	0.004	0.000	4756.200	0.238		0.000
Helium	0.000	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	0.605	28.013	0.169	0.008	0.000	0.000	0.000	0.000
Carbon Dioxide	0.328	44.010	0.144	0.007	0.000	0.000	0.000	0.000
Oxygen	0.000	32.000	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	0.000	34.080	0.000	0.000	637.100	0.000	588.000	0.000
TOTAL	100.000		21.579	1.000		1288.841		1170.162

Relative Mole Weight (lb/lb-mole) = [Mole Percent * Molecular weight (lb/lb-mole)] / 100

Weight Fraction = Net Mole Weight / Total Mole Weight

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27. Muddy Ridge, Sand Mesa and Coastal Construction Heavy Equipment Tailpipe Emissions

Assumptions:

Hours of Operation	28	hours/site (Project Proponents)
Development Rate	25	wells per year
Load Factor	0.5	(Assumed typical value)
Backhoe Size	84	hp (Contractor)
Backhoe Utilization	10	percent
Motor Grader Size	170	hp (Contractor)
Motor Grader Utilization	50	percent
Scraper Size	330	hp (Contractor)
Scraper Utilization	75	percent
D8 Dozer Size	305	hp (Contractor)
D8 Dozer Utilization	50	percent

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/hp-hr) * Rated Hp (hp)* Operating Hours (hrs) * Load Factor (Dimensionless) * Utilization}}{\text{453.6 (g/lb) * 2000 (lb/tons)}}$$

Heavy Const. Vehicles	Backhoe			Grader			Scraper		
	E. Factor [a] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)	E. Factor [b] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)	E. Factor [a] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)
NOx	8.15	0.075	0.026	7.14	0.669	0.234	8.15	2.223	0.778
CO	2.28	0.021	0.007	1.54	0.144	0.051	2.28	0.622	0.218
VOC [c]	0.37	0.003	0.001	0.36	0.034	0.012	0.37	0.101	0.035
PM10 [d]	0.5	0.005	0.002	0.63	0.059	0.021	0.5	0.136	0.048
PM2.5 [d]	0.5	0.005	0.002	0.63	0.059	0.021	0.5	0.136	0.048
SO2	0.22	0.002	0.001	0.22	0.021	0.007	0.22	0.060	0.021
Formaldehyde	0.22	0.002	0.001	0.12	0.011	0.004	0.22	0.060	0.021

Heavy Const. Vehicles	D8 Dozer			Total	
	E. Factor [a] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)
NOx	8.15	1.370	0.480	4.338	1.518
CO	2.28	0.383	0.134	1.171	0.410
VOC [c]	0.37	0.062	0.022	0.200	0.070
PM10 [d]	0.5	0.084	0.029	0.284	0.099
PM2.5 [d]	0.5	0.084	0.029	0.284	0.099
SO2	0.22	0.037	0.013	0.120	0.042
Formaldehyde	0.22	0.037	0.013	0.110	0.039

a AP-42 Volume II, Mobile Sources, Nonroad Vehicles, Table 11-7.1 Off-highway truck
b AP-42 Volume II, Mobile Sources, Nonroad Vehicles, Table 11-7.1 Motor Grader
c Emission Factor represents total Hydrocarbon Emissions
d All emitted particulate matter assumed to be PM2.5
e Assumes a proponet specified maximum development rate

10. Muddy Ridge, Sand Mesa and Coastal Reclamation Fugitive Dust Emissions

Assumptions:

Hours of Construction	3	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	24	hours per well pad
Pieces of Equipment	1	Grader @ 50% utilization (Project Proponent)
	1	Backhoe @ 10% utilization
	1	Dozer @ 50% utilization
Equivalent Equipment Utilization	1.1	
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	34	percent (Composit soil sample)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 13.36 lbs TSP/hour/piece of equipment

Emissions = 5.49 lbs PM15/hour/piece of equipment

Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	14.69	0.1763	4.408
PM15	6.04	0.0725	1.811
PM10	4.53	0.0543	1.359
PM2.5	1.54	0.0185	0.463

a Assumes Proponent specified equipment utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

4. Muddy Ridge, Sand Mesa and Coastal Construction Fugitive Dust Emissions

Assumptions:

Hours of Construction	3.5	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	28	hours per well pad
Pieces of Equipment	4	- 1 Grader @ 50% utilization (Project Proponent)
		- 1 Backhoe @ 10% utilization
		- 1 Scraper @ 75% utilization
		- 1 D8 Dozer @ 50% utilization
Equivalent Equipment Utilization	1.85	
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	34	percent (Composit well pad soil sample analysis)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 13.36 lbs TSP/hour/piece of equipment

Emissions = 5.49 lbs PM15/hour/piece of equipment

Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	24.71	0.3459	8.649
PM15	10.16	0.1422	3.554
PM10	7.62	0.1066	2.666
PM2.5	2.59	0.0363	0.908

a Assumes Proponent specified equipment utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

Buys & Associates, Inc. **Environmental Consultants**	Project: Wind River EIS Emission Inventory Date: 7/8/2004

68. Muddy Ridge Central Facility Heater Emissions

Assumptions

Separator Size:	0	MBTU/hr (Reported by Project Proponents)
Dehydrator Size:	1500	MBTU/hr (Reported by Project Proponents)
Total Heater Capacity:	1500	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour for entire year (Est.from fuel usage reported by Proponents)
	4380	hours/year
Net Low Fuel Gas Heat Content	1170	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

Fuel Consumption (MMscf/yr) = Heater Size (MBtu/hr) * 1,000 (Btu/MBtu) * Hours of Operation (hrs/yr) / Fuel Heat Value (Btu/scf) * 1,000,000 (scf/MMscf)

NOx/CO/TOC Emissions (tons/yr) = AP-42 E.Factor (lbs/MMscf) * Fuel Consumption (MMscf/yr) * Fuel heating Value (Btu/scf) / 2,000 (lbs/ton) * 1,000 (Btu/scf - Standard Fuel Heating Value)

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Species	Total Heater Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx [a]	100	0.075	0.329
CO [a]	84	0.063	0.276
TOC [c]	11	0.008	0.036
VOC	N.A.	0.002	0.009
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.006	0.025
PM10 [c]	7.6	0.006	0.025
PM2.5 [c]	7.6	0.006	0.025
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.001	0.006
Formaldehyde [d]	0.075	0.000	0.000

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

74. Muddy Ridge Dehydrator

Assumptions

Proposed Action Throughput Rate: 20 MMscf/day (As projected by Project Proponents)
Alternative A Throughput Rate: 26.4

Gas Composition: Muddy Ridge Sample

Inlet Gas Conditions: Inlet gas was assumed to be saturated at 700 psi and 80 F
as reported by the project proponents

Calculations

Dehydrator emissions were simulated using GRI GlyCalc version 4.0 software

Emissions

Species	Emissions (lbs/hr)	Emissions (tons/year)
VOC	1.195	5.233
Benzene	0.061	0.267
Toluene	0.000	0.000
Ethylbenzene	0.000	0.000
Xylenes	0.000	0.000
n-Hexane	0.003	0.013
Total HAPs	0.064	0.280

37. Muddy Ridge Well Development Venting

Assumptions: Following Completion, Wells are Vented prior to connnection to the gathering pipeline

Venting Period 24 hours (Project Proponents)

Amount of Vented Gas: 0.5 MMscf (Average Volume Estimated by Proponents)

Development Rate: 12 Wells per year (Project Proponents)

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/day)	COMPONENT FLOW RATE (lb/hr)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	79.318	12.725	0.590	396.590	698.579	100.595
Ethane	30.07	10.453	3.143	0.146	52.265	172.557	24.848
Propane	44.097	3.927	1.732	0.080	19.635	95.067	13.690
i-Butane	58.123	1.456	0.846	0.039	7.280	46.459	6.690
n-Butane	58.123	1.069	0.621	0.029	5.345	34.110	4.912
i-Pentane	72.15	1.136	0.820	0.038	5.680	44.996	6.479
n-Pentane	72.15	0.759	0.548	0.025	3.795	30.063	4.329
Hexanes	86.177	0.865	0.745	0.035	4.325	40.923	5.893
Heptanes	100.204	0.080	0.080	0.004	0.400	4.401	0.634
Octanes	114.231	0.000	0.000	0.000	0.000	0.000	0.000
Nonanes	128.258	0.000	0.000	0.000	0.000	0.000	0.000
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.005	0.043	0.006
Toluene	92.13	0.000	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	106.16	0.000	0.000	0.000	0.000	0.000	0.000
Xylenes	106.16	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	86.177	0.005	0.004	0.000	0.025	0.237	0.034
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	0.605	0.169	0.008	3.025	9.304	1.340
Carbon Dioxide	44.01	0.328	0.144	0.007	1.640	7.925	1.141
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**9.298**	**5.397**	**0.250**	**46.490**	**296.298**	**42.667**
HAP SUBTOTAL		**0.006**	**0.005**	**0.000**	**0.030**	**0.279**	**0.040**
TOTAL		**100**	**21.579**	**1.000**	**500**	**1184.663**	**170.592**

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43. Muddy Ridge Production Heater Emissions

Assumptions

Number of new producing wells	66	(Reported by Project Proponents)
Separator Size	750	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour (Est.from fuel usage reported by Proponents)
	6	months/year (Nov. thru April - Project Proponents)
	2190	hours/year
Net Low Fuel Gas Heat Content	1267	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

Fuel Consumption (MMscf/yr) = $\dfrac{\text{Heater Size (MBtu/hr) * 1,000 (Btu/MBtu) * Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf) * 1,000,000 (scf/MMscf)}}$

NOx/CO/TOC Emissions (tons/yr) = $\dfrac{\text{AP-42 E.Factor (lbs/MMscf) * Fuel Consumption (MMscf/yr) * Fuel heating Value (Btu/scf)}}{\text{2,000 (lbs/ton) * 1,000 (Btu/scf - Standard Fuel Heating Value)}}$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Pollutant	Separator Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr/well)	Emissions [e] (tons/yr)
NOx [a]	100	0.019	5.420
CO [a]	84	0.016	4.553
TOC [c]	11	0.002	0.596
VOC	N.A.	0.001	0.149
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.001	0.412
PM10 [c]	7.6	0.001	0.412
PM2.5 [c]	7.6	0.001	0.412
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.098
Formaldehyde [d]	0.075	0.000	0.004

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

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61. Muddy Ridge Compression and Processing

Assumptions:

Total Power Requirement: 6300 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	13.89	60.8
CO [1]		2.0	27.78	121.7
VOC [1]		1.0	13.89	60.8
PM10 [2, 5]	0.0194	0.070	0.98	4.3
PM2.5 [2,5]	0.0194	0.070	0.98	4.3
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.08	0.3
Toluene [2]	0.000558	0.00203	0.03	0.1
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.01	0.0
Formaldehyde [1]		0.07	0.97	4.3

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

30. Muddy Ridge Drill Rig Engine Emissions

Assumptions:

Hours of Operation	720	hours/well (30 days on average @ 24 hrs/day - Project Proponents)
Development Rate	12	wells/year
Load Factor	0.4	(Assumed typical value)
Rig Size	1500	hp (Drilling Contractor)
Diesel Fuel Sulfur Content	0.05	% (typical value)

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (lb/hp-hr) * Rated Horsepower (hp)* Operating Hours (hrs) * Load Factor (Dimensionless)}}{\text{2000 (lb/tons)}}$$

SO2 E. Factor (lb/hp-hr) = Fuel sulfur content * 0.00809

Species	Drill Rig Emissions			
	E. Factor [d] (lb/MMBtu)	E. Factor [a] (lb/hp-hr)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx		0.024	14.400	62.21
CO		0.0055	3.300	14.26
VOC [b]		0.000705	0.423	1.83
PM10 [c]	0.0573	0.0004011	0.241	1.04
PM2.5 [d]	0.0556	0.0003892	0.234	1.01
SO2		0.0004045	0.243	1.05

a AP-42 Volume I, Large Stationary Diesel Engines Table 3.4-1, 10/96
b Emission Factor represents total Hydrocarbon Emissions
c PM10 Emission Factor determined from Table 3.4-2, 10/96
d PM2.5 Emission Factor estimated as PM3.0 (filterable + condensable) from Table 3.4-2, 10/96
e Conversion from lb/MMBtu to lb/hp-hr assumes a BSFC of 7,000 BTU/hp-hr (Table 3.4-1, 10/96)
f Assumes a Development rate as stated by the proponents (Summarized in page 1)

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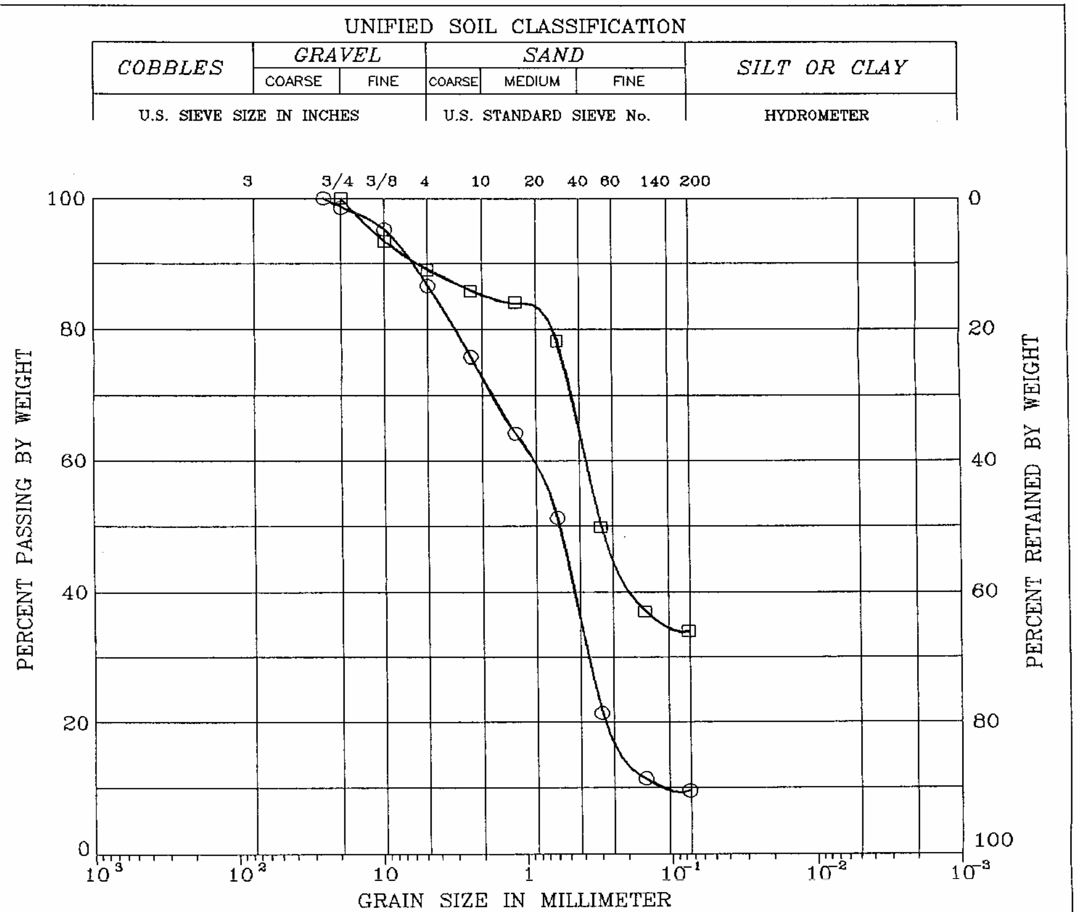
5. Muddy Ridge Road and Pad Silt Content



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
○	Road	–			Well-Graded Sand (SW) 13% grvl, 77% sand, 10% silt
□	Pad	–			Silty Sand (SM) 11% grvl, 55% sand, 34% silt

GRAIN SIZE DISTRIBUTION

Muddy Ridge Field, Wyoming

Project No.
For Buys & Assoc.

Resource Engineering, Inc.

47. Muddy Ridge Condensate Storage Tank Emissions

Assumptions:

Average Condensate Production Rate :	1.7	bbls per day (Average production for existing wells - WOGCC)
Expected Successful Producting Wells:	66	
Predicted Condensate Production:	112.2	bbls/day
Separator Conditions :		200 psi and 130 F (Specified by Proponent)
Condensate Composition:		Average of 4 samples from Muddy Ridge wells

Calculations:

Stock tank flash emissions estimated with E&P Tanks software

Emissions:

Component	Flash Emissions (tons/yr)
Benzene	0.355
Toluene	0.537
Ethylbenzene	0.021
Xylenes	0.202
n-Hexane	2.134
Total HAPS	3.250
Total VOC	160.657

Buys & Associates, Inc.
Environmental Consultants

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14. Muddy Ridge Unpaved Road Fugitive Dust Emissions

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity
Const. & Drilling Activities				
Semi: Rig Transport	60,000	15		
Haul Truck: Water/fuel	20,000	83		
Haul Truck: Other	48,000	48		
HD Pickup Truck: Misc.	7,000	295		
Total Const. & Drilling	15,712	441	20	720

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	7.09	86.89	31.28	375.4
PM10	1.95	23.85	8.59	103.0
PM2.5	0.28	3.49	1.25	15.1

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity
Completion Activities				
Haul Truck: Water	20,000	40		
Haul Truck: Other	48,000	159		
HD Pickup Truck: Misc.	7,000	185		
Total Completion	25,331	384	20	300

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	9.01	230.56	34.58	415.0
PM10	2.36	60.33	9.05	108.6
PM2.5	0.34	8.82	1.32	15.9

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity
Development & Reclamation				
Haul Truck: Water	20,000	0		
Haul Truck: Other	48,000	3		
HD Pickup Truck: Misc.	7,000	10		
Total Dev. & Reclamation	16,462	13	20	30

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	7.26	62.92	0.94	11.3
PM10	1.98	17.19	0.26	3.1
PM2.5	0.29	2.51	0.04	0.5

* Const. & Drilling Assumes 30 24-hr days
Completion assumes 30 10-hr days
Development & Reclamation assumes 3 10-hr days

Muddy Ridge Total

Particulate Matter Scale	Emission Factor (lbs/VMT)	Max Emissions (lbs/hr)	Total Emissions (Tons/well)	Total Emissions (Tons/year)
TSP		230.56	66.81	801.7
PM10		60.33	17.89	214.7
PM2.5		8.82	2.62	31.4

52. Muddy Ridge Well Blowdown Emissions

Assumptions:		During Production, a percentage of the wells are periodically blown down to unload fluids
# of New Producing Wells	66	
% Wells Requiring Blowdown	20	% (Estimated by Project Proponents)
# of Blowdown wells	13.2	Wells
Blowdown Frequency	1	per week for a period of 1 hour each (Project Proponents)
Blowdown Volume	15	Mscf/event (Estimated from Production Data)
Annual Blowdown Volume	10.3	MMscf/year

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/hr)	COMPONENT FLOW RATE (lb/hr/well)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	79.318	12.725	0.590	11.898	502.977	172.622
Ethane	30.07	10.453	3.143	0.146	1.568	124.241	42.640
Propane	44.097	3.927	1.732	0.080	0.589	68.448	23.491
i-Butane	58.123	1.456	0.846	0.039	0.218	33.450	11.480
n-Butane	58.123	1.069	0.621	0.029	0.160	24.559	8.429
i-Pentane	72.15	1.136	0.820	0.038	0.170	32.397	11.119
n-Pentane	72.15	0.759	0.548	0.025	0.114	21.646	7.429
Hexanes	86.177	0.865	0.745	0.035	0.130	29.464	10.112
Heptanes	100.204	0.080	0.080	0.004	0.012	3.169	1.087
Octanes	114.231	0.000	0.000	0.000	0.000	0.000	0.000
Nonanes	128.258	0.000	0.000	0.000	0.000	0.000	0.000
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.000	0.031	0.011
Toluene	92.13	0.000	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	106.16	0.000	0.000	0.000	0.000	0.000	0.000
Xylenes	106.16	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	86.177	0.005	0.004	0.000	0.001	0.170	0.058
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	0.605	0.169	0.008	0.091	6.699	2.299
Carbon Dioxide	44.01	0.328	0.144	0.007	0.049	5.706	1.958
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**9.298**	**5.397**	**0.250**	**1.395**	**213.335**	**73.216**
HAP SUBTOTAL		**0.006**	**0.005**	**0.000**	**0.001**	**0.201**	**0.069**
TOTAL		**100.002**	**21.579**	**1.000**	**15**	**852.958**	**292.735**

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17. Wind Erosion Fugitive Dust Emissions From Well & Facility Pads

Assumptions

Threshold Friction Velocity U_t* 1.02 m/s (2.28 mph) for well pads (AP-42 Table 13.2.5-2 Overburden - Western Surface Coal Mine)

Exposed Surface Type Flat

Fastest Mile Wind Speed U_{10}^+ 23.2 meters/sec (52 mph) reported as fastest 2-minute wind speed for Lander, WY (2002)

Number soil of disturbances 2 for well and facility pads (disturbance at construction and reclamation)

Equations

Friction Velocity $U^* = 0.053\ U_{10}^+$

Erosion Potential P (g/m^2/period) = $58*(U^*-U_t^*)^2 + 25*(U^*-U_t^*)$ for $U^*>U_t^*$, P = 0 for $U^*< U_t^*$

$$\text{Emissions (tons/year)} = \frac{\text{Erosion Potential(g/m}^2\text{/period)*Disturbed Area(m}^2\text{)*Disturbances/year*(k)* Number of Wells/year}}{\text{(453.6 g/lb)*2000 lbs/ton/Develop Period*Total Number of Wells}}$$

Particle Size Multiplier (k)		
30 um	**<10 um**	**<2.5 um**
1.0	0.5	0.2

Maxium U_{10}^+ Wind Speed (m/s)	**Maximum U* Friction Velocity m/s**	**Well/Pipeline U_t* Threshold Velocity[a] m/s**	**Erosion Potential g/m^2**
23.20	1.23	1.02	7.79

Wind Erosion Emissions

Development Area	**Disturbance (Acres)**	**Disturbance (meters^2)**	**TSP Emissions (tons/year)**	**PM10 Emissions (tons/year)**	**PM2.5 Emissions (tons/year)**
Pavillion	264	1,068,368	1.22	0.61	0.24
Muddy Ridge	174	705,366	2.15	1.08	0.43
Sand Mesa	345	1,396,973	1.41	0.71	0.28
Sand Mesa S.	126	511,319	0.54	0.27	0.11
Coastal	86	346,208	0.36	0.18	0.07
Total	**995**	**4,028,234**	**5.7**	**2.8**	**1.1**

2. Pavillion Construction Fugitive Dust Emissions

Assumptions:

Hours of Construction	2	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	16	hours per well pad
Pieces of Equipment	2	- 1 Backhoe & 1 Grader each @ 100% utilization (Project Proponent)
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	45	percent (Composit Soil Sample from Pavillion Well Pads)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 18.70 lbs TSP/hour/piece of equipment

Emissions = 8.36 lbs PM15/hour/piece of equipment

Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	37.40	0.2992	4.188
PM15	16.72	0.1337	1.872
PM10	12.54	0.1003	1.404
PM2.5	3.93	0.0314	0.440

a Assumes 100% utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

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36. Pavillion Well Development Venting

Assumptions: Following Completion, Wells are Vented prior to connnection to the gathering pipeline

Venting Period 24 hours (Project Proponents)

Amount of Vented Gas: 0.5 MMscf (Average Volume Estimated by Proponents)

Development Rate: 14 Wells per year (Project Proponents)

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/day)	COMPONENT FLOW RATE (lb/hr)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	81.960	13.149	0.589	409.800	721.848	121.271
Ethane	30.07	9.165	2.756	0.123	45.825	151.295	25.418
Propane	44.097	1.654	0.729	0.033	8.270	40.041	6.727
i-Butane	58.123	0.703	0.409	0.018	3.515	22.432	3.769
n-Butane	58.123	0.426	0.248	0.011	2.130	13.593	2.284
i-Pentane	72.15	0.377	0.272	0.012	1.885	14.933	2.509
n-Pentane	72.15	0.180	0.130	0.006	0.900	7.130	1.198
Hexanes	86.177	1.164	1.003	0.045	5.820	55.068	9.251
Heptanes	100.204	1.832	1.836	0.082	9.160	100.779	16.931
Octanes	114.231	0.813	0.929	0.042	4.065	50.984	8.565
Nonanes	128.258	0.361	0.463	0.021	1.805	25.419	4.270
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.005	0.043	0.007
Toluene	92.13	0.004	0.004	0.000	0.022	0.217	0.037
Ethylbenzene	106.16	0.001	0.001	0.000	0.005	0.052	0.009
Xylenes	106.16	0.001	0.001	0.000	0.003	0.029	0.005
n-Hexane	86.177	0.006	0.005	0.000	0.029	0.270	0.045
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	1.200	0.336	0.015	6.000	18.454	3.100
Carbon Dioxide	44.01	0.153	0.067	0.003	0.765	3.697	0.621
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**7.5224**	**6.029**	**0.270**	**37.612**	**330.989**	**55.606**
HAP SUBTOTAL		**0.0124**	**0.011**	**0.000**	**0.062**	**0.612**	**0.103**
TOTAL		**100.000**	**22.337**	**1.000**	**500**	**1226.283**	**206.016**

29. Pavillion Drill Rig Engine Emissions

Assumptions:

Hours of Operation 216 hours/well (9 days on average @ 24 hrs/day - Project Proponents)

Development Rate 14 wells/year (Project Proponents)

Load Factor 0.4 (Assumed typical value)

Rig Size 550 hp (Drilling Contractor)

Diesel Fuel Sulfur Content 0.05 % (typical value)

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (lb/hp-hr) * Rated Horsepower (hp)* Operating Hours (hrs) * Load Factor (Dimensionless)}}{\text{2000 (lb/tons)}}$$

SO2 E. Factor (lb/hp-hr) = Fuel sulfur content * 0.00809

Species	**Drill Rig Emissions**			
	E. Factor [d] (lb/MMBtu)	E. Factor [a] (lb/hp-hr)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx		0.024	5.280	7.98
CO		0.0055	1.210	1.83
VOC [b]		0.000705	0.155	0.23
PM10 [c]	0.0573	0.0004011	0.088	0.13
PM2.5 [d]	0.0556	0.0003892	0.086	0.13
SO2		0.0004045	0.089	0.13

a AP-42 Volume I, Large Stationary Diesel Engines Table 3.4-1, 10/96
b Emission Factor represents total Hydrocarbon Emissions
c PM10 Emission Factor determined from Table 3.4-2, 10/96
d PM2.5 Emission Factor estimated as PM3.0 (filterable + condensable) from Table 3.4-2, 10/96
e Conversion from lb/MMBtu to lb/hp-hr assumes a BSFC of 7,000 BTU/hp-hr (Table 3.4-1, 10/96)
f Assumes a Development rate as stated by the proponents (Summarized in page 1)

33. Pavillion Produced Gas Characteristics (Pavillion 11-10)

Gas Heat Value (wet): 1301 Btu/scf

C1-C2 Wt. Fraction:	0.712
VOC Wt. Fraction:	0.270
Non-HC Wt. Fraction:	0.018
Total:	1.000

COMPONENT	MOLE PERCENT	COMPONENT MOLE WEIGHT (lb/lb-mole)	NET MOLE WEIGHT (lb/lb-mole)	WEIGHT FRACTION	GROSS HEATING VALUE (BTU/scf)	NET DRY HEATING VALUE (BTU/scf)	LOWER HEATING VALUE (BTU/scf)	NET LOW HEATING VALUE (BTU/scf)
Methane	81.960	16.043	13.149	0.589	1010.000	827.796	910.000	745.836
Ethane	9.165	30.070	2.756	0.123	1769.800	162.202	1618.000	148.290
Propane	1.654	44.097	0.729	0.033	2516.200	41.618	2316.000	38.307
i-Butane	0.703	58.123	0.409	0.018	3252.100	22.862	3005.000	21.125
n-Butane	0.426	58.123	0.248	0.011	3262.400	13.898	3013.000	12.835
i-Pentane	0.377	72.150	0.272	0.012	4000.900	15.083	3698.000	13.941
n-Pentane	0.180	72.150	0.130	0.006	4008.800	7.216	3708.000	6.674
Hexanes+	1.164	86.177	1.003	0.045	4756.200	55.362	4404.000	51.263
Heptanes	1.832	100.204	1.836	0.082	5502.500	100.806	5100.000	93.432
Octanes	0.813	114.231	0.929	0.042	6249.100	50.805		0.000
Nonanes	0.361	128.258	0.463	0.021	6996.400	25.257		0.000
Decanes	0.000	142.285	0.000	0.000	7743.200	0.000		0.000
Benzene	0.001	78.120	0.001	0.000	3715.500	0.037		0.000
Toluene	0.004	92.130	0.004	0.000	4444.600	0.191		0.000
Ethylbenzene	0.001	106.160	0.001	0.000	5191.500	0.047		0.000
Xylenes	0.001	106.160	0.001	0.000	5183.500	0.026		0.000
n-Hexane	0.006	86.177	0.005	0.000	4756.200	0.271		0.000
Helium	0.000	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	1.200	28.013	0.336	0.015	0.000	0.000	0.000	0.000
Carbon Dioxide	0.153	44.010	0.067	0.003	0.000	0.000	0.000	0.000
Oxygen	0.000	32.000	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	0.000	34.080	0.000	0.000	637.100	0.000	588.000	0.000
TOTAL	100.000		22.337	1.000		1323.478		1131.703

Relative Mole Weight (lb/lb-mole) = [Mole Percent * Molecular weight (lb/lb-mole)] / 100

Weight Fraction = Net Mole Weight / Total Mole Weight

42. Pavillion Production Heater Emissions

Assumptions

Number of new producing wells	206	(Reported by Project Proponents)
Separator Size	500	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour (Est.from fuel usage reported by Proponents)
	6	months/year (Nov. thru April - Project Proponents)
	2190	hours/year
Net Low Fuel Gas Heat Content	1132	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.270	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * \text{1,000 (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * \text{1,000,000 (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{\text{2,000 (lbs/ton)} * \text{1,000 (Btu/scf - Standard Fuel Heating Value)}}$$

$$\text{VOC Emissions (tons/yr)} = \text{TOC Emissions (tons/yr)} * \text{VOC wt. fraction}$$

Species	Separator Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr/well)	Emissions [e] (tons/yr)
NOx [a]	100	0.013	11.279
CO [a]	84	0.011	9.474
TOC [c]	11	0.001	1.241
VOC	N.A.	0.000	0.335
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.001	0.857
PM10 [c]	7.6	0.001	0.857
PM2.5 [c]	7.6	0.001	0.857
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.203
Formaldehyde [d]	0.075	0.000	0.008

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

26. Pavillion Construction Heavy Equipment Tailpipe Emissions

Assumptions:

Hours of Operation	16	hours/site (Project Proponents)
Development Rate	14	wells per year
Load Factor	0.5	(Assumed typical value)
Backhoe Size	84	hp (Contractor)
Backhoe Utilization	100	percent
Motor Grader Size	170	hp (Contractor)
Motor Grader Utilization	100	percent

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Rated Hp (hp)} * \text{Operating Hours (hrs)} * \text{Load Factor (Dimensionless)} * \text{Utilization}}{453.6 \text{ (g/lb)} * 2000 \text{ (lb/tons)}}$$

Heavy Const. Vehicles	Backhoe			Grader		
	E. Factor [a] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)	E. Factor [b] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)
NOx	8.15	0.755	0.085	7.14	1.338	0.150
CO	2.28	0.211	0.024	1.54	0.289	0.032
VOC [c]	0.37	0.034	0.004	0.36	0.067	0.008
PM10 [d]	0.5	0.046	0.005	0.63	0.118	0.013
PM2.5 [d]	0.5	0.046	0.005	0.63	0.118	0.013
SO2	0.22	0.020	0.002	0.22	0.041	0.005
Formaldehyde	0.22	0.020	0.002	0.12	0.022	0.003

Heavy Const. Vehicles	Total	
	Emissions (lb/hr/well)	Emissions[e] (tons/yr)
NOx	2.093	0.234
CO	0.500	0.056
VOC [c]	0.102	0.011
PM10 [d]	0.164	0.018
PM2.5 [d]	0.164	0.018
SO2	0.062	0.007
Formaldehyde	0.043	0.005

a AP-42 Volume II, Mobile Sources, Nonroad Vehicles, Table 11-7.1 Off-highway truck
b AP-42 Volume II, Mobile Sources, Nonroad Vehicles, Table 11-7.1 Motor Grader
c Emission Factor represents total Hydrocarbon Emissions
d All emitted particulate matter assumed to be PM2.5
e Assumes a proponet specified maximum development rate

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60. Pavillion Plant Compression and Processing

Assumptions:

Total Power Requirement: 2400 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	5.29	23.2
CO [1]		2.0	10.58	46.3
VOC [1]		1.0	5.29	23.2
PM10 [2, 5]	0.0194	0.070	0.37	1.6
PM2.5 [2,5]	0.0194	0.070	0.37	1.6
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.03	0.1
Toluene [2]	0.000558	0.00203	0.01	0.0
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.00	0.0
Formaldehyde [1]		0.07	0.37	1.6

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

9. Pavillion Reclamation Fugitive Dust Emissions

Assumptions:

Hours of Construction	2	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	16	hours per well pad
Pieces of Equipment	1	- 1 Grader @ 100% utilization (Project Proponent)
Equivalent Equipment Utilization	1	
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	45	percent (Composite soil sample)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 18.70 lbs TSP/hour/piece of equipment

Emissions = 8.36 lbs PM15/hour/piece of equipment

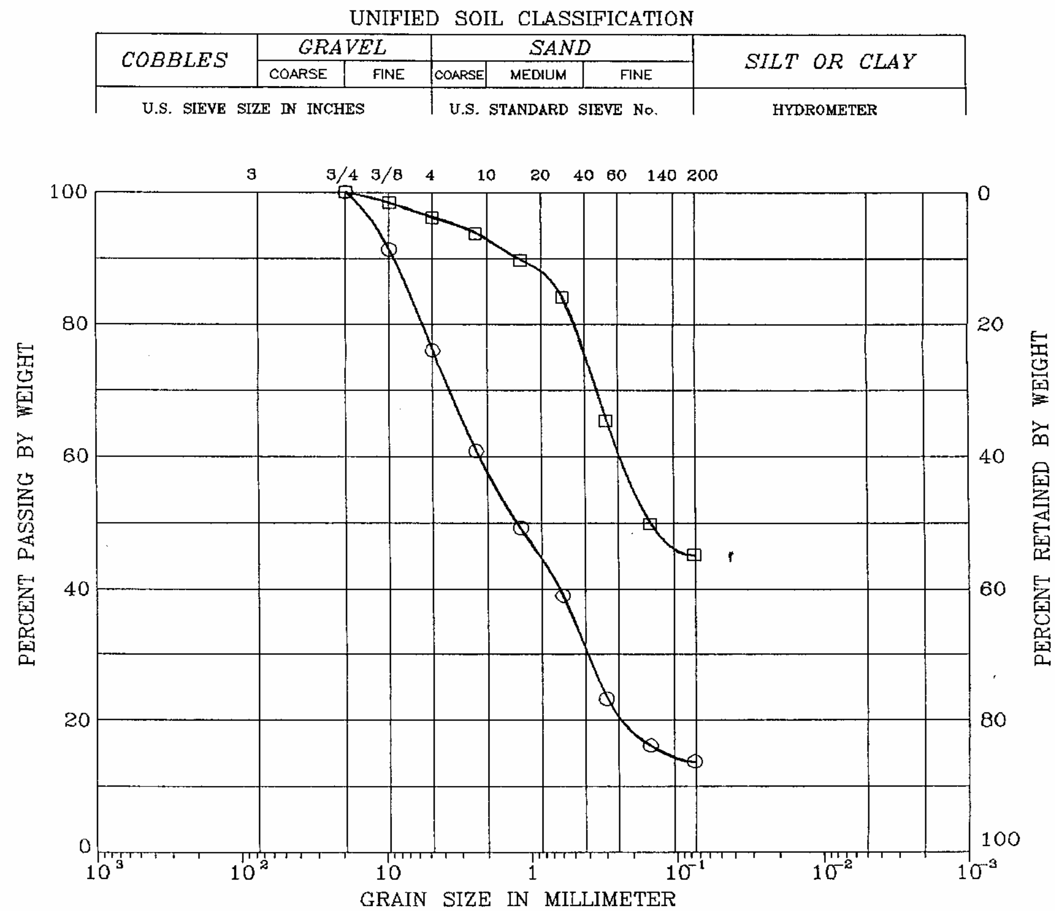
Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	18.70	0.1496	2.094
PM15	8.36	0.0669	0.936
PM10	6.27	0.0501	0.702
PM2.5	1.96	0.0157	0.220

a Assumes Proponent specified equipment utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative A Inventory Date: 7/8/2004

3. Pavillion Road and Pad Silt Content



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION	
○	Road	–			Silty Sand (SM)	24% grvl, 62% sand, 14% silt
□	Pad	–			Very Silty Sand (SM)	4% grvl, 51% sand, 45% silt

GRAIN SIZE DISTRIBUTION

Pavillion Field, Wyoming	Project No. For Buys & Assoc.

Resource Engineering, Inc.

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative A Inventory Date: 7/8/2004

46. Pavillion Condensate Storage Tank Emissions

Assumptions:

Average Condensate Production Rate :	0.25	bbls per day (Average production for existing wells - WOGCC)
Expected Successful Producting Wells:	206	
Predicted Condensate Production:	51.5	bbls/day
Separator Conditions :		200 psi and 130 F (Specified by Proponent)
Condensate Composition:		Analysis from Pavillion 11-10 well

Calculations:

Stock tank flash emissions estimated with E&P Tanks software

Emissions:

Component	Flash Emissions (tons/yr)
Benzene	0.004
Toluene	0.008
Ethylbenzene	0.001
Xylenes	0.007
n-Hexane	0.035
Total HAPS	0.054
Total VOC	2.400

Buys & Associates, Inc.
Environmental Consultants

Project: Wind River Alternative A Inventory
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13. Pavillion Unpaved Road Fugitive Dust Emissions

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity*
Const. & Drilling Activities				
Semi: Rig Transport	60,000	10		
Haul Truck: Water/Fuel	20,000	29		
Haul Truck: Other	48,000	34		
HD Pickup Truck: Misc.	7,000	94		
Total Const. & Drilling	20,778	167	15	240

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	8.16	85.14	10.22	143.0
PM10	2.18	22.72	2.73	38.2
PM2.5	0.32	3.32	0.40	5.6

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity*
Completion Activities				
Haul Truck: Water	20,000	12		
Haul Truck: Other	48,000	78		
HD Pickup Truck: Misc.	7,000	65		
Total Completion	28,639	155	15	55

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	9.58	404.82	11.13	155.9
PM10	2.48	104.64	2.88	40.3
PM2.5	0.36	15.29	0.42	5.9

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity*
Development & Reclamation				
Haul Truck: Water	20,000	0		
Haul Truck: Other	48,000	2		
HD Pickup Truck: Misc.	7,000	10		
Total Dev. & Reclamation	13,833	12	15	30

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	6.66	39.93	0.60	8.4
PM10	1.85	11.10	0.17	2.3
PM2.5	0.27	1.62	0.02	0.3

Pavillion Total

Particulate Matter Scale	Emission Factor (lbs/VMT)	Max Emissions (lbs/hr)	Total Emissions (Tons/well)	Total Emissions (Tons/year)
TSP		404.82	21.95	307.3
PM10		104.64	5.77	80.8
PM2.5		15.29	0.84	11.8

* Const. & Drilling Assumes 10 24-hr days
Completion assumes 5.5 10-hr days
Development & Reclamation assumes 3 10-hr days

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative A Inventory Date: 7/8/2004

51. Pavillion Well Blowdown Emissions

Assumptions: During Production, a percentage of the wells are periodically blown down to unload fluids

# of New Producing Wells	206	
% Wells Requiring Blowdown	20	% (Estimated by Project Proponents)
# of Blowdown wells	41.2	Wells
Blowdown Frequency	1	per week for a period of 1 hour each (Project Proponents)
Blowdown Volume	14	Mscf/event (Estimated from Production Data)
Annual Blowdown Volume	30.0	MMscf/year

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/hr)	COMPONENT FLOW RATE (lb/hr/well)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	81.960	13.149	0.589	11.474	485.082	519.620
Ethane	30.07	9.165	2.756	0.123	1.283	101.670	108.909
Propane	44.097	1.654	0.729	0.033	0.232	26.907	28.823
i-Butane	58.123	0.703	0.409	0.018	0.098	15.074	16.147
n-Butane	58.123	0.426	0.248	0.011	0.060	9.135	9.785
i-Pentane	72.15	0.377	0.272	0.012	0.053	10.035	10.749
n-Pentane	72.15	0.180	0.130	0.006	0.025	4.791	5.132
Hexanes	86.177	1.164	1.003	0.045	0.163	37.006	39.641
Heptanes	100.204	1.832	1.836	0.082	0.256	67.723	72.545
Octanes	114.231	0.813	0.929	0.042	0.114	34.261	36.701
Nonanes	128.258	0.361	0.463	0.021	0.051	17.081	18.297
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.000	0.029	0.031
Toluene	92.13	0.004	0.004	0.000	0.001	0.146	0.157
Ethylbenzene	106.16	0.001	0.001	0.000	0.000	0.035	0.038
Xylenes	106.16	0.001	0.001	0.000	0.000	0.020	0.021
n-Hexane	86.177	0.006	0.005	0.000	0.001	0.181	0.194
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	1.200	0.336	0.015	0.168	12.401	13.284
Carbon Dioxide	44.01	0.153	0.067	0.003	0.021	2.484	2.661
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**7.5224**	**6.029**	**0.270**	**1.053**	**222.425**	**238.261**
HAP SUBTOTAL		**0.0124**	**0.011**	**0.000**	**0.002**	**0.411**	**0.440**
TOTAL		**100.000**	**22.337**	**1.000**	**14**	**824.062**	**882.736**

7. Pipeline Construction Fugitive Dust Emissions

Assumptions:

Number of Completed Wells/Year	33	Assumes 100% success rate in Pavillion & Muddy Ridge, 50% success rate in Sand Mesa and Coastal
Hours of Construction	2	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	16	hours per well pad
Pieces of Equipment	3	- 1 Grader @ 30% utilization (Project Sub-Contractor) - 1 Backhoe @ 50% utilization - 1 Trencher @ 60% utilization
Equivalent Equipment Utilization	1.4	
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	39.2	percent (Weighted soil sample analysis)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 15.84 lbs TSP/hour/piece of equipment

Emissions = 6.80 lbs PM15/hour/piece of equipment

Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	22.18	0.1775	5.856
PM15	9.51	0.0761	2.512
PM10	7.14	0.0571	1.884
PM2.5	2.33	0.0186	0.615

a Assumes Proponent specified equipment utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

8. Pipeline Fugitive Dust Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
TSP	2.484	2.129	0.710	0.355	0.177	5.856
PM15	1.066	0.913	0.304	0.152	0.076	2.512
PM10	0.799	0.685	0.228	0.114	0.057	1.884
PM2.5	0.261	0.224	0.075	0.037	0.019	0.615

18. Wind Erosion Fugitive Dust Emissions From Pipeline ROWs

Assumptions

Threshold Friction Velocity U_t* 1.02 m/s (2.28 mph) for well pads (AP-42 Table 13.2.5-2 Overburden - Western Surface Coal Mine

Exposed Surface Type Flat

Fastest Mile Wind Speed U_{10}^+ 23.2 meters/sec (52 mph) reported as fastest 2-minute wind speed for Lander, WY (2002)

Number soil of disturbances 2 for well and facility pads (disturbance at construction and reclamation)

Equations

Friction Velocity $U^* = 0.053\ U_{10}^+$

Erosion Potential P (g/m^2/period) = $58*(U^*-U_t^*)^2 + 25*(U^*-U_t^*)$ for $U^*>U_t^*$, P = 0 for $U^*< U_t^*$

$$\text{Emissions (tons/year)} = \frac{\text{Erosion Potential(g/m}^2\text{/period)*Disturbed Area(m}^2\text{)*Disturbances/year*(k)* Number of Wells/year}}{\text{(453.6 g/lb)*2000 lbs/ton/Develop Period*Total Number of Wells}}$$

Particle Size Multiplier (k)		
30 um	**<10 um**	**<2.5 um**
1.0	0.5	0.2

Maxium U_{10}^+ Wind Speed (m/s)	Maximum U* Friction Velocity m/s	Well/Pipeline U_t* Threshold Velocity[a] m/s	Erosion Potential g/m^2
23.20	1.23	1.02	7.79

Wind Erosion Emissions

Development Area	Disturbance (Acres)	Disturbance (meters^2)	TSP Emissions (tons/year)	PM10 Emissions (tons/year)	PM2.5 Emissions (tons/year)
Pavillion	125	504,238	0.58	0.29	0.12
Muddy Ridge	264	1,067,964	3.26	1.63	0.65
Sand Mesa	394	1,593,650	1.61	0.81	0.32
Sand Mesa S.	459	1,857,504	1.95	0.98	0.39
Coastal	487	1,970,816	2.07	1.03	0.41
Total	**1728**	**6,994,171**	**9.5**	**4.7**	**1.9**

83. Point Source Locations and Stack Parameters

Facility	UTM Easting (meters)	UTM Northing (meters)	UTM Zone	Lambert Easting (km)	Lambert Northing (km)	Ground Elevation (meters)
South Pavillion	696600	4790560	12	-2.236	74.561	1615.1
Pavillion Plant	699450	4792200	12	0.564	76.065	1613.9
Muddy Ridge	697950	4794950	12	-0.807	78.764	1654.8
Hidden Valley	722050	4782150	12	22.114	65.718	1549.0
Shoshoni Booster	734850	4788000	12	34.644	71.009	1499.0
Sand Mesa	715975	4798000	12	16.692	81.201	1514.9
Sand Mesa South	715125	4795469	12	15.800	78.780	1501.2
Coastal Extension	705976	4799569	12	7.078	83.000	1550.2

Note: Proposed locations for Shoshoni, Sand Mesa South, and Coastal facilities estimated from pipeline routes

Measurement System	Stack Height (ft or m)	Stack Diameter (ft or m)	Exhaust Velocity (ft/sec or m/s)	Exhaust Temp. (F or K)
Imperial	30	1	114.8	1000
Metric	9.144	0.3048	35	811

55. Production Emissions Summary

Pavillion

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	11.279		0.447		11.726
CO	9.474		4.968		14.442
VOC	0.335	2.400	0.272	238.261	241.268
SO2	0.000		0.032		0.032
TSP	0.857				0.857
PM10	0.857				0.857
PM2.5	0.857				0.857
Formaldehyde	0.008				0.008
Benzene	0.000	0.0039871		0.031	0.035
Toluene	0.000	0.0079496		0.157	0.165
Ethylbenzene		0.001329		0.038	0.039
Xylenes		0.0066452		0.021	0.028
n-Hexane	0.203	0.0345548		0.194	0.432

Muddy Ridge

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	5.420		0.143		5.564
CO	4.553		1.592		6.145
VOC	0.149	160.657	0.087	73.216	234.110
SO2	0.000		0.010		0.010
TSP	0.412				0.412
PM10	0.412				0.412
PM2.5	0.412				0.412
Formaldehyde	0.004				0.004
Benzene	0.000	0.35508		0.011	0.366
Toluene	0.000	0.53724		0.000	0.537
Ethylbenzene		0.02112		0.000	0.021
Xylenes		0.20196		0.000	0.202
n-Hexane	0.098	2.13444		0.058	2.290

Sand Mesa

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	7.337		0.146		7.482
CO	6.163		1.616		7.779
VOC	0.202	9.071	0.088	79.281	88.642
SO2	0.000		0.010		0.010
TSP	0.558				0.558
PM10	0.558				0.558
PM2.5	0.558				0.558
Formaldehyde	0.006				0.006
Benzene	0.000	0.030		0.011	0.042
Toluene	0.000	0.070		0.000	0.071
Ethylbenzene		0.003		0.000	0.003
Xylenes		0.037		0.000	0.037
n-Hexane	0.132	0.231		0.063	0.427

56. Production Emissions Summary Continued

Sand Mesa South

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	2.628		0.052		2.680
CO	2.208		0.579		2.786
VOC	0.072	3.249	0.032	28.399	31.752
SO2	0.000		0.004		0.004
TSP	0.200				0.200
PM10	0.200				0.200
PM2.5	0.200				0.200
Formaldehyde	0.002				0.002
Benzene	0.000	0.011		0.004	0.015
Toluene	0.000	0.025		0.000	0.025
Ethylbenzene		0.001		0.000	0.001
Xylenes		0.013		0.000	0.013
n-Hexane	0.047	0.083		0.023	0.153

Coastal Extension

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	0.657		0.013		0.670
CO	0.552		0.145		0.697
VOC	0.018	0.812	0.008	7.100	7.938
SO2	0.000		0.001		0.001
TSP	0.050				0.050
PM10	0.050				0.050
PM2.5	0.050				0.050
Formaldehyde	0.000				0.000
Benzene	0.000	0.003		0.001	0.004
Toluene	0.000	0.006		0.000	0.006
Ethylbenzene		0.000		0.000	0.000
Xylenes		0.003		0.000	0.003
n-Hexane	0.012	0.021		0.006	0.038

Total Production

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	27.320		0.802		28.122
CO	22.949		8.899		31.848
VOC	0.776	176.190	0.487	426.257	603.710
SO2	0.000		0.057		0.057
TSP	2.076				2.076
PM10	2.076				2.076
PM2.5	2.076				2.076
Formaldehyde	0.020				0.020
Benzene	0.001	0.403		0.058	0.461
Toluene	0.001	0.647		0.157	0.805
Ethylbenzene		0.027		0.038	0.065
Xylenes		0.262		0.021	0.283
n-Hexane	0.492	2.504		0.344	3.340

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative A Inventory Date: 7/8/2004

1. Alternative A Development Summary (Increased Development)

Well Development

Field	Total Wells To Be Drilled	Wells Drilled Per Year	Total Producing Wells	Pad Disturbance (acres)	Pipeline Distrubance (acres)	Development Area Size (acres)
Pavillion	206	14	206	264	125	11,774
Muddy Ridge	66	12	66	174	264	7,550
Sand Mesa	133	8	67	345	394	9,572
Sand Mesa South	48	3	24	126	459	3,820
Coastal Extension	32	2	6	86	487	5220
Total	**485**	**39**	**369**	**995**	**1728**	**37,936**

Additional Compression/Treatment/Generation Capacity (hp)

Facility	Compression	Treatment	Generation	Total
South Pavillion	4,650	0	0	**4,650**
Pavillion Plant	2,400	0	0	**2,400**
Muddy Ridge	6,300	0	0	**6,300**
Hidden Valley	2,400	0	0	**2,400**
Shoshoni Booster	4,650	0	700	**5,350**
Sand Mesa	9,100	4,600	700	**14,400**
Sand Mesa South	4,650	1,400	700	**6,750**
Coastal Extension	3,100	0	700	**3,800**
Total	**37,250**	**6,000**	**2,800**	**46,050**

Additional Facility Heater Capacity (MMbtu)

Facility	Dehydration	Separation	Total
South Pavillion			**0.00**
Pavillion Plant			**0.00**
Muddy Ridge	1.50		**1.50**
Hidden Valley			**0.00**
Shoshoni Booster		0.50	**0.50**
Sand Mesa	2.50	1.75	**4.25**
Sand Mesa South	1.50	1.00	**2.50**
Coastal Extension	1.00	1.00	**2.00**
Total	**6.50**	**4.25**	**10.75**

50. Pumper Tailpipe Emissions

Assumptions:

Number of New Pumpers:	8	(Estimated by Project Proponent for full development)
Pumper Mileage:	2,500	miles/pumper/month (Project Proponents)
Total Annual New Pumper Mileage:	240,000	miles/year
Hours of Pumper Operation:	8	hours per day (Project Proponents)
Hours of Pumper Operation:	2080	hours per year
Fuel sulfur content	0.05	% (Typical value)
Fuel density	7.08	lbs/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile) * Vehicle Miles Traveled (miles/yr)}}{\text{453.6 (g/lb) * 2000 (lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal) * 453.6 (g/lb) * Fuel Sulfur Content * 2 (S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Pumper Vehicles	Heavy Duty Pickups		
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	3.03	0.771	0.802
CO	33.64	8.557	8.899
VOC [b]	1.84	0.468	0.487
SO2	0.21	0.054	0.057

a AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
b Emission factor is for total Hydrocarbons.

Pumper Vehicles	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx	0.447	0.143	0.146	0.052	0.013	0.802
CO	4.968	1.592	1.616	0.579	0.145	8.899
VOC	0.272	0.087	0.088	0.032	0.008	0.487
SO2	0.032	0.010	0.010	0.004	0.001	0.057

11. Reclamation Fugitive Dust Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
TSP	2.094	2.116	1.410	0.529	0.353	6.502
PM15	0.936	0.869	0.580	0.217	0.145	2.748
PM10	0.702	0.652	0.435	0.163	0.109	2.061
PM2.5	0.220	0.222	0.148	0.056	0.037	0.683

12. Vehicle Unpaved Road Fugitive Dust Emissions

Assumptions:

Precipitation	73	days per year (NCDC data for Lander, WY - 2002)
Road Silt Content	12	percent (Average value of composit samples)
Road Moisture	0.9	percent (Average value of composit samples)

Equation: From AP-42 13.2.2, Unpaved Roads, 9/98

$$E \text{ Size Spec. Factor (lb/VMT)} = \frac{k * (s/12)^{\wedge}a * (W/3)^{\wedge}b * [(365-p)/365]}{(M/0.2)^{\wedge}c}$$

Where k, a, b, and c are empirical constants listed below and

E = particle size specific emission factor (lbs/VMT)
s = surface material silt content (%)
W = mean vehicle weight (tons)
M = surface material moisture content (%)
p = number of days with at least 0.01 in of precipitation per year

Empirical Constants			
Constant	**PM2.5**	**PM10**	**PM30/TSP**
k	0.38	2.6	10.0
a	0.8	0.8	0.8
b	0.4	0.4	0.5
c	0.3	0.3	0.4

Emission Factor Constant K S/12^a [(365-p)/365]/M/.02^c

PM2.5	PM10	PM30/TSP
0.194	1.325	4.383

31. Sand Mesa and Coastal Drill Rig Engine Emissions

Assumptions:

Hours of Operation 1200 hours/well (50 days on average @ 24 hrs/day - Project Proponents)

Development Rate 13 wells/year

Load Factor 0.4 (Assumed typical value)

Rig Size 1500 hp (Drilling Contractor)

Diesel Fuel Sulfur Content 0.05 % (typical value)

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (lb/hp-hr)} * \text{Rated Horsepower (hp)} * \text{Operating Hours (hrs)} * \text{Load Factor (Dimensionless)}}{\text{2000 (lb/tons)}}$$

SO2 E. Factor (lb/hp-hr) = Fuel sulfur content * 0.00809

Total Emissions Summary

Species	Drill Rig Emissions			
	E. Factor [d] (lb/MMBtu)	E. Factor [a] (lb/hp-hr)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx		0.024	14.40	112.32
CO		0.0055	3.30	25.74
VOC [b]		0.000705	0.42	3.30
PM10 [c]	0.0573	0.0004011	0.24	1.88
PM2.5 [d]	0.0556	0.0003892	0.23	1.82
SO2		0.0004045	0.24	1.89

Development Area	Wells per Year
Sand Mesa	8
Sand Mesa South	3
Coastal Extension	2
Total	**13**

a AP-42 Volume I, Large Stationary Diesel Engines Table 3.4-1, 10/96
b Emission Factor represents total Hydrocarbon Emissions
c PM10 Emission Factor determined from Table 3.4-2, 10/96
d PM2.5 Emission Factor estimated as PM3.0 (filterable + condensable) from Table 3.4-2, 10/96
e Conversion from lb/MMBtu to lb/hp-hr assumes a BSFC of 7,000 BTU/hp-hr (Table 3.4-1, 10/96)
f Assumes a Development rate as stated by the proponents (Summarized in page 1)

Area Summary

Species	Emissions (tons/year)			
	Sand Mesa	Sand Mesa South	Coastal Extension	Total
NOx	69.12	25.92	17.28	112.32
CO	15.84	5.94	3.96	25.74
VOC [b]	2.03	0.76	0.51	3.30
PM10 [c]	1.16	0.43	0.29	1.88
PM2.5 [d]	1.12	0.42	0.28	1.82
SO2	1.16	0.44	0.29	1.89

70. Sand Mesa Central Facility Heater Emissions

Assumptions

Separator Size:	1750	MBTU/hr (Reported by Project Proponents)
Dehydrator Size:	2500	MBTU/hr (Reported by Project Proponents)
Total Heater Capacity:	4250	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour for entire year (Est.from fuel usage reported by Proponents)
	4380	hours/year
Net Low Fuel Gas Heat Content	1170	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * 1{,}000 \text{ (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * 1{,}000{,}000 \text{ (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{2{,}000 \text{ (lbs/ton)} * 1{,}000 \text{ (Btu/scf - Standard Fuel Heating Value)}}$$

$$\text{VOC Emissions (tons/yr)} = \text{TOC Emissions (tons/yr)} * \text{VOC wt. fraction}$$

Species	Total Heater Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx [a]	100	0.213	0.931
CO [a]	84	0.179	0.782
TOC [c]	11	0.023	0.102
VOC	N.A.	0.006	0.026
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.016	0.071
PM10 [c]	7.6	0.016	0.071
PM2.5 [c]	7.6	0.016	0.071
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.004	0.017
Formaldehyde [d]	0.075	0.000	0.001

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

64. Sand Mesa Compression and Processing

Assumptions:

Total Power Requirement: 14400 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	31.75	139.0
CO [1]		2.0	63.49	278.1
VOC [1]		1.0	31.75	139.0
PM10 [2, 5]	0.0194	0.070	2.24	9.8
PM2.5 [2,5]	0.0194	0.070	2.24	9.8
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.18	0.8
Toluene [2]	0.000558	0.00203	0.06	0.3
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.02	0.1
Formaldehyde [1]		0.07	2.22	9.7

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

75. Sand Mesa Dehydrator

Assumptions

Proposed Action Throughput Rate: 55 MMscf/day (As projected by Project Proponents)
Alternative A Throughput Rate: 73.7

Gas Composition: Muddy Ridge Sample

Inlet Gas Conditions: Inlet gas was assumed to be saturated at 700 psi and 80 F
as reported by the project proponents

Calculations

Dehydrator emissions were simulated using GRI GlyCalc version 4.0 software

Emissions

Species	Emissions (lbs/hr)	Emissions (tons/year)
VOC	3.335	14.608
Benzene	0.170	0.747
Toluene	0.000	0.000
Ethylbenzene	0.000	0.000
Xylenes	0.000	0.000
n-Hexane	0.008	0.036
Total HAPs	0.179	0.782

38. Sand Mesa and Coastal Well Development Venting

Assumptions: Following Completion, Wells are Vented prior to connnection to the gathering pipeline

Venting Period 24 hours (Project Proponents)

Amount of Vented Gas: 0.5 MMscf (Average Volume Estimated by Proponents)

Development Rate: 7 Wells per year (Project Proponents - Assumes a 50% success rate)

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/day)	COMPONENT FLOW RATE (lb/hr)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	79.318	12.725	0.590	396.590	698.579	54.489
Ethane	30.07	10.453	3.143	0.146	52.265	172.557	13.459
Propane	44.097	3.927	1.732	0.080	19.635	95.067	7.415
i-Butane	58.123	1.456	0.846	0.039	7.280	46.459	3.624
n-Butane	58.123	1.069	0.621	0.029	5.345	34.110	2.661
i-Pentane	72.15	1.136	0.820	0.038	5.680	44.996	3.510
n-Pentane	72.15	0.759	0.548	0.025	3.795	30.063	2.345
Hexanes	86.177	0.865	0.745	0.035	4.325	40.923	3.192
Heptanes	100.204	0.080	0.080	0.004	0.400	4.401	0.343
Octanes	114.231	0.000	0.000	0.000	0.000	0.000	0.000
Nonanes	128.258	0.000	0.000	0.000	0.000	0.000	0.000
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.005	0.043	0.003
Toluene	92.13	0.000	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	106.16	0.000	0.000	0.000	0.000	0.000	0.000
Xylenes	106.16	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	86.177	0.005	0.004	0.000	0.025	0.237	0.018
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	0.605	0.169	0.008	3.025	9.304	0.726
Carbon Dioxide	44.01	0.328	0.144	0.007	1.640	7.925	0.618
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**9.298**	**5.397**	**0.250**	**46.490**	**296.298**	**23.111**
HAP SUBTOTAL		**0.006**	**0.005**	**0.000**	**0.030**	**0.279**	**0.022**
TOTAL		**100**	**21.579**	**1.000**	**500**	**1184.663**	**92.404**

48. Sand Meas and Coastal Condensate Storage Tank Emissions

Assumptions:

Average Condensate Production Rate :	0.32	bbls per day (Average production for existing wells - WOGCC)
Expected Successful Producting Wells:	97	
Predicted Condensate Production:	31.04	bbls/day
Separator Conditions :		200 psi and 130 F (Specified by Proponent)
Condensate Composition:		Sample from Grayling 29-33

Calculations:

Stock tank flash emissions estimated with E&P Tanks software

Emissions:

Component	Flash Emissions (tons/yr)
Benzene	0.044
Toluene	0.102
Ethylbenzene	0.005
Xylenes	0.053
n-Hexane	0.335
Total HAPS	0.538
Total VOC	13.132

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Project: Wind River Alternative A Inventory
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35. Sand Mesa and Coastal Produced Gas Characteristics

Gas Heat Value (wet): 1267 Btu/scf

C1-C2 Wt. Fraction:	0.735
VOC Wt. Fraction:	0.250
Non-HC Wt. Fraction:	0.015
Total:	1.000

COMPONENT	MOLE PERCENT	COMPONENT MOLE WEIGHT (lb/lb-mole)	NET MOLE WEIGHT (lb/lb-mole)	WEIGHT FRACTION	GROSS HEATING VALUE (BTU/scf)	NET DRY HEATING VALUE (BTU/scf)	LOWER HEATING VALUE (BTU/scf)	NET LOW HEATING VALUE (BTU/scf)
Methane	79.318	16.043	12.725	0.590	1010.000	801.112	910.000	721.794
Ethane	10.453	30.070	3.143	0.146	1769.800	184.997	1618.000	169.130
Propane	3.927	44.097	1.732	0.080	2516.200	98.811	2316.000	90.949
i-Butane	1.456	58.123	0.846	0.039	3252.100	47.351	3005.000	43.753
n-Butane	1.069	58.123	0.621	0.029	3262.400	34.875	3013.000	32.209
i-Pentane	1.136	72.150	0.820	0.038	4000.900	45.450	3698.000	42.009
n-Pentane	0.759	72.150	0.548	0.025	4008.800	30.427	3708.000	28.144
Hexanes+	0.865	86.177	0.745	0.035	4756.200	41.141	4404.000	38.095
Heptanes	0.080	100.204	0.080	0.004	5502.500	4.402	5100.000	4.080
Octanes	0.000	114.231	0.000	0.000	6249.100	0.000		0.000
Nonanes	0.000	128.258	0.000	0.000	6996.400	0.000		0.000
Decanes	0.000	142.285	0.000	0.000	7743.200	0.000		0.000
Benzene	0.001	78.120	0.001	0.000	3715.500	0.037		0.000
Toluene	0.000	92.130	0.000	0.000	4444.600	0.000		0.000
Ethylbenzene	0.000	106.160	0.000	0.000	5191.500	0.000		0.000
Xylenes	0.000	106.160	0.000	0.000	5183.500	0.000		0.000
n-Hexane	0.005	86.177	0.004	0.000	4756.200	0.238		0.000
Helium	0.000	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	0.605	28.013	0.169	0.008	0.000	0.000	0.000	0.000
Carbon Dioxide	0.328	44.010	0.144	0.007	0.000	0.000	0.000	0.000
Oxygen	0.000	32.000	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	0.000	34.080	0.000	0.000	637.100	0.000	588.000	0.000
TOTAL	100.000		21.579	1.000		1288.841		1170.162

Relative Mole Weight (lb/lb-mole) = [Mole Percent * Molecular weight (lb/lb-mole)] / 100

Weight Fraction = Net Mole Weight / Total Mole Weight

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44. Sand Mesa and Coastal Production Heater Emissions

Assumptions

Number of new producing wells	97	(Reported by Project Proponents)
Separator Size	1,000	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour (Est.from fuel usage reported by Proponents)
	6	months/year (Nov. thru April - Project Proponents)
	2190	hours/year
Net Low Fuel Gas Heat Content	1267	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * 1{,}000 \text{ (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * 1{,}000{,}000 \text{ (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{2{,}000 \text{ (lbs/ton)} * 1{,}000 \text{ (Btu/scf - Standard Fuel Heating Value)}}$$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Pollutant	Separator Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr/well)	Emissions [e] (tons/yr)
NOx [a]	100	0.025	10.622
CO [a]	84	0.021	8.922
TOC [c]	11	0.003	1.168
VOC	N.A.	0.001	0.292
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.002	0.807
PM10 [c]	7.6	0.002	0.807
PM2.5 [c]	7.6	0.002	0.807
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.191
Formaldehyde [d]	0.075	0.000	0.008

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

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Environmental Consultants

Project: Wind River Alternative A Inventory
Date: 7/8/2004

65. Sand Mesa South Compression and Processing

Assumptions:

Total Power Requirement: 6750 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{\text{453.6 (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	14.88	65.2
CO [1]		2.0	29.76	130.4
VOC [1]		1.0	14.88	65.2
PM10 [2, 5]	0.0194	0.070	1.05	4.6
PM2.5 [2,5]	0.0194	0.070	1.05	4.6
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.09	0.4
Toluene [2]	0.000558	0.00203	0.03	0.1
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.01	0.0
Formaldehyde [1]		0.07	1.04	4.6

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

76. Sand Mesa South Dehydrator

Assumptions

Proposed Action Throughput Rate: 26 MMscf/day (As projected by Project Proponents)
Alternative A Throughput Rate: 104

Gas Composition: Muddy Ridge Sample

Inlet Gas Conditions: Inlet gas was assumed to be saturated at 700 psi and 80 F
as reported by the project proponents

Calculations

Dehydrator emissions were simulated using GRI GlyCalc version 4.0 software

Emissions

Species	Emissions (lbs/hr)	Emissions (tons/year)
VOC	4.706	20.614
Benzene	0.240	1.053
Toluene	0.000	0.000
Ethylbenzene	0.000	0.000
Xylenes	0.000	0.000
n-Hexane	0.012	0.051
Total HAPs	0.252	1.104

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53. Sand Mesa and Coastal Well Blowdown Emissions

Assumptions: During Production, a percentage of the wells are periodically blown down to unload fluids

# of New Producing Wells	97	
% Wells Requiring Blowdown	20	% (Estimated by Project Proponents)
# of Blowdown wells	19	Wells
Blowdown Frequency	1	per week for a period of 1 hour each (Project Proponents)
Blowdown Volume	16	Mscf/event (Estimated from Production Data)
Annual Blowdown Volume	16.1	MMscf/year

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/hr)	COMPONENT FLOW RATE (lb/hr/well)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	79.318	12.725	0.590	12.691	536.509	270.615
Ethane	30.07	10.453	3.143	0.146	1.672	132.524	66.845
Propane	44.097	3.927	1.732	0.080	0.628	73.011	36.827
i-Butane	58.123	1.456	0.846	0.039	0.233	35.680	17.997
n-Butane	58.123	1.069	0.621	0.029	0.171	26.197	13.214
i-Pentane	72.15	1.136	0.820	0.038	0.182	34.557	17.430
n-Pentane	72.15	0.759	0.548	0.025	0.121	23.089	11.646
Hexanes	86.177	0.865	0.745	0.035	0.138	31.429	15.853
Heptanes	100.204	0.080	0.080	0.004	0.013	3.380	1.705
Octanes	114.231	0.000	0.000	0.000	0.000	0.000	0.000
Nonanes	128.258	0.000	0.000	0.000	0.000	0.000	0.000
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.000	0.033	0.017
Toluene	92.13	0.000	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	106.16	0.000	0.000	0.000	0.000	0.000	0.000
Xylenes	106.16	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	86.177	0.005	0.004	0.000	0.001	0.182	0.092
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	0.605	0.169	0.008	0.097	7.146	3.604
Carbon Dioxide	44.01	0.328	0.144	0.007	0.052	6.086	3.070
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**9.298**	**5.397**	**0.250**	**1.488**	**227.557**	**114.780**
HAP SUBTOTAL		**0.006**	**0.005**	**0.000**	**0.001**	**0.215**	**0.108**
TOTAL		**100.002**	**21.579**	**1.000**	**16**	**909.821**	**458.914**

63. Shoshoni Booster Compression and Processing

Assumptions:

Total Power Requirement: 5350 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	11.79	51.7
CO [1]		2.0	23.59	103.3
VOC [1]		1.0	11.79	51.7
PM10 [2, 5]	0.0194	0.070	0.83	3.6
PM2.5 [2,5]	0.0194	0.070	0.83	3.6
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.07	0.3
Toluene [2]	0.000558	0.00203	0.02	0.1
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.01	0.0
Formaldehyde [1]		0.07	0.83	3.6

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

69. Shoshoni Booster Central Facility Heater Emissions

Assumptions

Separator Size:	500	MBTU/hr (Reported by Project Proponents)
Dehydrator Size:	0	MBTU/hr (Reported by Project Proponents)
Total Heater Capacity:	500	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour for entire year (Est.from fuel usage reported by Proponents)
	4380	hours/year
Net Low Fuel Gas Heat Content	1170	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

Fuel Consumption (MMscf/yr) = $\frac{\text{Heater Size (MBtu/hr) * 1,000 (Btu/MBtu) * Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf) * 1,000,000 (scf/MMscf)}}$

NOx/CO/TOC Emissions (tons/yr) = $\frac{\text{AP-42 E.Factor (lbs/MMscf) * Fuel Consumption (MMscf/yr) * Fuel heating Value (Btu/scf)}}{\text{2,000 (lbs/ton) * 1,000 (Btu/scf - Standard Fuel Heating Value)}}$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Species	Total Heater Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx [a]	100	0.025	0.110
CO [a]	84	0.021	0.092
TOC [c]	11	0.003	0.012
VOC	N.A.	0.001	0.003
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.002	0.008
PM10 [c]	7.6	0.002	0.008
PM2.5 [c]	7.6	0.002	0.008
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.002
Formaldehyde [d]	0.075	0.000	0.000

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

Buys & Associates, Inc. Environmental Consultants	Project: Wind River EIS Emission Inventory Date: 7/8/2004

71. Sand Mesa South Central Facility Heater Emissions

Assumptions

Separator Size: 1000 MBTU/hr (Reported by Project Proponents)
Dehydrator Size: 1500 MBTU/hr (Reported by Project Proponents)
Total Heater Capacity: 2500 MBTU/hr (Reported by Project Proponents)

Firing Rate 30 Minutes/hour for entire year (Est.from fuel usage reported by Proponents)
4380 hours/year

Net Low Fuel Gas Heat Content 1170 Btu/scf (Gas Analyses from Existing Wells)

Fuel Gas VOC Content 0.250 by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * 1{,}000\ \text{(Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * 1{,}000{,}000\ \text{(scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{2{,}000\ \text{(lbs/ton)} * 1{,}000\ \text{(Btu/scf - Standard Fuel Heating Value)}}$$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Species	Total Heater Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx [a]	100	0.125	0.548
CO [a]	84	0.105	0.460
TOC [c]	11	0.014	0.060
VOC	N.A.	0.003	0.015
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.010	0.042
PM10 [c]	7.6	0.010	0.042
PM2.5 [c]	7.6	0.010	0.042
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.002	0.010
Formaldehyde [d]	0.075	0.000	0.000

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

Buys & Associates, Inc.
Environmental Consultants

Project: Wind River Alternative A Inventory
Date: 7/8/2004

59. South Pavillion Compression and Processing

Assumptions:

Total Power Requirement: 4650 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6\ \text{(g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	10.25	44.9
CO [1]		2.0	20.50	89.8
VOC [1]		1.0	10.25	44.9
PM10 [2, 5]	0.0194	0.070	0.72	3.2
PM2.5 [2,5]	0.0194	0.070	0.72	3.2
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.06	0.3
Toluene [2]	0.000558	0.00203	0.02	0.1
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.01	0.0
Formaldehyde [1]		0.07	0.72	3.1

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average BSFC of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

49. Condensate Tank Emissions Summary

Component	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
Benzene	0.004	0.355	0.030	0.011	0.003	0.403
Toluene	0.008	0.537	0.070	0.025	0.006	0.647
Ethylbenzene	0.001	0.021	0.003	0.001	0.000	0.027
Xylenes	0.007	0.202	0.037	0.013	0.003	0.262
n-Hexane	0.035	2.134	0.231	0.083	0.021	2.504
Total HAPS	0.054	3.250	0.372	0.133	0.033	3.843
Total VOC	2.400	160.657	9.071	3.249	0.812	176.190

82. Total Emissions

Species	Wellsite Emissions (tons/yr)	Facility Emissions (tons/yr)	Total Project Emissions (tons/yr)
NOx [a]	216.826	447.017	663.843
NO [b]	127.268	262.380	389.647
NO2 [c]	21.683	44.702	66.384
CO	96.593	891.303	987.896
VOC	733.194	491.129	1224.324
SO2	3.402	0.000	3.402
TSP	2189.445	31.526	2220.971
PM10	597.772	31.526	629.298
PM2.5	95.152	31.526	126.678
Formaldehyde	0.064	31.128	31.192
Benzene	0.478	4.922	5.400
Toluene	0.841	0.901	1.742
Ethylbenzene	0.074	0.040	0.114
Xylenes	0.288	0.315	0.603
n-Hexane	3.437	0.156	3.594

NOTES

a NOx measured as NO_2
b Emitted NOx assumed to be 90% NO. Emissions corrected for the difference in molecular weights (30 mw NO/46 mw NO2)
c Emitted NOx assumed to be 10% NO_2.

57. Total Well Emissions Summary

Pavillion

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	9.812	11.726	21.538
CO	9.946	14.442	24.388
VOC	56.806	241.268	298.074
SO2	0.221	0.032	0.252
TSP	317.992	0.857	318.849
PM10	84.747	0.857	85.604
PM2.5	13.236	0.857	14.093
Formaldehyde	0.005	0.008	0.013
Benzene	0.007	0.035	0.042
Toluene	0.037	0.165	0.201
Ethylbenzene	0.009	0.039	0.048
Xylenes	0.005	0.028	0.033
n-Hexane	0.045	0.432	0.477

Muddy Ridge

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	64.303	5.564	69.867
CO	21.361	6.145	27.506
VOC	45.346	234.110	279.455
SO2	1.137	0.010	1.147
TSP	816.618	0.412	817.030
PM10	221.129	0.412	221.541
PM2.5	34.403	0.412	34.815
Formaldehyde	0.019	0.004	0.023
Benzene	0.006	0.366	0.372
Toluene	0.000	0.537	0.537
Ethylbenzene	0.000	0.021	0.021
Xylenes	0.000	0.202	0.202
n-Hexane	0.034	2.290	2.325

Sand Mesa

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	70.517	7.482	77.999
CO	20.577	7.779	28.355
VOC	16.820	88.642	105.462
SO2	1.224	0.010	1.234
TSP	645.931	0.558	646.489
PM10	177.400	0.558	177.958
PM2.5	27.582	0.558	28.140
Formaldehyde	0.012	0.006	0.018
Benzene	0.002	0.042	0.044
Toluene	0.000	0.071	0.071
Ethylbenzene	0.000	0.003	0.003
Xylenes	0.000	0.037	0.037
n-Hexane	0.011	0.427	0.438

58. Total Well Emissions Summary Continued

Sand Mesa South

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	26.444	2.680	29.124
CO	7.716	2.786	10.503
VOC	6.308	31.752	38.060
SO2	0.459	0.004	0.463
TSP	243.667	0.200	243.867
PM10	67.231	0.200	67.430
PM2.5	10.623	0.200	10.823
Formaldehyde	0.005	0.002	0.007
Benzene	0.001	0.015	0.016
Toluene	0.000	0.025	0.025
Ethylbenzene	0.000	0.001	0.001
Xylenes	0.000	0.013	0.013
n-Hexane	0.004	0.153	0.157

Coastal Extension

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	17.629	0.670	18.299
CO	5.144	0.697	5.841
VOC	4.205	7.938	12.143
SO2	0.306	0.001	0.307
TSP	163.160	0.050	163.210
PM10	45.189	0.050	45.239
PM2.5	7.231	0.050	7.281
Formaldehyde	0.003	0.000	0.004
Benzene	0.001	0.004	0.004
Toluene	0.000	0.006	0.006
Ethylbenzene	0.000	0.000	0.000
Xylenes	0.000	0.003	0.003
n-Hexane	0.003	0.038	0.041

Total Wellsite

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	188.705	28.122	216.826
CO	64.744	31.848	96.593
VOC	129.484	603.710	733.194
SO2	3.346	0.057	3.402
TSP	2187.369	2.076	2189.445
PM10	595.695	2.076	597.772
PM2.5	93.075	2.076	95.152
Formaldehyde	0.043	0.020	0.064
Benzene	0.017	0.461	0.478
Toluene	0.037	0.805	0.841
Ethylbenzene	0.009	0.065	0.074
Xylenes	0.005	0.283	0.288
n-Hexane	0.098	3.340	3.437

19. Total Wind Erosion (Pad and Pipeline)

Total Wind Erosion Emissions

Development Area	TSP Emissions (tons/year)	PM10 Emissions (tons/year)	PM2.5 Emissions (tons/year)
Pavillion	1.80	0.90	0.36
Muddy Ridge	5.42	2.71	1.08
Sand Mesa	3.02	1.51	0.60
Sand Mesa South	2.49	1.24	0.50
Coastal Extension	2.43	1.22	0.49
Total	**15.2**	**7.6**	**3.0**

16. Unpaved Road Fugitive Dust Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
TSP	307.278	801.718	636.834	238.813	159.209	2143.852
PM10	80.792	214.717	173.186	64.945	43.297	576.936
PM2.5	11.808	31.382	25.312	9.492	6.328	84.321

Note: Assumes a 50% success rate for Sand Mesa and Coastal areas

25. Vehicle Tailpipe Emissions Summary

Pollutant	Construction		Drilling		Completion	
	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	0.101	0.043	0.206	2.613	0.681	1.714
CO	0.458	0.196	1.127	14.285	2.967	7.472
VOC	0.060	0.026	0.123	1.565	0.407	1.024
SO2	0.005	0.002	0.011	0.134	0.032	0.081

Pollutant	Development		Total	
	Emissions (lb/hr)	Emissions (tons/yr)	Max (lb/hr)	Emissions (tons/yr)
NOx	0.181	0.071	0.681	4.441
CO	1.282	0.500	2.967	22.453
VOC	0.109	0.042	0.407	2.657
SO2	0.010	0.004	0.032	0.221

Development Area	NOx (tons/year)	CO (tons/year)	VOC (tons/year)	SO2 (tons/year)
Pavillion	1.594	8.060	0.954	0.079
Muddy Ridge	1.366	6.909	0.818	0.068
Sand Mesa	0.911	4.606	0.545	0.045
Sand Mesa South	0.342	1.727	0.204	0.017
Coastal Extension	0.228	1.151	0.136	0.011
Total	4.441	22.453	2.657	0.221

79. Central Facility Summary

South Pavillion

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	22.016			22.016
NO [b]	12.922			12.922
NO2 [c]	2.202			2.202
CO	44.032			44.032
VOC	22.016			22.016
SO2	0.000			0.000
TSP	1.552			1.552
PM10	1.552			1.552
PM2.5	1.552			1.552
Formaldehyde	1.541			1.541
Benzene	0.126			0.126
Toluene	0.045			0.045
Ethylbenzene	0.002			0.002
Xylenes	0.016			0.016
n-Hexane				0.000

Pavillion Plant

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	11.587			11.587
NO [b]	6.801			6.801
NO2 [c]	1.159			1.159
CO	23.175			23.175
VOC	11.587			11.587
SO2	0.000			0.000
TSP	0.817			0.817
PM10	0.817			0.817
PM2.5	0.817			0.817
Formaldehyde	0.811			0.811
Benzene	0.066			0.066
Toluene	0.023			0.023
Ethylbenzene	0.001			0.001
Xylenes	0.008			0.008
n-Hexane				0.000

Muddy Ridge

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	29.934	0.164		30.098
NO [b]	17.570	0.096		17.666
NO2 [c]	2.993	0.016		3.010
CO	59.868	0.138		60.006
VOC	29.934	0.005	3.171	33.110
SO2	0.000	0.000		0.000
TSP	2.110	0.012		2.123
PM10	2.110	0.012		2.123
PM2.5	2.110	0.012		2.123
Formaldehyde	2.095	0.000		2.095
Benzene	0.172	0.000	0.162	0.334
Toluene	0.061	0.000	0.000	0.061
Ethylbenzene	0.003		0.000	0.003
Xylenes	0.021		0.000	0.021
n-Hexane		0.003	0.008	0.011

NOTES

1. NOx measured as NO_2
2. Emitted NOx assumed to be 90% NO. Emissions corrected for the difference in molecular weights (30 mw NO/46 mw NO2)
3. Emitted NOx assumed to be 10% NO_2.

80. Central Facility Summary Continued

Hidden Valley

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	11.394			11.394
NO [b]	6.688			6.688
NO2 [c]	1.139			1.139
CO	22.788			22.788
VOC	11.394			11.394
SO2	0.000			0.000
TSP	0.803			0.803
PM10	0.803			0.803
PM2.5	0.803			0.803
Formaldehyde	0.798			0.798
Benzene	0.065			0.065
Toluene	0.023			0.023
Ethylbenzene	0.001			0.001
Xylenes	0.008			0.008
n-Hexane				0.000

Shoshoni Booster

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	25.396	0.055		25.450
NO [b]	14.906	0.032		14.938
NO2 [c]	2.540	0.005		2.545
CO	50.791	0.046		50.837
VOC	25.396	0.002		25.397
SO2	0.000	0.000		0.000
TSP	1.790	0.004		1.794
PM10	1.790	0.004		1.794
PM2.5	1.790	0.004		1.794
Formaldehyde	1.778	0.000		1.778
Benzene	0.146	0.000		0.146
Toluene	0.051	0.000		0.051
Ethylbenzene	0.002			0.002
Xylenes	0.018			0.018
n-Hexane		0.001		0.001

Sand Mesa

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	68.848	0.449		69.297
NO [b]	40.411	0.264		40.674
NO2 [c]	6.885	0.045		6.930
CO	137.696	0.377		138.073
VOC	68.848	0.012	8.721	77.582
SO2	0.000	0.000		0.000
TSP	4.854	0.034		4.888
PM10	4.854	0.034		4.888
PM2.5	4.854	0.034		4.888
Formaldehyde	4.819	0.000		4.820
Benzene	0.395	0.000	0.446	0.841
Toluene	0.140	0.000	0.000	0.140
Ethylbenzene	0.006		0.000	0.006
Xylenes	0.049		0.000	0.049
n-Hexane		0.008	0.021	0.029

81. Central Facility Summary Continued

Sand Mesa South

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	32.155	0.274		32.429
NO [b]	18.873	0.161		19.034
NO2 [c]	3.215	0.027		3.243
CO	64.310	0.230		64.539
VOC	32.155	0.008	4.295	36.457
SO2	0.000	0.000		0.000
TSP	2.267	0.021		2.288
PM10	2.267	0.021		2.288
PM2.5	2.267	0.021		2.288
Formaldehyde	2.251	0.000		2.251
Benzene	0.185	0.000	0.219	0.404
Toluene	0.065	0.000	0.000	0.065
Ethylbenzene	0.003		0.000	0.003
Xylenes	0.023		0.000	0.023
n-Hexane		0.005	0.011	0.016

Coastal Extension

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	17.864	0.219		18.083
NO [b]	10.485	0.129		10.614
NO2 [c]	1.786	0.022		1.808
CO	35.728	0.184		35.911
VOC	17.864	0.006	1.982	19.852
SO2	0.000	0.000		0.000
TSP	1.259	0.017		1.276
PM10	1.259	0.017		1.276
PM2.5	1.259	0.017		1.276
Formaldehyde	1.250	0.000		1.251
Benzene	0.103	0.000	0.101	0.204
Toluene	0.036	0.000	0.000	0.036
Ethylbenzene	0.002		0.000	0.002
Xylenes	0.013		0.000	0.013
n-Hexane		0.004	0.005	0.009

Total Facility

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	219.193	1.161		220.354
NO [b]	128.657	0.681		129.338
NO2 [c]	21.919	0.116		22.035
CO	438.386	0.975		439.361
VOC	219.193	0.032	18.170	237.395
SO2	0.000	0.000		0.000
TSP	15.452	0.088		15.541
PM10	15.452	0.088		15.541
PM2.5	15.452	0.088		15.541
Formaldehyde	15.344	0.001		15.344
Benzene	1.258	0.000	0.928	2.186
Toluene	0.444	0.000	0.000	0.444
Ethylbenzene	0.020		0.000	0.020
Xylenes	0.155		0.000	0.155
n-Hexane		0.021	0.044	0.065

73. Central Facility Heater Summary

Species	Muddy Ridge (tons/yr)	Shoshoni Booster (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx [a]	0.164	0.055	0.449	0.274	0.219	1.161
CO [a]	0.138	0.046	0.377	0.230	0.184	0.975
TOC [c]	0.018	0.006	0.049	0.030	0.024	0.128
VOC	0.005	0.002	0.012	0.008	0.006	0.032
SOx [b]	0.000	0.000	0.000	0.000	0.000	0.000
TSP [c]	0.012	0.004	0.034	0.021	0.017	0.088
PM10 [c]	0.012	0.004	0.034	0.021	0.017	0.088
PM2.5 [c]	0.012	0.004	0.034	0.021	0.017	0.088
Benzene [d]	0.000	0.000	0.000	0.000	0.000	0.000
Toluene [d]	0.000	0.000	0.000	0.000	0.000	0.000
Hexane [d]	0.003	0.001	0.008	0.005	0.004	0.021
Formaldehyde [d]	0.000	0.000	0.000	0.000	0.000	0.001

77. Coastal Extension Dehydrator

Assumptions

Proposed Action Throughput Rate: 20 MMscf/day (As projected by Project Proponents)
Alternative B Throughput Rate: 10

Gas Composition: Muddy Ridge Sample

Inlet Gas Conditions: Inlet gas was assumed to be saturated at 700 psi and 80 F
as reported by the project proponents

Calculations

Dehydrator emissions were simulated using GRI GlyCalc version 4.0 software

Emissions

Species	Emissions (lbs/hr)	Emissions (tons/year)
VOC	0.453	1.982
Benzene	0.023	0.101
Toluene	0.000	0.000
Ethylbenzene	0.000	0.000
Xylenes	0.000	0.000
n-Hexane	0.001	0.005
Total HAPs	0.024	0.106

Note: See Muddy Ridge GRI GlyCalc report for Coastal Extension emissions

72. Coastal Extension Central Facility Heater Emissions

Assumptions

Separator Size:	500	MBTU/hr (Reported by Project Proponents)
Dehydrator Size:	500	MBTU/hr (Reported by Project Proponents)
Total Heater Capacity:	1000	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour for entire year (Est.from fuel usage reported by Proponents)
	4380	hours/year
Net Low Fuel Gas Heat Content	1170	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * 1{,}000 \text{ (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * 1{,}000{,}000 \text{ (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{2{,}000 \text{ (lbs/ton)} * 1{,}000 \text{ (Btu/scf - Standard Fuel Heating Value)}}$$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Species	Total Heater Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx [a]	100	0.050	0.219
CO [a]	84	0.042	0.184
TOC [c]	11	0.006	0.024
VOC	N.A.	0.001	0.006
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.004	0.017
PM10 [c]	7.6	0.004	0.017
PM2.5 [c]	7.6	0.004	0.017
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.001	0.004
Formaldehyde [d]	0.075	0.000	0.000

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

66. Coastal Extension Compression and Processing

Assumptions:

Total Power Requirement: 1850 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	4.08	17.9
CO [1]		2.0	8.16	35.7
VOC [1]		1.0	4.08	17.9
PM10 [2, 5]	0.0194	0.070	0.29	1.3
PM2.5 [2,5]	0.0194	0.070	0.29	1.3
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.02	0.1
Toluene [2]	0.000558	0.00203	0.01	0.0
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.00	0.0
Formaldehyde [1]		0.07	0.29	1.3

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engine:
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

es)

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative B Inventory Date: 7/8/2004

23. Completion Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0	miles (Estimated from project area and existing road system)
Hours of Operation	155	hours per site (Weighted average for all areas - Project Proponents)
Number of Heavy Diesel Truck Trips	147	(Weighted average for all areas - Project Proponents)
Number of Pickup Trips	132	(Weighted average for all areas - Project Proponents)
Diesel Fuel sulfur content	0.05	% (Typical value)
Diesel Fuel density	7.08	lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10	miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile) * \# Trips * Trip Distance (miles)}}{\text{453.6 (g/lb) * 2000 (lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal) * 453.6 (g/lb) * Fuel Sulfur Content * 2 (S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Completion Vehicles	Heavy Haul Trucks			Heavy Duty Pickups			Total [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.510	0.040	3.03	0.171	0.013	0.681	1.688
CO	17.09	1.072	0.083	33.64	1.895	0.147	2.967	7.357
VOC [c]	4.83	0.303	0.023	1.84	0.104	0.008	0.407	1.008
SO2	0.32	0.020	0.002	0.21	0.012	0.001	0.032	0.080

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate and a 50% success rate in Sand Mesa and Coastal

67. Compression Summary

Pollutant	South Pavillion (tons/yr)	Pavillion Plant (tons/yr)	Muddy Ridge (tons/yr)	Hidden Valley (tons/yr)	Shoshoni Booster (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx [1]	22.02	11.59	29.93	11.39	25.40	68.85	32.15	17.86	219.19
CO [1]	44.03	23.17	59.87	22.79	50.79	137.70	64.31	35.73	438.39
VOC [1]	22.02	11.59	29.93	11.39	25.40	68.85	32.15	17.86	219.19
PM10 [2, 5]	1.55	0.82	2.11	0.80	1.79	4.85	2.27	1.26	15.45
PM2.5 [2,5]	1.55	0.82	2.11	0.80	1.79	4.85	2.27	1.26	15.45
SO2 [3]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzene [2]	0.13	0.07	0.17	0.07	0.15	0.40	0.18	0.10	1.26
Toluene [2]	0.04	0.02	0.06	0.02	0.05	0.14	0.07	0.04	0.44
Ethylbenzene [2]	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.02
Xylenes [2]	0.02	0.01	0.02	0.01	0.02	0.05	0.02	0.01	0.16
Formaldehyde [1]	1.54	0.81	2.10	0.80	1.78	4.82	2.25	1.25	15.34

6. Construction Equipment Fugitive Dust Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
TSP	4.188	4.151	2.768	1.038	0.346	12.491
PM15	1.872	1.706	1.137	0.427	0.142	5.284
PM10	1.404	1.280	0.853	0.320	0.107	3.963
PM2.5	0.440	0.436	0.291	0.109	0.036	1.312

21. Construction Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0	miles (Estimated from project area and existing road system)
Hours of Construction	22	hours per site (Project proponents - Weighted average for all areas)
Number of Heavy Diesel Truck Trips	3	(Project proponents - Weighted average for all areas)
Number of Pickup Trips	3	(Project proponents - Weighted average for all areas)
Diesel Fuel sulfur content	0.05	% (Typical value)
Diesel Fuel density	7.08	lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10	miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile)} * \text{Number of Trips} * \text{Trip Distance (miles)}}{453.6 \text{ (g/lb)} * 2000 \text{ (lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal)} * 453.6 \text{ (g/lb)} * \text{Fuel Sulfur Content} * 2 \text{ (S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Construction Vehicles	Heavy Haul Trucks			Heavy Duty Pickups			Total [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.073	0.001	3.03	0.027	0.000	0.101	0.042
CO	17.09	0.154	0.002	33.64	0.303	0.003	0.458	0.191
VOC [c]	4.83	0.044	0.000	1.84	0.017	0.000	0.060	0.025
SO2	0.32	0.003	0.000	0.21	0.002	0.000	0.005	0.002

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate

40. Construction Emissions Summary

Pavillion

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		1.601	0.234	7.983		9.818
CO		8.088	0.056	1.830		9.974
VOC		0.958	0.011	0.235	55.606	56.810
SO2		0.080	0.007	0.135		0.221
TSP	318.288		0.018	0.133		318.440
PM10	84.819		0.018	0.133		84.971
PM2.5	13.177		0.018	0.129		13.325
Formaldehyde			0.0048			0.005
Benzene					0.007	0.007
Toluene					0.037	0.037
Ethylbenzene					0.009	0.009
Xylenes					0.005	0.005
n-Hexane					0.045	0.045

Muddy Ridge

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		1.372	0.729	62.208		64.309
CO		6.933	0.197	14.256		21.386
VOC		0.821	0.034	1.827	42.667	45.349
SO2		0.068	0.020	1.048		1.137
TSP	815.26		0.048	1.040		816.343
PM10	219.90		0.048	1.040		220.991
PM2.5	33.29		0.048	1.009		34.348
Formaldehyde			0.019			0.019
Benzene					0.006	0.006
Toluene					0.000	0.000
Ethylbenzene					0.000	0.000
Xylenes					0.000	0.000
n-Hexane					0.034	0.034

Sand Mesa

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		0.915	0.486	69.120		70.520
CO		4.622	0.131	15.840		20.593
VOC		0.547	0.022	2.030	14.222	16.822
SO2		0.045	0.013	1.165		1.224
TSP	643.920		0.032	1.155		645.107
PM10	175.802		0.032	1.155		176.988
PM2.5	26.265		0.032	1.121		27.417
Formaldehyde			0.012			0.012
Benzene					0.002	0.002
Toluene					0.000	0.000
Ethylbenzene					0.000	0.000
Xylenes					0.000	0.000
n-Hexane					0.011	0.011

41. Construction Emissions Summary Continued

Sand Mesa South

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		0.343	0.182	25.920		26.445
CO		1.733	0.049	5.940		7.722
VOC		0.205	0.008	0.761	5.333	6.308
SO2		0.017	0.005	0.437		0.459
TSP	242.520		0.012	0.433		242.965
PM10	66.451		0.012	0.433		66.896
PM2.5	10.059		0.012	0.420		10.492
Formaldehyde			0.005			0.005
Benzene					0.001	0.001
Toluene					0.000	0.000
Ethylbenzene					0.000	0.000
Xylenes					0.000	0.000
n-Hexane					0.004	0.004

Coastal Extension

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		0.114	0.061	8.640		8.815
CO		0.578	0.016	1.980		2.574
VOC		0.068	0.003	0.254	1.778	2.103
SO2		0.006	0.002	0.146		0.153
TSP	81.313		0.004	0.144		81.461
PM10	22.387		0.004	0.144		22.535
PM2.5	3.448		0.004	0.140		3.592
Formaldehyde			0.002			0.002
Benzene					0.000	0.000
Toluene					0.000	0.000
Ethylbenzene					0.000	0.000
Xylenes					0.000	0.000
n-Hexane					0.001	0.001

Total Construction

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		4.344	1.692	173.871		179.908
CO		21.954	0.449	39.846		62.249
VOC		2.600	0.079	5.107	119.607	127.392
SO2		0.216	0.047	2.930		3.194
TSP	2101.298		0.114	2.906		2104.317
PM10	569.362		0.114	2.906		572.381
PM2.5	86.240		0.114	2.820		89.174
Formaldehyde			0.042			0.042
Benzene					0.016	0.016
Toluene					0.037	0.037
Ethylbenzene					0.009	0.009
Xylenes					0.005	0.005
n-Hexane					0.096	0.096

78. Central Dehydrator Summary

Species	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
VOC	3.171	8.721	4.295	1.982	18.170
Benzene	0.162	0.446	0.219	0.101	0.928
Toluene	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	0.000	0.000	0.000	0.000	0.000
Xylenes	0.000	0.000	0.000	0.000	0.000
n-Hexane	0.008	0.021	0.011	0.005	0.044
Total HAPs	0.170	0.467	0.230	0.106	0.973

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative B Inventory Date: 7/8/2004

24. Development & Reclamation Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0	miles (Estimated from project area and existing road system)
Hours of Operation	20	hours per site (Weighted average for all areas - Project Proponents)
Number of Heavy Diesel Truck Trips	3	(Weighted average for all areas - Project Proponents)
Number of Pickup Trips	10	(Weighted average for all areas - Project Proponents)
Diesel Fuel sulfur content	0.05	% (Typical value)
Diesel Fuel density	7.08	lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10	miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile)} * \#\ \text{Trips} * \text{Trip Distance (miles)}}{453.6\ \text{(g/lb)} * 2000\ \text{(lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal)} * 453.6\ \text{(g/lb)} * \text{Fuel Sulfur Content} * 2\ \text{(S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Development Vehicles	**Heavy Haul Trucks**			**Heavy Duty Pickups**			**Total** [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.081	0.001	3.03	0.100	0.001	0.181	0.069
CO	17.09	0.170	0.002	33.64	1.112	0.011	1.282	0.487
VOC [c]	4.83	0.048	0.000	1.84	0.061	0.001	0.109	0.041
SO2	0.32	0.003	0.000	0.21	0.007	0.000	0.010	0.004

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate

39. Well Development Venting Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
VOC	55.606	42.667	14.222	5.333	1.778	119.607
Benzene	0.007	0.006	0.002	0.001	0.000	0.016
Toluene	0.037	0.000	0.000	0.000	0.000	0.037
Ethylbenzene	0.009	0.000	0.000	0.000	0.000	0.009
Xylenes	0.005	0.000	0.000	0.000	0.000	0.005
n-Hexane	0.045	0.034	0.011	0.004	0.001	0.096

Note: Assumes a 50% success rate for Sand Mesa and Coastal

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32. Drill Rig Emissions Summary

Assumptions: 2 to 4 rigs will be in operation at any one time
1 rig will operate part of the year in Pavillion
1 rig will operate full time in Muddy Ridge
1or 2 rigs will operate full time in Sand Mesa, Sand Mesa South or Coastal Extension

Short-Term Emissions (lbs/hr)

Species	Pavillion	Muddy Ridge	Sand Mesa	Sand Mesa South	Coastal Extension	Maximum (lbs/hr)
NOx	5.28	14.40	14.40	*	*	14.40
CO	1.21	3.30	3.30	*	*	3.30
VOC [b]	0.16	0.42	0.42	*	*	0.42
PM10 [c]	0.09	0.24	0.24	*	*	0.24
PM2.5 [d]	0.09	0.23	0.23	*	*	0.23
SO2	0.09	0.24	0.24	*	*	0.24

***** Identical to Sand Mesa - One or two rigs covers all three areas

Annual Emissions (tons/yr)

Species	Pavillion	Muddy Ridge	Sand Mesa	Sand Mesa South	Coastal Extension	Total (tons/yr)
NOx	7.983	62.208	69.120	25.920	8.640	173.871
CO	1.830	14.256	15.840	5.940	1.980	39.846
VOC [b]	0.235	1.827	2.030	0.761	0.254	5.107
PM10 [c]	0.133	1.040	1.155	0.433	0.144	2.906
PM2.5 [d]	0.129	1.009	1.121	0.420	0.140	2.820
SO2	0.135	1.048	1.165	0.437	0.146	2.930

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22. Drilling Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0	miles (Estimated from project area and existing road system)
Hours of Operation	650	hours per site (Time weighted average - project proponents)
Number of Heavy Diesel Truck Trips	156	(Area weighted average - project proponents)
Number of Pickup Trips	250	(Area weighted average - project proponents)
Diesel Fuel sulfur content	0.05	% (Typical value)
Diesel Fuel density	7.08	lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10	miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile)} * \text{\# Trips} * \text{Trip Distance (miles)}}{453.6 \text{ (g/lb)} * 2000 \text{ (lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal)} * 453.6 \text{ (g/lb)} * \text{Fuel Sulfur Content} * 2 \text{ (S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Drilling Vehicles	Heavy Haul Trucks			Heavy Duty Pickups			Total [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.129	0.042	3.03	0.077	0.025	0.206	2.546
CO	17.09	0.271	0.088	33.64	0.856	0.278	1.127	13.918
VOC [c]	4.83	0.077	0.025	1.84	0.047	0.015	0.123	1.525
SO2	0.32	0.005	0.002	0.21	0.005	0.002	0.011	0.130

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate

20. Fugitive Dust Summary

TSP Fugitive Dust Summary

Development Area	Construction		Pipeline		Reclamation		Unpaved Road		Wind Erosion	Max	Total
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	tons/yr	lbs/hr	tons/yr
Pavillion	37.40	4.188	22.18	2.484	18.70	2.094	404.82	307.28	2.24	404.82	318.29
Muddy Ridge	24.71	4.151	22.18	2.129	14.69	2.116	230.56	801.72	5.14	230.56	815.26
Sand Mesa	24.71	2.768	22.18	0.710	14.69	1.410	279.10	636.83	2.20	279.10	643.92
Sand Mesa South	24.71	1.038	22.18	0.266	14.69	0.529	279.10	238.81	1.87	279.10	242.52
Coastal Extension	24.71	0.346	22.18	0.089	14.69	0.176	279.10	79.60	1.10	279.10	81.31
Maximum/Total	**37.40**	**12.491**	**22.18**	**5.679**	**18.70**	**6.326**	**404.82**	**2064.25**	**12.55**	**404.82**	**2101.30**

PM10 Fugitive Dust Summary

Development Area	Construction		Pipeline		Reclamation		Unpaved Road		Wind Erosion	Max	Total
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	tons/yr	lbs/hr	tons/yr
Pavillion	12.54	1.404	7.14	0.799	6.27	0.702	104.64	80.79	1.12	104.64	84.82
Muddy Ridge	7.62	1.280	7.14	0.685	4.53	0.652	60.33	214.72	2.57	60.33	219.90
Sand Mesa	7.62	0.853	7.14	0.228	4.53	0.435	73.46	173.19	1.10	73.46	175.80
Sand Mesa South	7.62	0.320	7.14	0.086	4.53	0.163	73.46	64.94	0.94	73.46	66.45
Coastal Extension	7.62	0.107	7.14	0.029	4.53	0.054	73.46	21.65	0.55	73.46	22.39
Maximum/Total	**12.54**	**3.963**	**7.14**	**1.827**	**6.27**	**2.006**	**104.64**	**555.29**	**6.28**	**104.64**	**569.36**

PM2.5 Fugitive Dust Summary

Development Area	Construction		Pipeline		Reclamation		Unpaved Road		Wind Erosion	Max	Total
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	tons/yr	lbs/hr	tons/yr
Pavillion	3.93	0.440	2.33	0.261	1.96	0.220	15.29	11.81	0.45	15.29	13.18
Muddy Ridge	2.59	0.436	2.33	0.224	1.54	0.222	8.82	31.38	1.03	8.82	33.29
Sand Mesa	2.59	0.291	2.33	0.075	1.54	0.148	10.74	25.31	0.44	10.74	26.26
Sand Mesa South	2.59	0.109	2.33	0.028	1.54	0.056	10.74	9.49	0.37	10.74	10.06
Coastal Extension	2.59	0.036	2.33	0.009	1.54	0.019	10.74	3.16	0.22	10.74	3.45
Maximum/Total	**3.93**	**1.312**	**2.33**	**0.596**	**1.96**	**0.664**	**15.29**	**81.16**	**2.51**	**15.29**	**86.24**

45. Production Heater Summary

Pollutant	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx [a]	5.26	3.29	4.38	0.55	0.22	13.69
CO [a]	4.42	2.76	3.68	0.46	0.18	11.50
TOC [c]	0.58	0.36	0.48	0.06	0.02	1.51
VOC	0.16	0.09	0.12	0.02	0.01	0.39
SOx [b]	0.00	0.00	0.00	0.00	0.00	0.00
TSP [c]	0.40	0.25	0.33	0.04	0.02	1.04
PM10 [c]	0.40	0.25	0.33	0.04	0.02	1.04
PM2.5 [c]	0.40	0.25	0.33	0.04	0.02	1.04
Benzene [d]	0.00	0.00	0.00	0.00	0.00	0.00
Toluene [d]	0.00	0.00	0.00	0.00	0.00	0.00
Hexane [d]	0.09	0.06	0.08	0.01	0.00	0.25
Formaldehyde [d]	0.00	0.00	0.00	0.00	0.00	0.01

28. Heavy Equipment Tailpipe Emissions Summary

Development Area	NOx (tons/year)	CO (tons/year)	VOC (tons/year)	PM10 (tons/year)	PM2.5 (tons/year)	SO2 (tons/year)	Formaldehyde (tons/year)
Pavillion	0.234	0.056	0.011	0.018	0.018	0.007	0.005
Muddy Ridge	0.729	0.197	0.034	0.048	0.048	0.020	0.019
Sand Mesa	0.486	0.131	0.022	0.032	0.032	0.013	0.012
Sand Mesa South	0.182	0.049	0.008	0.012	0.012	0.005	0.005
Coastal Extension	0.061	0.016	0.003	0.004	0.004	0.002	0.002
Total	1.692	0.449	0.079	0.114	0.114	0.047	0.042

62. Hidden Valley Compression and Processing

Assumptions:

Total Power Requirement: 1180 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	2.60	11.4
CO [1]		2.0	5.20	22.8
VOC [1]		1.0	2.60	11.4
PM10 [2, 5]	0.0194	0.070	0.18	0.8
PM2.5 [2,5]	0.0194	0.070	0.18	0.8
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.01	0.1
Toluene [2]	0.000558	0.00203	0.01	0.0
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.00	0.0
Formaldehyde [1]		0.07	0.18	0.8

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engine:
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

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34. Muddy Ridge Produced Gas Characteristics (MR 24-42)

Gas Heat Value (wet): 1267 Btu/scf

C1-C2 Wt. Fraction:	0.735
VOC Wt. Fraction:	0.250
Non-HC Wt. Fraction:	0.015
Total:	1.000

COMPONENT	MOLE PERCENT	COMPONENT MOLE WEIGHT (lb/lb-mole)	NET MOLE WEIGHT (lb/lb-mole)	WEIGHT FRACTION	GROSS HEATING VALUE (BTU/scf)	NET DRY HEATING VALUE (BTU/scf)	LOWER HEATING VALUE (BTU/scf)	NET LOW HEATING VALUE (BTU/scf)
Methane	79.318	16.043	12.725	0.590	1010.000	801.112	910.000	721.794
Ethane	10.453	30.070	3.143	0.146	1769.800	184.997	1618.000	169.130
Propane	3.927	44.097	1.732	0.080	2516.200	98.811	2316.000	90.949
i-Butane	1.456	58.123	0.846	0.039	3252.100	47.351	3005.000	43.753
n-Butane	1.069	58.123	0.621	0.029	3262.400	34.875	3013.000	32.209
i-Pentane	1.136	72.150	0.820	0.038	4000.900	45.450	3698.000	42.009
n-Pentane	0.759	72.150	0.548	0.025	4008.800	30.427	3708.000	28.144
Hexanes+	0.865	86.177	0.745	0.035	4756.200	41.141	4404.000	38.095
Heptanes	0.080	100.204	0.080	0.004	5502.500	4.402	5100.000	4.080
Octanes	0.000	114.231	0.000	0.000	6249.100	0.000		0.000
Nonanes	0.000	128.258	0.000	0.000	6996.400	0.000		0.000
Decanes	0.000	142.285	0.000	0.000	7743.200	0.000		0.000
Benzene	0.001	78.120	0.001	0.000	3715.500	0.037		0.000
Toluene	0.000	92.130	0.000	0.000	4444.600	0.000		0.000
Ethylbenzene	0.000	106.160	0.000	0.000	5191.500	0.000		0.000
Xylenes	0.000	106.160	0.000	0.000	5183.500	0.000		0.000
n-Hexane	0.005	86.177	0.004	0.000	4756.200	0.238		0.000
Helium	0.000	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	0.605	28.013	0.169	0.008	0.000	0.000	0.000	0.000
Carbon Dioxide	0.328	44.010	0.144	0.007	0.000	0.000	0.000	0.000
Oxygen	0.000	32.000	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	0.000	34.080	0.000	0.000	637.100	0.000	588.000	0.000
TOTAL	100.000		21.579	1.000		1288.841		1170.162

Relative Mole Weight (lb/lb-mole) = [Mole Percent * Molecular weight (lb/lb-mole)] / 100

Weight Fraction = Net Mole Weight / Total Mole Weight

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4. Muddy Ridge, Sand Mesa and Coastal Construction Fugitive Dust Emissions

Assumptions:

Hours of Construction	3.5	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	28	hours per well pad
Pieces of Equipment	4	- 1 Grader @ 50% utilization (Project Proponent)
		- 1 Backhoe @ 10% utilization
		- 1 Scraper @ 75% utilization
		- 1 D8 Dozer @ 50% utilization
Equivalent Equipment Utilization	1.85	
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	34	percent (Composit well pad soil sample analysis)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 13.36 lbs TSP/hour/piece of equipment

Emissions = 5.49 lbs PM15/hour/piece of equipment

Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	24.71	0.3459	8.303
PM15	10.16	0.1422	3.412
PM10	7.62	0.1066	2.559
PM2.5	2.59	0.0363	0.872

a Assumes Proponent specified equipment utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

10. Muddy Ridge, Sand Mesa and Coastal Reclamation Fugitive Dust Emissions

Assumptions:

Hours of Construction	3	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	24	hours per well pad
Pieces of Equipment	1	Grader @ 50% utilization (Project Proponent)
	1	Backhoe @ 10% utilization
	1	Dozer @ 50% utilization
Equivalent Equipment Utilization	1.1	
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	34	percent (Composit soil sample)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 13.36 lbs TSP/hour/piece of equipment

Emissions = 5.49 lbs PM15/hour/piece of equipment

Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	14.69	0.1763	4.231
PM15	6.04	0.0725	1.739
PM10	4.53	0.0543	1.304
PM2.5	1.54	0.0185	0.444

a Assumes Proponent specified equipment utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

68. Muddy Ridge Central Facility Heater Emissions

Assumptions

Separator Size:	0	MBTU/hr (Reported by Project Proponents)
Dehydrator Size:	750	MBTU/hr (Reported by Project Proponents)
Total Heater Capacity:	750	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour for entire year (Est.from fuel usage reported by Proponents)
	4380	hours/year
Net Low Fuel Gas Heat Content	1170	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * \text{1,000 (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * \text{1,000,000 (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{\text{2,000 (lbs/ton)} * \text{1,000 (Btu/scf - Standard Fuel Heating Value)}}$$

$$\text{VOC Emissions (tons/yr)} = \text{TOC Emissions (tons/yr)} * \text{VOC wt. fraction}$$

Species	Total Heater Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx [a]	100	0.038	0.164
CO [a]	84	0.032	0.138
TOC [c]	11	0.004	0.018
VOC	N.A.	0.001	0.005
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.003	0.012
PM10 [c]	7.6	0.003	0.012
PM2.5 [c]	7.6	0.003	0.012
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.001	0.003
Formaldehyde [d]	0.075	0.000	0.000

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

74. Muddy Ridge Dehydrator

Assumptions

Proposed Action Throughput Rate: 20 MMscf/day (As projected by Project Proponents)
Alternative B Throughput Rate: 16

Gas Composition: Muddy Ridge Sample

Inlet Gas Conditions: Inlet gas was assumed to be saturated at 700 psi and 80 F
as reported by the project proponents

Calculations

Dehydrator emissions were simulated using GRI GlyCalc version 4.0 software

Emissions

Species	Emissions (lbs/hr)	Emissions (tons/year)
VOC	0.724	3.171
Benzene	0.037	0.162
Toluene	0.000	0.000
Ethylbenzene	0.000	0.000
Xylenes	0.000	0.000
n-Hexane	0.002	0.008
Total HAPs	0.039	0.170

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative B Inventory Date: 7/8/2004

37. Muddy Ridge Well Development Venting

Assumptions: Following Completion, Wells are Vented prior to connnection to the gathering pipeline

Venting Period 24 hours (Project Proponents)

Amount of Vented Gas: 0.5 MMscf (Average Volume Estimated by Proponents)

Development Rate: 12 Wells per year (Project Proponents)

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/day)	COMPONENT FLOW RATE (lb/hr)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	79.318	12.725	0.590	396.590	698.579	100.595
Ethane	30.07	10.453	3.143	0.146	52.265	172.557	24.848
Propane	44.097	3.927	1.732	0.080	19.635	95.067	13.690
i-Butane	58.123	1.456	0.846	0.039	7.280	46.459	6.690
n-Butane	58.123	1.069	0.621	0.029	5.345	34.110	4.912
i-Pentane	72.15	1.136	0.820	0.038	5.680	44.996	6.479
n-Pentane	72.15	0.759	0.548	0.025	3.795	30.063	4.329
Hexanes	86.177	0.865	0.745	0.035	4.325	40.923	5.893
Heptanes	100.204	0.080	0.080	0.004	0.400	4.401	0.634
Octanes	114.231	0.000	0.000	0.000	0.000	0.000	0.000
Nonanes	128.258	0.000	0.000	0.000	0.000	0.000	0.000
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.005	0.043	0.006
Toluene	92.13	0.000	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	106.16	0.000	0.000	0.000	0.000	0.000	0.000
Xylenes	106.16	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	86.177	0.005	0.004	0.000	0.025	0.237	0.034
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	0.605	0.169	0.008	3.025	9.304	1.340
Carbon Dioxide	44.01	0.328	0.144	0.007	1.640	7.925	1.141
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**9.298**	**5.397**	**0.250**	**46.490**	**296.298**	**42.667**
HAP SUBTOTAL		**0.006**	**0.005**	**0.000**	**0.030**	**0.279**	**0.040**
TOTAL		**100**	**21.579**	**1.000**	**500**	**1184.663**	**170.592**

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43. Muddy Ridge Production Heater Emissions

Assumptions

Number of new producing wells	40	(Reported by Project Proponents)
Separator Size	750	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour (Est.from fuel usage reported by Proponents)
	6	months/year (Nov. thru April - Project Proponents)
	2190	hours/year
Net Low Fuel Gas Heat Content	1267	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * 1{,}000 \text{ (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * 1{,}000{,}000 \text{ (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{2{,}000 \text{ (lbs/ton)} * 1{,}000 \text{ (Btu/scf - Standard Fuel Heating Value)}}$$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Pollutant	Separator Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr/well)	Emissions [e] (tons/yr)
NOx [a]	100	0.019	3.285
CO [a]	84	0.016	2.759
TOC [c]	11	0.002	0.361
VOC	N.A.	0.001	0.090
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.001	0.250
PM10 [c]	7.6	0.001	0.250
PM2.5 [c]	7.6	0.001	0.250
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.059
Formaldehyde [d]	0.075	0.000	0.002

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

61. Muddy Ridge Compression and Processing

Assumptions:

Total Power Requirement: 3100 Horsepower

Equations:

Emissions (lbs/hr) = $\frac{\text{Emission Factor (g/hp-hr) * Power (hp)}}{\text{453.6 (g/lb)}}$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	6.83	29.9
CO [1]		2.0	13.67	59.9
VOC [1]		1.0	6.83	29.9
PM10 [2, 5]	0.0194	0.070	0.48	2.1
PM2.5 [2,5]	0.0194	0.070	0.48	2.1
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.04	0.2
Toluene [2]	0.000558	0.00203	0.01	0.1
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.00	0.0
Formaldehyde [1]		0.07	0.48	2.1

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engine:
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

es)

30. Muddy Ridge Drill Rig Engine Emissions

Assumptions:

Hours of Operation	720	hours/well (30 days on average @ 24 hrs/day - Project Proponents)
Development Rate	12	wells/year
Load Factor	0.4	(Assumed typical value)
Rig Size	1500	hp (Drilling Contractor)
Diesel Fuel Sulfur Content	0.05	% (typical value)

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (lb/hp-hr)} * \text{Rated Horsepower (hp)} * \text{Operating Hours (hrs)} * \text{Load Factor (Dimensionless)}}{\text{2000 (lb/tons)}}$$

SO2 E. Factor (lb/hp-hr) = Fuel sulfur content * 0.00809

Species	Drill Rig Emissions			
	E. Factor [d] (lb/MMBtu)	E. Factor [a] (lb/hp-hr)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx		0.024	14.400	62.21
CO		0.0055	3.300	14.26
VOC [b]		0.000705	0.423	1.83
PM10 [c]	0.0573	0.0004011	0.241	1.04
PM2.5 [d]	0.0556	0.0003892	0.234	1.01
SO2		0.0004045	0.243	1.05

a AP-42 Volume I, Large Stationary Diesel Engines Table 3.4-1, 10/96
b Emission Factor represents total Hydrocarbon Emissions
c PM10 Emission Factor determined from Table 3.4-2, 10/96
d PM2.5 Emission Factor estimated as PM3.0 (filterable + condensable) from Table 3.4-2, 10/96
e Conversion from lb/MMBtu to lb/hp-hr assumes a BSFC of 7,000 BTU/hp-hr (Table 3.4-1, 10/96)
f Assumes a Development rate as stated by the proponents (Summarized in page 1)

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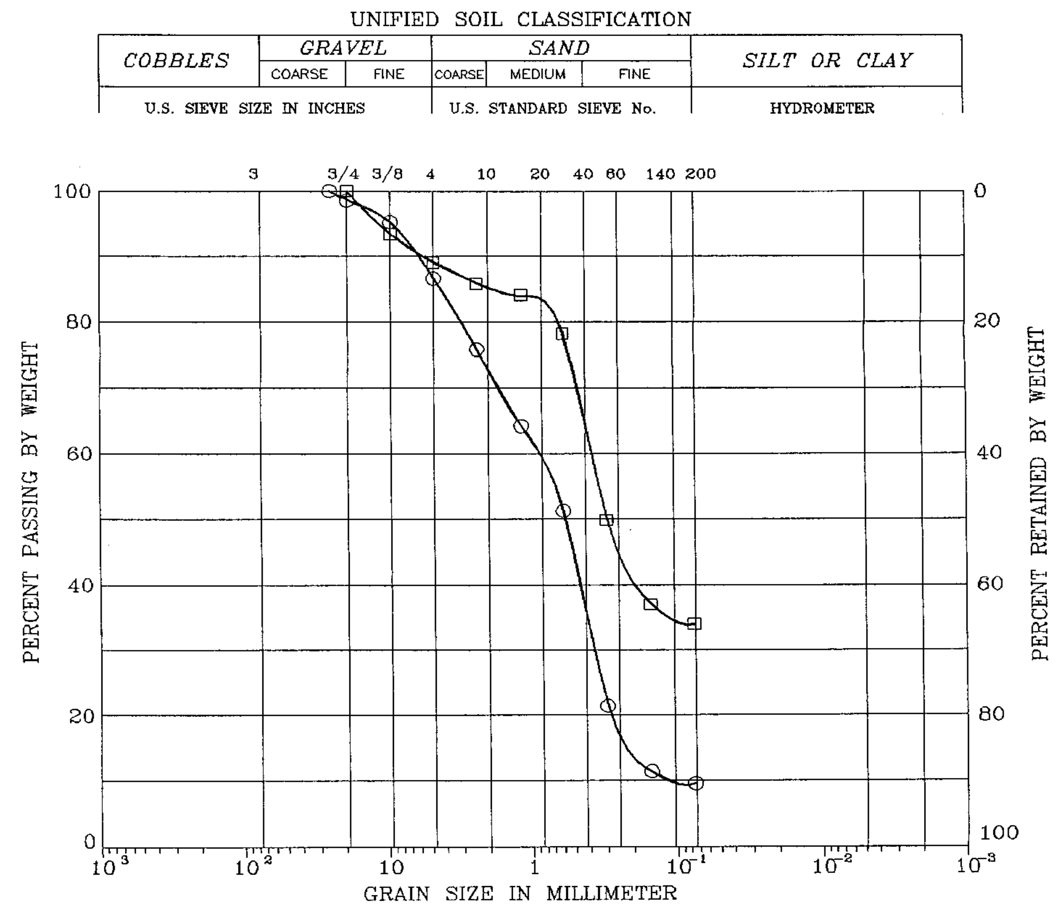
5. Muddy Ridge Road and Pad Silt Content



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION
○	Road	–			Well-Graded Sand (SW) 13% grvl, 77% sand, 10% silt
□	Pad	–			Silty Sand (SM) 11% grvl, 55% sand, 34% silt

GRAIN SIZE DISTRIBUTION

Muddy Ridge Field, Wyoming	Project No. For Buys & Assoc.

Resource Engineering, Inc.

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative B Inventory Date: 7/8/2004

47. Muddy Ridge Condensate Storage Tank Emissions

Assumptions:

Average Condensate Production Rate :	1.7	bbls per day (Average production for existing wells - WOGCC)
Expected Successful Producting Wells:	40	
Predicted Condensate Production:	68	bbls/day
Separator Conditions :		200 psi and 130 F (Specified by Proponent)
Condensate Composition:		Average of 4 samples from Muddy Ridge wells

Calculations:

Stock tank flash emissions estimated with E&P Tanks software

Emissions:

Component	Flash Emissions (tons/yr)
Benzene	0.215
Toluene	0.326
Ethylbenzene	0.013
Xylenes	0.122
n-Hexane	1.294
Total HAPS	1.970
Total VOC	97.368

Buys & Associates, Inc.
Environmental Consultants

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14. Muddy Ridge Unpaved Road Fugitive Dust Emissions

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity
Const. & Drilling Activities				
Semi: Rig Transport	60,000	15		
Haul Truck: Water/fuel	20,000	83		
Haul Truck: Other	48,000	48		
HD Pickup Truck: Misc.	7,000	295		
Total Const. & Drilling	15,712	441	20	720

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	7.09	86.89	31.28	375.4
PM10	1.95	23.85	8.59	103.0
PM2.5	0.28	3.49	1.25	15.1

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity
Completion Activities				
Haul Truck: Water	20,000	40		
Haul Truck: Other	48,000	159		
HD Pickup Truck: Misc.	7,000	185		
Total Completion	25,331	384	20	300

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	9.01	230.56	34.58	415.0
PM10	2.36	60.33	9.05	108.6
PM2.5	0.34	8.82	1.32	15.9

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity
Development & Reclamation				
Haul Truck: Water	20,000	0		
Haul Truck: Other	48,000	3		
HD Pickup Truck: Misc.	7,000	10		
Total Dev. & Reclamation	16,462	13	20	30

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	7.26	62.92	0.94	11.3
PM10	1.98	17.19	0.26	3.1
PM2.5	0.29	2.51	0.04	0.5

* Const. & Drilling Assumes 30 24-hr days
Completion assumes 30 10-hr days
Development & Reclamation assumes 3 10-hr days

Muddy Ridge Total

Particulate Matter Scale	Emission Factor (lbs/VMT)	Max Emissions (lbs/hr)	Total Emissions (Tons/well)	Total Emissions (Tons/year)
TSP		230.56	66.81	801.7
PM10		60.33	17.89	214.7
PM2.5		8.82	2.62	31.4

52. Muddy Ridge Well Blowdown Emissions

Assumptions: During Production, a percentage of the wells are periodically blown down to unload fluids

# of New Producing Wells	40	
% Wells Requiring Blowdown	20	% (Estimated by Project Proponents)
# of Blowdown wells	8	Wells
Blowdown Frequency	1	per week for a period of 1 hour each (Project Proponents)
Blowdown Volume	15	Mscf/event (Estimated from Production Data)
Annual Blowdown Volume	6.2	MMscf/year

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/hr)	COMPONENT FLOW RATE (lb/hr/well)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	79.318	12.725	0.590	11.898	502.977	104.619
Ethane	30.07	10.453	3.143	0.146	1.568	124.241	25.842
Propane	44.097	3.927	1.732	0.080	0.589	68.448	14.237
i-Butane	58.123	1.456	0.846	0.039	0.218	33.450	6.958
n-Butane	58.123	1.069	0.621	0.029	0.160	24.559	5.108
i-Pentane	72.15	1.136	0.820	0.038	0.170	32.397	6.739
n-Pentane	72.15	0.759	0.548	0.025	0.114	21.646	4.502
Hexanes	86.177	0.865	0.745	0.035	0.130	29.464	6.129
Heptanes	100.204	0.080	0.080	0.004	0.012	3.169	0.659
Octanes	114.231	0.000	0.000	0.000	0.000	0.000	0.000
Nonanes	128.258	0.000	0.000	0.000	0.000	0.000	0.000
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.000	0.031	0.006
Toluene	92.13	0.000	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	106.16	0.000	0.000	0.000	0.000	0.000	0.000
Xylenes	106.16	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	86.177	0.005	0.004	0.000	0.001	0.170	0.035
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	0.605	0.169	0.008	0.091	6.699	1.393
Carbon Dioxide	44.01	0.328	0.144	0.007	0.049	5.706	1.187
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**9.298**	**5.397**	**0.250**	**1.395**	**213.335**	**44.374**
HAP SUBTOTAL		**0.006**	**0.005**	**0.000**	**0.001**	**0.201**	**0.042**
TOTAL		**100.002**	**21.579**	**1.000**	**15**	**852.958**	**177.415**

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17. Wind Erosion Fugitive Dust Emissions From Well & Facility Pads

Assumptions

Threshold Friction Velocity U_t* — 1.02 m/s (2.28 mph) for well pads (AP-42 Table 13.2.5-2 Overburden - Western Surface Coal Mine)

Exposed Surface Type — Flat

Fastest Mile Wind Speed U_{10}^+ — 23.2 meters/sec (52 mph) reported as fastest 2-minute wind speed for Lander, WY (2002)

Number soil of disturbances — 2 for well and facility pads (disturbance at construction and reclamation)

Equations

Friction Velocity $U^* = 0.053\ U_{10}^+$

Erosion Potential P (g/m^2/period) = $58*(U^*-U_t^*)^2 + 25*(U^*-U_t^*)$ for $U^*>U_t^*$, P = 0 for $U^*< U_t^*$

$$\text{Emissions (tons/year)} = \frac{\text{Erosion Potential(g/m}^2\text{/period)*Disturbed Area(m}^2\text{)*Disturbances/year*(k)* Number of Wells/year}}{\text{(453.6 g/lb)*2000 lbs/ton/Develop Period*Total Number of Wells}}$$

Particle Size Multiplier (k)		
30 um	<10 um	<2.5 um
1.0	0.5	0.2

Maxium U_{10}^+ Wind Speed (m/s)	Maximum U* Friction Velocity m/s	Well/Pipeline U_t* Threshold Velocity[a] m/s	Erosion Potential g/m^2
23.20	1.23	1.02	7.79

Wind Erosion Emissions

Development Area	Disturbance (Acres)	Disturbance (meters^2)	TSP Emissions (tons/year)	PM10 Emissions (tons/year)	PM2.5 Emissions (tons/year)
Pavillion	119	481,899	1.18	0.59	0.24
Muddy Ridge	106	428,966	2.16	1.08	0.43
Sand Mesa	146	591,245	0.99	0.50	0.20
Sand Mesa S.	28	111,288	0.56	0.28	0.11
Coastal	20	80,937	0.19	0.10	0.04
Total	**419**	**1,694,335**	**5.1**	**2.5**	**1.0**

2. Pavillion Construction Fugitive Dust Emissions

Assumptions:

Hours of Construction	2	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	16	hours per well pad
Pieces of Equipment	2	- 1 Backhoe & 1 Grader each @ 100% utilization (Project Proponent)
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	45	percent (Composit Soil Sample from Pavillion Well Pads)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 18.70 lbs TSP/hour/piece of equipment

Emissions = 8.36 lbs PM15/hour/piece of equipment

Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	37.40	0.2992	4.188
PM15	16.72	0.1337	1.872
PM10	12.54	0.1003	1.404
PM2.5	3.93	0.0314	0.440

a Assumes 100% utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

36. Pavillion Well Development Venting

Assumptions: Following Completion, Wells are Vented prior to connnection to the gathering pipeline

Venting Period 24 hours (Project Proponents)

Amount of Vented Gas: 0.5 MMscf (Average Volume Estimated by Proponents)

Development Rate: 14 Wells per year (Project Proponents)

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/day)	COMPONENT FLOW RATE (lb/hr)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	81.960	13.149	0.589	409.800	721.848	121.271
Ethane	30.07	9.165	2.756	0.123	45.825	151.295	25.418
Propane	44.097	1.654	0.729	0.033	8.270	40.041	6.727
i-Butane	58.123	0.703	0.409	0.018	3.515	22.432	3.769
n-Butane	58.123	0.426	0.248	0.011	2.130	13.593	2.284
i-Pentane	72.15	0.377	0.272	0.012	1.885	14.933	2.509
n-Pentane	72.15	0.180	0.130	0.006	0.900	7.130	1.198
Hexanes	86.177	1.164	1.003	0.045	5.820	55.068	9.251
Heptanes	100.204	1.832	1.836	0.082	9.160	100.779	16.931
Octanes	114.231	0.813	0.929	0.042	4.065	50.984	8.565
Nonanes	128.258	0.361	0.463	0.021	1.805	25.419	4.270
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.005	0.043	0.007
Toluene	92.13	0.004	0.004	0.000	0.022	0.217	0.037
Ethylbenzene	106.16	0.001	0.001	0.000	0.005	0.052	0.009
Xylenes	106.16	0.001	0.001	0.000	0.003	0.029	0.005
n-Hexane	86.177	0.006	0.005	0.000	0.029	0.270	0.045
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	1.200	0.336	0.015	6.000	18.454	3.100
Carbon Dioxide	44.01	0.153	0.067	0.003	0.765	3.697	0.621
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**7.5224**	**6.029**	**0.270**	**37.612**	**330.989**	**55.606**
HAP SUBTOTAL		**0.0124**	**0.011**	**0.000**	**0.062**	**0.612**	**0.103**
TOTAL		**100.000**	**22.337**	**1.000**	**500**	**1226.283**	**206.016**

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative B Inventory Date: 7/8/2004

29. Pavillion Drill Rig Engine Emissions

Assumptions:

Hours of Operation	216	hours/well (9 days on average @ 24 hrs/day - Project Proponents)
Development Rate	14	wells/year (Project Proponents)
Load Factor	0.4	(Assumed typical value)
Rig Size	550	hp (Drilling Contractor)
Diesel Fuel Sulfur Content	0.05	% (typical value)

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (lb/hp-hr) * Rated Horsepower (hp)* Operating Hours (hrs) * Load Factor (Dimensionless)}}{\text{2000 (lb/tons)}}$$

SO2 E. Factor (lb/hp-hr) = Fuel sulfur content * 0.00809

Species	Drill Rig Emissions			
	E. Factor [d] (lb/MMBtu)	E. Factor [a] (lb/hp-hr)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx		0.024	5.280	7.98
CO		0.0055	1.210	1.83
VOC [b]		0.000705	0.155	0.23
PM10 [c]	0.0573	0.0004011	0.088	0.13
PM2.5 [d]	0.0556	0.0003892	0.086	0.13
SO2		0.0004045	0.089	0.13

a AP-42 Volume I, Large Stationary Diesel Engines Table 3.4-1, 10/96
b Emission Factor represents total Hydrocarbon Emissions
c PM10 Emission Factor determined from Table 3.4-2, 10/96
d PM2.5 Emission Factor estimated as PM3.0 (filterable + condensable) from Table 3.4-2, 10/96
e Conversion from lb/MMBtu to lb/hp-hr assumes a BSFC of 7,000 BTU/hp-hr (Table 3.4-1, 10/96)
f Assumes a Development rate as stated by the proponents (Summarized in page 1)

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33. Pavillion Produced Gas Characteristics (Pavillion 11-10)

Gas Heat Value (wet): 1301 Btu/scf

C1-C2 Wt. Fraction:	0.712
VOC Wt. Fraction:	0.270
Non-HC Wt. Fraction:	0.018
Total:	1.000

COMPONENT	MOLE PERCENT	COMPONENT MOLE WEIGHT (lb/lb-mole)	NET MOLE WEIGHT (lb/lb-mole)	WEIGHT FRACTION	GROSS HEATING VALUE (BTU/scf)	NET DRY HEATING VALUE (BTU/scf)	LOWER HEATING VALUE (BTU/scf)	NET LOW HEATING VALUE (BTU/scf)
Methane	81.960	16.043	13.149	0.589	1010.000	827.796	910.000	745.836
Ethane	9.165	30.070	2.756	0.123	1769.800	162.202	1618.000	148.290
Propane	1.654	44.097	0.729	0.033	2516.200	41.618	2316.000	38.307
i-Butane	0.703	58.123	0.409	0.018	3252.100	22.862	3005.000	21.125
n-Butane	0.426	58.123	0.248	0.011	3262.400	13.898	3013.000	12.835
i-Pentane	0.377	72.150	0.272	0.012	4000.900	15.083	3698.000	13.941
n-Pentane	0.180	72.150	0.130	0.006	4008.800	7.216	3708.000	6.674
Hexanes+	1.164	86.177	1.003	0.045	4756.200	55.362	4404.000	51.263
Heptanes	1.832	100.204	1.836	0.082	5502.500	100.806	5100.000	93.432
Octanes	0.813	114.231	0.929	0.042	6249.100	50.805		0.000
Nonanes	0.361	128.258	0.463	0.021	6996.400	25.257		0.000
Decanes	0.000	142.285	0.000	0.000	7743.200	0.000		0.000
Benzene	0.001	78.120	0.001	0.000	3715.500	0.037		0.000
Toluene	0.004	92.130	0.004	0.000	4444.600	0.191		0.000
Ethylbenzene	0.001	106.160	0.001	0.000	5191.500	0.047		0.000
Xylenes	0.001	106.160	0.001	0.000	5183.500	0.026		0.000
n-Hexane	0.006	86.177	0.005	0.000	4756.200	0.271		0.000
Helium	0.000	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	1.200	28.013	0.336	0.015	0.000	0.000	0.000	0.000
Carbon Dioxide	0.153	44.010	0.067	0.003	0.000	0.000	0.000	0.000
Oxygen	0.000	32.000	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	0.000	34.080	0.000	0.000	637.100	0.000	588.000	0.000
TOTAL	100.000		22.337	1.000		1323.478		1131.703

Relative Mole Weight (lb/lb-mole) = [Mole Percent * Molecular weight (lb/lb-mole)] / 100

Weight Fraction = Net Mole Weight / Total Mole Weight

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42. Pavillion Production Heater Emissions

Assumptions

Number of new producing wells	96	(Reported by Project Proponents)
Separator Size	500	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour (Est.from fuel usage reported by Proponents)
	6	months/year (Nov. thru April - Project Proponents)
	2190	hours/year
Net Low Fuel Gas Heat Content	1132	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.270	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * \text{1,000 (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * \text{1,000,000 (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{\text{2,000 (lbs/ton)} * \text{1,000 (Btu/scf - Standard Fuel Heating Value)}}$$

$$\text{VOC Emissions (tons/yr)} = \text{TOC Emissions (tons/yr)} * \text{VOC wt. fraction}$$

Species	Separator Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr/well)	Emissions [e] (tons/yr)
NOx [a]	100	0.013	5.256
CO [a]	84	0.011	4.415
TOC [c]	11	0.001	0.578
VOC	N.A.	0.000	0.156
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.001	0.399
PM10 [c]	7.6	0.001	0.399
PM2.5 [c]	7.6	0.001	0.399
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.095
Formaldehyde [d]	0.075	0.000	0.004

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

26. Pavillion Construction Heavy Equipment Tailpipe Emissions

Assumptions:

Hours of Operation	16	hours/site (Project Proponents)
Development Rate	14	wells per year
Load Factor	0.5	(Assumed typical value)
Backhoe Size	84	hp (Contractor)
Backhoe Utilization	100	percent
Motor Grader Size	170	hp (Contractor)
Motor Grader Utilization	100	percent

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Rated Hp (hp)} * \text{Operating Hours (hrs)} * \text{Load Factor (Dimensionless)} * \text{Utilization}}{453.6 \text{ (g/lb)} * 2000 \text{ (lb/tons)}}$$

Heavy Const. Vehicles	Backhoe			Grader		
	E. Factor [a] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)	E. Factor [b] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)
NOx	8.15	0.755	0.085	7.14	1.338	0.150
CO	2.28	0.211	0.024	1.54	0.289	0.032
VOC [c]	0.37	0.034	0.004	0.36	0.067	0.008
PM10 [d]	0.5	0.046	0.005	0.63	0.118	0.013
PM2.5 [d]	0.5	0.046	0.005	0.63	0.118	0.013
SO2	0.22	0.020	0.002	0.22	0.041	0.005
Formaldehyde	0.22	0.020	0.002	0.12	0.022	0.003

Heavy Const. Vehicles	Total	
	Emissions (lb/hr/well)	Emissions[e] (tons/yr)
NOx	2.093	0.234
CO	0.500	0.056
VOC [c]	0.102	0.011
PM10 [d]	0.164	0.018
PM2.5 [d]	0.164	0.018
SO2	0.062	0.007
Formaldehyde	0.043	0.005

a AP-42 Volume II, Mobile Sources, Nonroad Vehicles, Table 11-7.1 Off-highway truck
b AP-42 Volume II, Mobile Sources, Nonroad Vehicles, Table 11-7.1 Motor Grader
c Emission Factor represents total Hydrocarbon Emissions
d All emitted particulate matter assumed to be PM2.5
e Assumes a proponet specified maximum development rate

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60. Pavillion Plant Compression and Processing

Assumptions:

Total Power Requirement: 1200 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	2.65	11.6
CO [1]		2.0	5.29	23.2
VOC [1]		1.0	2.65	11.6
PM10 [2, 5]	0.0194	0.070	0.19	0.8
PM2.5 [2,5]	0.0194	0.070	0.19	0.8
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.02	0.1
Toluene [2]	0.000558	0.00203	0.01	0.0
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.00	0.0
Formaldehyde [1]		0.07	0.19	0.8

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

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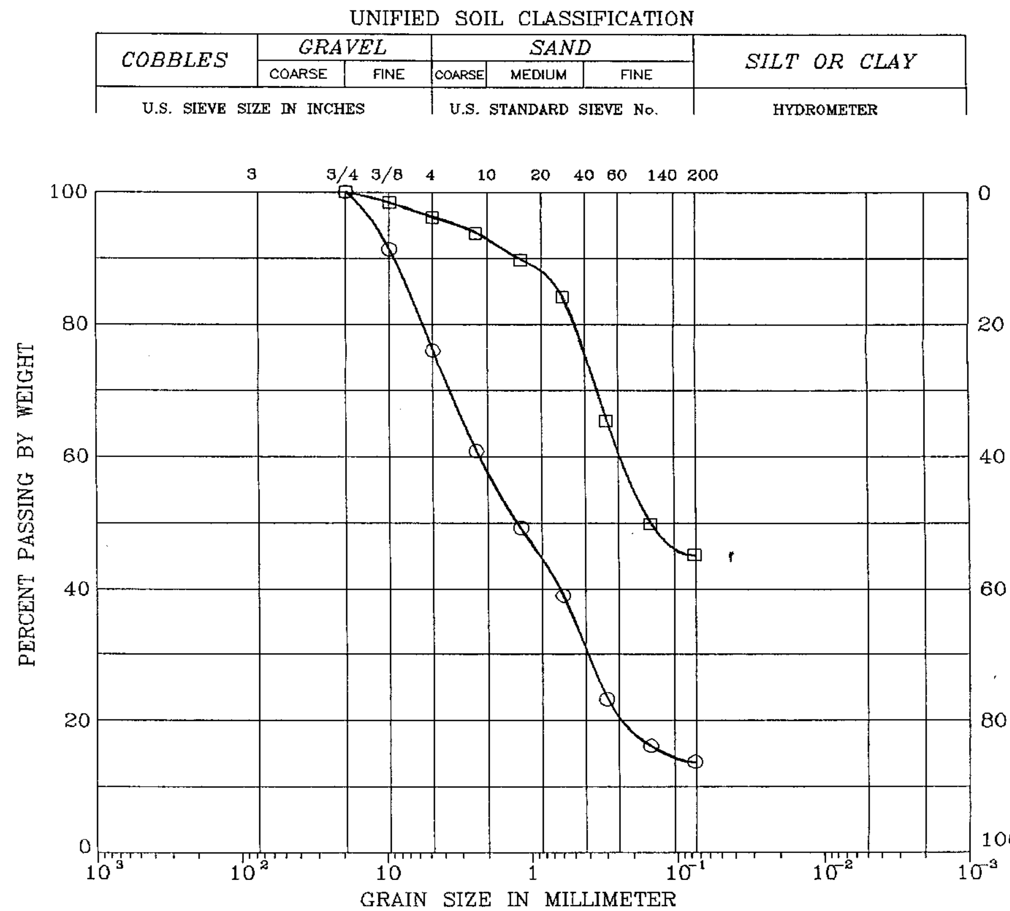
3. Pavillion Road and Pad Silt Content



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION	
○	Road	–			Silty Sand (SM)	24% grvl, 62% sand, 14% silt
□	Pad	–			Very Silty Sand (SM)	4% grvl, 51% sand, 45% silt

GRAIN SIZE DISTRIBUTION

Pavillion Field, Wyoming

Project No.
For Buys & Assoc.

Resource Engineering, Inc.

46. Pavillion Condensate Storage Tank Emissions

Assumptions:

Average Condensate Production Rate :	0.25	bbls per day (Average production for existing wells - WOGCC)
Expected Successful Producting Wells:	96	
Predicted Condensate Production:	24	bbls/day
Separator Conditions :		200 psi and 130 F (Specified by Proponent)
Condensate Composition:		Analysis from Pavillion 11-10 well

Calculations:

Stock tank flash emissions estimated with E&P Tanks software

Emissions:

Component	Flash Emissions (tons/yr)
Benzene	0.002
Toluene	0.004
Ethylbenzene	0.001
Xylenes	0.003
n-Hexane	0.016
Total HAPS	0.025
Total VOC	1.119

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13. Pavillion Unpaved Road Fugitive Dust Emissions

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity*
Const. & Drilling Activities				
Semi: Rig Transport	60,000	10		
Haul Truck: Water/Fuel	20,000	29		
Haul Truck: Other	48,000	34		
HD Pickup Truck: Misc.	7,000	94		
Total Const. & Drilling	20,778	167	15	240

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	8.16	85.14	10.22	143.0
PM10	2.18	22.72	2.73	38.2
PM2.5	0.32	3.32	0.40	5.6

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity*
Completion Activities				
Haul Truck: Water	20,000	12		
Haul Truck: Other	48,000	78		
HD Pickup Truck: Misc.	7,000	65		
Total Completion	28,639	155	15	55

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	9.58	404.82	11.13	155.9
PM10	2.48	104.64	2.88	40.3
PM2.5	0.36	15.29	0.42	5.9

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity*
Development & Reclamation				
Haul Truck: Water	20,000	0		
Haul Truck: Other	48,000	2		
HD Pickup Truck: Misc.	7,000	10		
Total Dev. & Reclamation	13,833	12	15	30

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	6.66	39.93	0.60	8.4
PM10	1.85	11.10	0.17	2.3
PM2.5	0.27	1.62	0.02	0.3

Pavillion Total

Particulate Matter Scale	Emission Factor (lbs/VMT)	Max Emissions (lbs/hr)	Total Emissions (Tons/well)	Total Emissions (Tons/year)
TSP		404.82	21.95	307.3
PM10		104.64	5.77	80.8
PM2.5		15.29	0.84	11.8

* Const. & Drilling Assumes 10 24-hr days
Completion assumes 5.5 10-hr days
Development & Reclamation assumes 3 10-hr days

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51. Pavillion Well Blowdown Emissions

Assumptions:		During Production, a percentage of the wells are periodically blown down to unload fluids
# of New Producing Wells	96	
% Wells Requiring Blowdown	20	% (Estimated by Project Proponents)
# of Blowdown wells	19.2	Wells
Blowdown Frequency	1	per week for a period of 1 hour each (Project Proponents)
Blowdown Volume	14	Mscf/event (Estimated from Production Data)
Annual Blowdown Volume	14.0	MMscf/year

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/hr)	COMPONENT FLOW RATE (lb/hr/well)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	81.960	13.149	0.589	11.474	485.082	242.153
Ethane	30.07	9.165	2.756	0.123	1.283	101.670	50.754
Propane	44.097	1.654	0.729	0.033	0.232	26.907	13.432
i-Butane	58.123	0.703	0.409	0.018	0.098	15.074	7.525
n-Butane	58.123	0.426	0.248	0.011	0.060	9.135	4.560
i-Pentane	72.15	0.377	0.272	0.012	0.053	10.035	5.009
n-Pentane	72.15	0.180	0.130	0.006	0.025	4.791	2.392
Hexanes	86.177	1.164	1.003	0.045	0.163	37.006	18.473
Heptanes	100.204	1.832	1.836	0.082	0.256	67.723	33.807
Octanes	114.231	0.813	0.929	0.042	0.114	34.261	17.103
Nonanes	128.258	0.361	0.463	0.021	0.051	17.081	8.527
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.000	0.029	0.014
Toluene	92.13	0.004	0.004	0.000	0.001	0.146	0.073
Ethylbenzene	106.16	0.001	0.001	0.000	0.000	0.035	0.018
Xylenes	106.16	0.001	0.001	0.000	0.000	0.020	0.010
n-Hexane	86.177	0.006	0.005	0.000	0.001	0.181	0.090
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	1.200	0.336	0.015	0.168	12.401	6.191
Carbon Dioxide	44.01	0.153	0.067	0.003	0.021	2.484	1.240
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**7.5224**	**6.029**	**0.270**	**1.053**	**222.425**	**111.034**
HAP SUBTOTAL		**0.0124**	**0.011**	**0.000**	**0.002**	**0.411**	**0.205**
TOTAL		**100.000**	**22.337**	**1.000**	**14**	**824.062**	**411.372**

7. Pipeline Construction Fugitive Dust Emissions

Assumptions:

Number of Completed Wells/Year	32	Assumes 100% success rate in Pavillion & Muddy Ridge, 50% success rate in Sand Mesa and Coastal
Hours of Construction	2	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	16	hours per well pad
Pieces of Equipment	3	- 1 Grader @ 30% utilization (Project Sub-Contractor) - 1 Backhoe @ 50% utilization - 1 Trencher @ 60% utilization
Equivalent Equipment Utilization	1.4	
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	39.2	percent (Weighted soil sample analysis)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 15.84 lbs TSP/hour/piece of equipment

Emissions = 6.80 lbs PM15/hour/piece of equipment

Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	22.18	0.1775	5.679
PM15	9.51	0.0761	2.436
PM10	7.14	0.0571	1.827
PM2.5	2.33	0.0186	0.596

a Assumes Proponent specified equipment utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

8. Pipeline Fugitive Dust Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
TSP	2.484	2.129	0.710	0.266	0.089	5.679
PM15	1.066	0.913	0.304	0.114	0.038	2.436
PM10	0.799	0.685	0.228	0.086	0.029	1.827
PM2.5	0.261	0.224	0.075	0.028	0.009	0.596

18. Wind Erosion Fugitive Dust Emissions From Pipeline ROWs

Assumptions

Threshold Friction Velocity U_t* 1.02 m/s (2.28 mph) for well pads (AP-42 Table 13.2.5-2 Overburden - Western Surface Coal Mine

Exposed Surface Type Flat

Fastest Mile Wind Speed U_{10}^+ 23.2 meters/sec (52 mph) reported as fastest 2-minute wind speed for Lander, WY (2002)

Number soil of disturbances 2 for well and facility pads (disturbance at construction and reclamation)

Equations

Friction Velocity $U^* = 0.053\ U_{10}^+$

Erosion Potential P $(g/m^2/period) = 58*(U^*-U_t^*)^2 + 25*(U^*-U_t^*)$ for $U^*>U_t^*$, P = 0 for $U^*< U_t^*$

$$\text{Emissions (tons/year)} = \frac{\text{Erosion Potential}(g/m^2/\text{period})*\text{Disturbed Area}(m^2)*\text{Disturbances/year}*(k)*\text{ Number of Wells/year}}{(453.6\ g/lb)*2000\ \text{lbs/ton/Develop Period*Total Number of Wells}}$$

Particle Size Multiplier (k)		
30 um	<10 um	<2.5 um
1.0	0.5	0.2

Maxium U_{10}^+ Wind Speed (m/s)	Maximum U* Friction Velocity m/s	Well/Pipeline U_t* Threshold Velocity[a] m/s	Erosion Potential g/m²
23.20	1.23	1.02	7.79

Wind Erosion Emissions

Development Area	Disturbance (Acres)	Disturbance (meters²)	TSP Emissions (tons/year)	PM10 Emissions (tons/year)	PM2.5 Emissions (tons/year)
Pavillion	107	433,741	1.06	0.53	0.21
Muddy Ridge	146	591,245	2.98	1.49	0.60
Sand Mesa	177	717,264	1.20	0.60	0.24
Sand Mesa S.	64	260,617	1.31	0.66	0.26
Coastal	93	376,357	0.90	0.45	0.18
Total	**588**	**2,379,224**	**7.5**	**3.7**	**1.5**

83. Point Source Locations and Stack Parameters

Facility	UTM Easting (meters)	UTM Northing (meters)	UTM Zone	Lambert Easting (km)	Lambert Northing (km)	Ground Elevation (meters)
South Pavillion	696600	4790560	12	-2.236	74.561	1615.1
Pavillion Plant	699450	4792200	12	0.564	76.065	1613.9
Muddy Ridge	697950	4794950	12	-0.807	78.764	1654.8
Hidden Valley	722050	4782150	12	22.114	65.718	1549.0
Shoshoni Booster	734850	4788000	12	34.644	71.009	1499.0
Sand Mesa	715975	4798000	12	16.692	81.201	1514.9
Sand Mesa South	715125	4795469	12	15.800	78.780	1501.2
Coastal Extension	705976	4799569	12	7.078	83.000	1550.2

Note: Proposed locations for Shoshoni, Sand Mesa South, and Coastal facilities estimated from pipeline routes

Measurement System	Stack Height (ft or m)	Stack Diameter (ft or m)	Exhaust Velocity (ft/sec or m/s)	Exhaust Temp. (F or K)
Imperial	30	1	114.8	1000
Metric	9.144	0.3048	35	811

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55. Production Emissions Summary

Pavillion

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	5.256		0.158		5.414
CO	4.415		1.751		6.166
VOC	0.156	1.119	0.096	111.034	112.405
SO2	0.000		0.011		0.011
TSP	0.399				0.399
PM10	0.399				0.399
PM2.5	0.399				0.399
Formaldehyde	0.004				0.004
Benzene	0.000	0.0018581		0.014	0.016
Toluene	0.000	0.0037047		0.073	0.077
Ethylbenzene		0.0006194		0.018	0.018
Xylenes		0.0030968		0.010	0.013
n-Hexane	0.095	0.0161032		0.090	0.201

Muddy Ridge

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	3.285		0.066		3.351
CO	2.759		0.729		3.489
VOC	0.090	97.368	0.040	44.374	141.872
SO2	0.000		0.005		0.005
TSP	0.250				0.250
PM10	0.250				0.250
PM2.5	0.250				0.250
Formaldehyde	0.002				0.002
Benzene	0.000	0.2152		0.006	0.222
Toluene	0.000	0.3256		0.000	0.326
Ethylbenzene		0.0128		0.000	0.013
Xylenes		0.1224		0.000	0.122
n-Hexane	0.059	1.2936		0.035	1.388

Sand Mesa

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	4.380		0.066		4.446
CO	3.679		0.729		4.409
VOC	0.121	5.415	0.040	47.332	52.908
SO2	0.000		0.005		0.005
TSP	0.333				0.333
PM10	0.333				0.333
PM2.5	0.333				0.333
Formaldehyde	0.003				0.003
Benzene	0.000	0.018		0.007	0.025
Toluene	0.000	0.042		0.000	0.042
Ethylbenzene		0.002		0.000	0.002
Xylenes		0.022		0.000	0.022
n-Hexane	0.079	0.138		0.038	0.255

56. Production Emissions Summary Continued

Sand Mesa South

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	0.548		0.008		0.556
CO	0.460		0.091		0.551
VOC	0.015	0.677	0.005	5.916	6.613
SO2	0.000		0.001		0.001
TSP	0.042				0.042
PM10	0.042				0.042
PM2.5	0.042				0.042
Formaldehyde	0.000				0.000
Benzene	0.000	0.002		0.001	0.003
Toluene	0.000	0.005		0.000	0.005
Ethylbenzene		0.000		0.000	0.000
Xylenes		0.003		0.000	0.003
n-Hexane	0.010	0.017		0.005	0.032

Coastal Extension

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	0.219		0.003		0.222
CO	0.184		0.036		0.220
VOC	0.006	0.271	0.002	2.367	2.645
SO2	0.000		0.000		0.000
TSP	0.017				0.017
PM10	0.017				0.017
PM2.5	0.017				0.017
Formaldehyde	0.000				0.000
Benzene	0.000	0.001		0.000	0.001
Toluene	0.000	0.002		0.000	0.002
Ethylbenzene		0.000		0.000	0.000
Xylenes		0.001		0.000	0.001
n-Hexane	0.004	0.007		0.002	0.013

Total Production

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	13.688		0.301		13.988
CO	11.498		3.337		14.835
VOC	0.388	104.850	0.183	211.023	316.443
SO2	0.000		0.021		0.021
TSP	1.040				1.040
PM10	1.040				1.040
PM2.5	1.040				1.040
Formaldehyde	0.010				0.010
Benzene	0.000	0.238		0.029	0.267
Toluene	0.000	0.379		0.073	0.452
Ethylbenzene		0.016		0.018	0.033
Xylenes		0.151		0.010	0.161
n-Hexane	0.246	1.472		0.170	1.889

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Project: Wind River Alternative B Inventory
Date: 7/8/2004

1. Alternative B Development Summary (Reduced Development)

Well Development

Field	Total Wells To Be Drilled	Wells Drilled Per Year	Total Producing Wells	Pad Disturbance (acres)	Pipeline Distrubance (acres)	Development Area Size (acres)
Pavillion	96	14	96	119	107	11,774
Muddy Ridge	40	12	40	106	146	7,550
Sand Mesa	80	8	40	208	177	9,572
Sand Mesa South	10	3	5	28	64	3,820
Coastal Extension	7	1	2	20	93	5220
Total	**233**	**38**	**183**	**481**	**588**	**37,936**

Additional Compression/Treatment/Generation Capacity (hp)

Facility	Compression	Treatment	Generation	Total
South Pavillion	2,280	0	0	**2,280**
Pavillion Plant	1,200	0	0	**1,200**
Muddy Ridge	3,100	0	0	**3,100**
Hidden Valley	1,180	0	0	**1,180**
Shoshoni Booster	2,280	0	350	**2,630**
Sand Mesa	4,500	2,280	350	**7,130**
Sand Mesa South	2,280	700	350	**3,330**
Coastal Extension	1,500	0	350	**1,850**
Total	**18,320**	**2,980**	**1,400**	**22,700**

Additional Facility Heater Capacity (MMbtu)

Facility	Dehydration	Separation	Total
South Pavillion			**0.00**
Pavillion Plant			**0.00**
Muddy Ridge	0.75		**0.75**
Hidden Valley			**0.00**
Shoshoni Booster		0.25	**0.25**
Sand Mesa	1.20	0.85	**2.05**
Sand Mesa South	0.75	0.50	**1.25**
Coastal Extension	0.50	0.50	**1.00**
Total	**3.20**	**2.10**	**5.30**

50. Pumper Tailpipe Emissions

Assumptions:

Number of New Pumpers:	3	(Estimated by Project Proponent for full development)
Pumper Mileage:	2,500	miles/pumper/month (Project Proponents)
Total Annual New Pumper Mileage:	90,000	miles/year
Hours of Pumper Operation:	8	hours per day (Project Proponents)
Hours of Pumper Operation:	2080	hours per year
Fuel sulfur content	0.05	% (Typical value)
Fuel density	7.08	lbs/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile)} * \text{Vehicle Miles Traveled (miles/yr)}}{453.6\ \text{(g/lb)} * 2000\ \text{(lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal)} * 453.6\ \text{(g/lb)} * \text{Fuel Sulfur Content} * 2\ \text{(S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Pumper Vehicles	Heavy Duty Pickups		
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	3.03	0.289	0.301
CO	33.64	3.209	3.337
VOC [b]	1.84	0.176	0.183
SO2	0.21	0.020	0.021

a AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
b Emission factor is for total Hydrocarbons.

Pumper Vehicles	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx	0.158	0.066	0.066	0.008	0.003	0.301
CO	1.751	0.729	0.729	0.091	0.036	3.337
VOC	0.096	0.040	0.040	0.005	0.002	0.183
SO2	0.011	0.005	0.005	0.001	0.000	0.021

11. Reclamation Fugitive Dust Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
TSP	2.094	2.116	1.410	0.529	0.176	6.326
PM15	0.936	0.869	0.580	0.217	0.072	2.675
PM10	0.702	0.652	0.435	0.163	0.054	2.006
PM2.5	0.220	0.222	0.148	0.056	0.019	0.664

12. Vehicle Unpaved Road Fugitive Dust Emissions

Assumptions:

Precipitation	73	days per year (NCDC data for Lander, WY - 2002)
Road Silt Content	12	percent (Average value of composit samples)
Road Moisture	0.9	percent (Average value of composit samples)

Equation: From AP-42 13.2.2, Unpaved Roads, 9/98

$$\text{E Size Spec. Factor (lb/VMT)} = \frac{k * (s/12)^a * (W/3)^b * [(365-p)/365]}{(M/0.2)^c}$$

Where k, a, b, and c are empirical constants listed below and

E = particle size specific emission factor (lbs/VMT)
s = surface material silt content (%)
W = mean vehicle weight (tons)
M = surface material moisture content (%)
p = number of days with at least 0.01 in of precipitation per year

Empirical Constants			
Constant	**PM2.5**	**PM10**	**PM30/TSP**
k	0.38	2.6	10.0
a	0.8	0.8	0.8
b	0.4	0.4	0.5
c	0.3	0.3	0.4

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Project: Wind River Alternative B Inventory
Date: 7/8/2004

15. Sand Mesa & Coastal Unpaved Road Fugitive Dust Emissions

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity
Const. & Drilling Activities				
Semi: Rig Transport	60,000	20		
Haul Truck: Water	20,000	138		
Haul Truck: Other	48,000	64		
HD Pickup Truck: Misc.	7,000	434		
Total Const. & Drilling	15,351	656	25	1200

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	7.01	95.82	57.49	689.9
PM10	1.93	26.36	15.82	189.8
PM2.5	0.28	3.85	2.31	27.7

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity
Completion Activities				
Haul Truck: Water	20,000	40		
Haul Truck: Other	48,000	145		
HD Pickup Truck: Misc.	7,000	198		
Total Completion	23,880	383	25	300

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	8.74	279.10	41.87	251.2
PM10	2.30	73.46	11.02	66.1
PM2.5	0.34	10.74	1.61	9.7

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity
Development & Reclamation				
Haul Truck: Water	20,000	0		
Haul Truck: Other	48,000	3		
HD Pickup Truck: Misc.	7,000	10		
Total Dev. & Reclamation	16,462	13	25	30

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	7.26	78.66	1.18	14.2
PM10	1.98	21.49	0.32	3.9
PM2.5	0.29	3.14	0.05	0.6

* Const. & Drilling Assumes 50 24-hr days
Completion assumes 30 10-hr days
Development & Reclamation assumes 3 10-hr days

50% success rate assumed for completion operations

Sand Mesa and Coastal Total

Particulate Matter Scale	Emission Factor (lbs/VMT)	Max Emissions (lbs/hr)	Total Emissions (Tons/well)	Total Emissions (Tons/year)
TSP		279.10	100.54	955.3
PM10		73.46	27.16	259.8
PM2.5		10.74	3.97	38.0

31. Sand Mesa and Coastal Drill Rig Engine Emissions

Assumptions:

Hours of Operation	1200	hours/well (50 days on average @ 24 hrs/day - Project Proponents)
Development Rate	12	wells/year
Load Factor	0.4	(Assumed typical value)
Rig Size	1500	hp (Drilling Contractor)
Diesel Fuel Sulfur Content	0.05	% (typical value)

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (lb/hp-hr)} * \text{Rated Horsepower (hp)} * \text{Operating Hours (hrs)} * \text{Load Factor (Dimensionless)}}{\text{2000 (lb/tons)}}$$

SO2 E. Factor (lb/hp-hr) = Fuel sulfur content * 0.00809

Total Emissions Summary

Species	Drill Rig Emissions			
	E. Factor [d] (lb/MMBtu)	E. Factor [a] (lb/hp-hr)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx		0.024	14.40	103.68
CO		0.0055	3.30	23.76
VOC [b]		0.000705	0.42	3.05
PM10 [c]	0.0573	0.0004011	0.24	1.73
PM2.5 [d]	0.0556	0.0003892	0.23	1.68
SO2		0.0004045	0.24	1.75

Development Area	Wells per Year
Sand Mesa	8
Sand Mesa South	3
Coastal Extension	1
Total	**12**

a AP-42 Volume I, Large Stationary Diesel Engines Table 3.4-1, 10/96
b Emission Factor represents total Hydrocarbon Emissions
c PM10 Emission Factor determined from Table 3.4-2, 10/96
d PM2.5 Emission Factor estimated as PM3.0 (filterable + condensable) from Table 3.4-2, 10/96
e Conversion from lb/MMBtu to lb/hp-hr assumes a BSFC of 7,000 BTU/hp-hr (Table 3.4-1, 10/96)
f Assumes a Development rate as stated by the proponents (Summarized in page 1)

Area Summary

Species	Emissions (tons/year)			
	Sand Mesa	Sand Mesa South	Coastal Extension	Total
NOx	69.12	25.92	8.64	103.68
CO	15.84	5.94	1.98	23.76
VOC [b]	2.03	0.76	0.25	3.05
PM10 [c]	1.16	0.43	0.14	1.73
PM2.5 [d]	1.12	0.42	0.14	1.68
SO2	1.16	0.44	0.15	1.75

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70. Sand Mesa Central Facility Heater Emissions

Assumptions

Separator Size:	850	MBTU/hr (Reported by Project Proponents)
Dehydrator Size:	1200	MBTU/hr (Reported by Project Proponents)
Total Heater Capacity:	2050	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour for entire year (Est.from fuel usage reported by Proponents)
	4380	hours/year
Net Low Fuel Gas Heat Content	1170	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * 1{,}000 \text{ (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * 1{,}000{,}000 \text{ (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{2{,}000 \text{ (lbs/ton)} * 1{,}000 \text{ (Btu/scf - Standard Fuel Heating Value)}}$$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Species	Total Heater Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx [a]	100	0.103	0.449
CO [a]	84	0.086	0.377
TOC [c]	11	0.011	0.049
VOC	N.A.	0.003	0.012
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.008	0.034
PM10 [c]	7.6	0.008	0.034
PM2.5 [c]	7.6	0.008	0.034
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.002	0.008
Formaldehyde [d]	0.075	0.000	0.000

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

64. Sand Mesa Compression and Processing

Assumptions:

Total Power Requirement: 7130 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	15.72	68.8
CO [1]		2.0	31.44	137.7
VOC [1]		1.0	15.72	68.8
PM10 [2, 5]	0.0194	0.070	1.11	4.9
PM2.5 [2,5]	0.0194	0.070	1.11	4.9
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.09	0.4
Toluene [2]	0.000558	0.00203	0.03	0.1
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.01	0.0
Formaldehyde [1]		0.07	1.10	4.8

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engine
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

es)

75. Sand Mesa Dehydrator

Assumptions

Proposed Action Throughput Rate: 55 MMscf/day (As projected by Project Proponents)
Alternative B Throughput Rate: 44

Gas Composition: Muddy Ridge Sample

Inlet Gas Conditions: Inlet gas was assumed to be saturated at 700 psi and 80 F
as reported by the project proponents

Calculations

Dehydrator emissions were simulated using GRI GlyCalc version 4.0 software

Emissions

Species	Emissions (lbs/hr)	Emissions (tons/year)
VOC	1.991	8.721
Benzene	0.102	0.446
Toluene	0.000	0.000
Ethylbenzene	0.000	0.000
Xylenes	0.000	0.000
n-Hexane	0.005	0.021
Total HAPs	0.107	0.467

38. Sand Mesa and Coastal Well Development Venting

Assumptions: Following Completion, Wells are Vented prior to connnection to the gathering pipeline

Venting Period 24 hours (Project Proponents)

Amount of Vented Gas: 0.5 MMscf (Average Volume Estimated by Proponents)

Development Rate: 6 Wells per year (Project Proponents - Assumes a 50% success rate)

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/day)	COMPONENT FLOW RATE (lb/hr)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	79.318	12.725	0.590	396.590	698.579	50.298
Ethane	30.07	10.453	3.143	0.146	52.265	172.557	12.424
Propane	44.097	3.927	1.732	0.080	19.635	95.067	6.845
i-Butane	58.123	1.456	0.846	0.039	7.280	46.459	3.345
n-Butane	58.123	1.069	0.621	0.029	5.345	34.110	2.456
i-Pentane	72.15	1.136	0.820	0.038	5.680	44.996	3.240
n-Pentane	72.15	0.759	0.548	0.025	3.795	30.063	2.165
Hexanes	86.177	0.865	0.745	0.035	4.325	40.923	2.946
Heptanes	100.204	0.080	0.080	0.004	0.400	4.401	0.317
Octanes	114.231	0.000	0.000	0.000	0.000	0.000	0.000
Nonanes	128.258	0.000	0.000	0.000	0.000	0.000	0.000
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.005	0.043	0.003
Toluene	92.13	0.000	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	106.16	0.000	0.000	0.000	0.000	0.000	0.000
Xylenes	106.16	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	86.177	0.005	0.004	0.000	0.025	0.237	0.017
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	0.605	0.169	0.008	3.025	9.304	0.670
Carbon Dioxide	44.01	0.328	0.144	0.007	1.640	7.925	0.571
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**9.298**	**5.397**	**0.250**	**46.490**	**296.298**	**21.333**
HAP SUBTOTAL		**0.006**	**0.005**	**0.000**	**0.030**	**0.279**	**0.020**
TOTAL		**100**	**21.579**	**1.000**	**500**	**1184.663**	**85.296**

48. Sand Meas and Coastal Condensate Storage Tank Emissions

Assumptions:

Average Condensate Production Rate :	0.32	bbls per day (Average production for existing wells - WOGCC)
Expected Successful Producting Wells:	47	
Predicted Condensate Production:	15.04	bbls/day
Separator Conditions :		200 psi and 130 F (Specified by Proponent)
Condensate Composition:		Sample from Grayling 29-33

Calculations:

Stock tank flash emissions estimated with E&P Tanks software

Emissions:

Component	Flash Emissions (tons/yr)
Benzene	0.021
Toluene	0.049
Ethylbenzene	0.002
Xylenes	0.026
n-Hexane	0.162
Total HAPS	0.261
Total VOC	6.363

35. Sand Mesa and Coastal Produced Gas Characteristics

Gas Heat Value (wet): 1267 Btu/scf

C1-C2 Wt. Fraction:	0.735
VOC Wt. Fraction:	0.250
Non-HC Wt. Fraction:	0.015
Total:	1.000

COMPONENT	MOLE PERCENT	COMPONENT MOLE WEIGHT (lb/lb-mole)	NET MOLE WEIGHT (lb/lb-mole)	WEIGHT FRACTION	GROSS HEATING VALUE (BTU/scf)	NET DRY HEATING VALUE (BTU/scf)	LOWER HEATING VALUE (BTU/scf)	NET LOW HEATING VALUE (BTU/scf)
Methane	79.318	16.043	12.725	0.590	1010.000	801.112	910.000	721.794
Ethane	10.453	30.070	3.143	0.146	1769.800	184.997	1618.000	169.130
Propane	3.927	44.097	1.732	0.080	2516.200	98.811	2316.000	90.949
i-Butane	1.456	58.123	0.846	0.039	3252.100	47.351	3005.000	43.753
n-Butane	1.069	58.123	0.621	0.029	3262.400	34.875	3013.000	32.209
i-Pentane	1.136	72.150	0.820	0.038	4000.900	45.450	3698.000	42.009
n-Pentane	0.759	72.150	0.548	0.025	4008.800	30.427	3708.000	28.144
Hexanes+	0.865	86.177	0.745	0.035	4756.200	41.141	4404.000	38.095
Heptanes	0.080	100.204	0.080	0.004	5502.500	4.402	5100.000	4.080
Octanes	0.000	114.231	0.000	0.000	6249.100	0.000		0.000
Nonanes	0.000	128.258	0.000	0.000	6996.400	0.000		0.000
Decanes	0.000	142.285	0.000	0.000	7743.200	0.000		0.000
Benzene	0.001	78.120	0.001	0.000	3715.500	0.037		0.000
Toluene	0.000	92.130	0.000	0.000	4444.600	0.000		0.000
Ethylbenzene	0.000	106.160	0.000	0.000	5191.500	0.000		0.000
Xylenes	0.000	106.160	0.000	0.000	5183.500	0.000		0.000
n-Hexane	0.005	86.177	0.004	0.000	4756.200	0.238		0.000
Helium	0.000	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	0.605	28.013	0.169	0.008	0.000	0.000	0.000	0.000
Carbon Dioxide	0.328	44.010	0.144	0.007	0.000	0.000	0.000	0.000
Oxygen	0.000	32.000	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	0.000	34.080	0.000	0.000	637.100	0.000	588.000	0.000
TOTAL	100.000		21.579	1.000		1288.841		1170.162

Relative Mole Weight (lb/lb-mole) = [Mole Percent * Molecular weight (lb/lb-mole)] / 100

Weight Fraction = Net Mole Weight / Total Mole Weight

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative B Inventory Date: 7/8/2004

44. Sand Mesa and Coastal Production Heater Emissions

Assumptions

Number of new producing wells	47	(Reported by Project Proponents)
Separator Size	1,000	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour (Est.from fuel usage reported by Proponents)
	6	months/year (Nov. thru April - Project Proponents)
	2190	hours/year
Net Low Fuel Gas Heat Content	1267	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * \text{1,000 (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * \text{1,000,000 (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{\text{2,000 (lbs/ton)} * \text{1,000 (Btu/scf - Standard Fuel Heating Value)}}$$

$$\text{VOC Emissions (tons/yr)} = \text{TOC Emissions (tons/yr)} * \text{VOC wt. fraction}$$

Pollutant	Separator Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr/well)	Emissions [e] (tons/yr)
NOx [a]	100	0.025	5.147
CO [a]	84	0.021	4.323
TOC [c]	11	0.003	0.566
VOC	N.A.	0.001	0.142
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.002	0.391
PM10 [c]	7.6	0.002	0.391
PM2.5 [c]	7.6	0.002	0.391
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.093
Formaldehyde [d]	0.075	0.000	0.004

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

65. Sand Mesa South Compression and Processing

Assumptions:

Total Power Requirement: 3330 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6\ \text{(g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	7.34	32.2
CO [1]		2.0	14.68	64.3
VOC [1]		1.0	7.34	32.2
PM10 [2, 5]	0.0194	0.070	0.52	2.3
PM2.5 [2,5]	0.0194	0.070	0.52	2.3
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.04	0.2
Toluene [2]	0.000558	0.00203	0.01	0.1
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.01	0.0
Formaldehyde [1]		0.07	0.51	2.3

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engine:
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

es)

76. Sand Mesa South Dehydrator

Assumptions

Proposed Action Throughput Rate: 26 MMscf/day (As projected by Project Proponents)
Alternative B Throughput Rate: 21.7

Gas Composition: Muddy Ridge Sample

Inlet Gas Conditions: Inlet gas was assumed to be saturated at 700 psi and 80 F
as reported by the project proponents

Calculations

Dehydrator emissions were simulated using GRI GlyCalc version 4.0 software

Emissions

Species	Emissions (lbs/hr)	Emissions (tons/year)
VOC	0.981	4.295
Benzene	0.050	0.219
Toluene	0.000	0.000
Ethylbenzene	0.000	0.000
Xylenes	0.000	0.000
n-Hexane	0.002	0.011
Total HAPs	0.053	0.230

53. Sand Mesa and Coastal Well Blowdown Emissions

Assumptions: During Production, a percentage of the wells are periodically blown down to unload fluids

# of New Producing Wells	47	
% Wells Requiring Blowdown	20	% (Estimated by Project Proponents)
# of Blowdown wells	9	Wells
Blowdown Frequency	1	per week for a period of 1 hour each (Project Proponents)
Blowdown Volume	16	Mscf/event (Estimated from Production Data)
Annual Blowdown Volume	7.8	MMscf/year

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/hr)	COMPONENT FLOW RATE (lb/hr/well)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	79.318	12.725	0.590	12.691	536.509	131.123
Ethane	30.07	10.453	3.143	0.146	1.672	132.524	32.389
Propane	44.097	3.927	1.732	0.080	0.628	73.011	17.844
i-Butane	58.123	1.456	0.846	0.039	0.233	35.680	8.720
n-Butane	58.123	1.069	0.621	0.029	0.171	26.197	6.402
i-Pentane	72.15	1.136	0.820	0.038	0.182	34.557	8.446
n-Pentane	72.15	0.759	0.548	0.025	0.121	23.089	5.643
Hexanes	86.177	0.865	0.745	0.035	0.138	31.429	7.681
Heptanes	100.204	0.080	0.080	0.004	0.013	3.380	0.826
Octanes	114.231	0.000	0.000	0.000	0.000	0.000	0.000
Nonanes	128.258	0.000	0.000	0.000	0.000	0.000	0.000
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.000	0.033	0.008
Toluene	92.13	0.000	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	106.16	0.000	0.000	0.000	0.000	0.000	0.000
Xylenes	106.16	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	86.177	0.005	0.004	0.000	0.001	0.182	0.044
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	0.605	0.169	0.008	0.097	7.146	1.746
Carbon Dioxide	44.01	0.328	0.144	0.007	0.052	6.086	1.487
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**9.298**	**5.397**	**0.250**	**1.488**	**227.557**	**55.615**
HAP SUBTOTAL		**0.006**	**0.005**	**0.000**	**0.001**	**0.215**	**0.052**
TOTAL		**100.002**	**21.579**	**1.000**	**16**	**909.821**	**222.360**

Buys & Associates, Inc. **Environmental Consultants**	Project: Wind River Alternative B Inventory Date: 7/8/2004

63. Shoshoni Booster Compression and Processing

Assumptions:

Total Power Requirement: 2630 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6\ \text{(g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	5.80	25.4
CO [1]		2.0	11.60	50.8
VOC [1]		1.0	5.80	25.4
PM10 [2, 5]	0.0194	0.070	0.41	1.8
PM2.5 [2,5]	0.0194	0.070	0.41	1.8
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.03	0.1
Toluene [2]	0.000558	0.00203	0.01	0.1
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.00	0.0
Formaldehyde [1]		0.07	0.41	1.8

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engine:
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

es)

Buys & Associates, Inc. **Environmental Consultants**	Project: Wind River EIS Emission Inventory Date: 7/8/2004

69. Shoshoni Booster Central Facility Heater Emissions

Assumptions

Separator Size:	250	MBTU/hr (Reported by Project Proponents)
Dehydrator Size:	0	MBTU/hr (Reported by Project Proponents)
Total Heater Capacity:	250	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour for entire year (Est.from fuel usage reported by Proponents)
	4380	hours/year
Net Low Fuel Gas Heat Content	1170	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * 1{,}000\ \text{(Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * 1{,}000{,}000\ \text{(scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{2{,}000\ \text{(lbs/ton)} * 1{,}000\ \text{(Btu/scf - Standard Fuel Heating Value)}}$$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Species	Total Heater Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx [a]	100	0.013	0.055
CO [a]	84	0.011	0.046
TOC [c]	11	0.001	0.006
VOC	N.A.	0.000	0.002
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.001	0.004
PM10 [c]	7.6	0.001	0.004
PM2.5 [c]	7.6	0.001	0.004
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.001
Formaldehyde [d]	0.075	0.000	0.000

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

Buys & Associates, Inc. Environmental Consultants	Project: Wind River EIS Emission Inventory Date: 7/8/2004

71. Sand Mesa South Central Facility Heater Emissions

Assumptions

Separator Size:	500	MBTU/hr (Reported by Project Proponents)
Dehydrator Size:	750	MBTU/hr (Reported by Project Proponents)
Total Heater Capacity:	1250	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour for entire year (Est.from fuel usage reported by Proponents)
	4380	hours/year
Net Low Fuel Gas Heat Content	1170	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * 1{,}000 \text{ (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * 1{,}000{,}000 \text{ (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{2{,}000 \text{ (lbs/ton)} * 1{,}000 \text{ (Btu/scf - Standard Fuel Heating Value)}}$$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Species	Total Heater Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx [a]	100	0.063	0.274
CO [a]	84	0.053	0.230
TOC [c]	11	0.007	0.030
VOC	N.A.	0.002	0.008
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.005	0.021
PM10 [c]	7.6	0.005	0.021
PM2.5 [c]	7.6	0.005	0.021
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.001	0.005
Formaldehyde [d]	0.075	0.000	0.000

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative B Inventory Date: 7/8/2004

59. South Pavillion Compression and Processing

Assumptions:

Total Power Requirement: 2280 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	5.03	22.0
CO [1]		2.0	10.05	44.0
VOC [1]		1.0	5.03	22.0
PM10 [2, 5]	0.0194	0.070	0.35	1.6
PM2.5 [2,5]	0.0194	0.070	0.35	1.6
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.03	0.1
Toluene [2]	0.000558	0.00203	0.01	0.0
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.00	0.0
Formaldehyde [1]		0.07	0.35	1.5

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average BSFC of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

49. Condensate Tank Emissions Summary

Component	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
Benzene	0.002	0.215	0.018	0.002	0.001	0.238
Toluene	0.004	0.326	0.042	0.005	0.002	0.379
Ethylbenzene	0.001	0.013	0.002	0.000	0.000	0.016
Xylenes	0.003	0.122	0.022	0.003	0.001	0.151
n-Hexane	0.016	1.294	0.138	0.017	0.007	1.472
Total HAPS	0.025	1.970	0.222	0.028	0.011	2.256
Total VOC	1.119	97.368	5.415	0.677	0.271	104.850

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative B Inventory Date: 7/8/2004

82. Total Emissions

Species	Wellsite Emissions (tons/yr)	Facility Emissions (tons/yr)	Total Project Emissions (tons/yr)
NOx [a]	193.896	220.354	414.250
NO [b]	113.808	129.338	243.146
NO2 [c]	19.390	22.035	41.425
CO	77.084	439.361	516.445
VOC	443.835	237.395	681.230
SO2	3.215	0.000	3.215
TSP	2105.357	15.541	2120.898
PM10	573.422	15.541	588.962
PM2.5	90.214	15.541	105.755
Formaldehyde	0.052	15.344	15.397
Benzene	0.284	2.186	2.470
Toluene	0.489	0.444	0.933
Ethylbenzene	0.042	0.020	0.062
Xylenes	0.166	0.155	0.321
n-Hexane	1.985	0.065	2.050

NOTES

- a NOx measured as NO_2
- b Emitted NOx assumed to be 90% NO. Emissions corrected for the difference in molecular weights (30 mw NO/46 mw NO2)
- c Emitted NOx assumed to be 10% NO_2.

57. Total Well Emissions Summary

Pavillion

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	9.818	5.414	15.232
CO	9.974	6.166	16.140
VOC	56.810	112.405	169.215
SO2	0.221	0.011	0.232
TSP	318.440	0.399	318.839
PM10	84.971	0.399	85.370
PM2.5	13.325	0.399	13.725
Formaldehyde	0.005	0.004	0.009
Benzene	0.007	0.016	0.024
Toluene	0.037	0.077	0.113
Ethylbenzene	0.009	0.018	0.027
Xylenes	0.005	0.013	0.018
n-Hexane	0.045	0.201	0.246

Muddy Ridge

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	64.309	3.351	67.659
CO	21.386	3.489	24.874
VOC	45.349	141.872	187.221
SO2	1.137	0.005	1.141
TSP	816.343	0.250	816.593
PM10	220.991	0.250	221.241
PM2.5	34.348	0.250	34.598
Formaldehyde	0.019	0.002	0.021
Benzene	0.006	0.222	0.228
Toluene	0.000	0.326	0.326
Ethylbenzene	0.000	0.013	0.013
Xylenes	0.000	0.122	0.122
n-Hexane	0.034	1.388	1.422

Sand Mesa

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	70.520	4.446	74.966
CO	20.593	4.409	25.002
VOC	16.822	52.908	69.730
SO2	1.224	0.005	1.228
TSP	645.107	0.333	645.440
PM10	176.988	0.333	177.321
PM2.5	27.417	0.333	27.750
Formaldehyde	0.012	0.003	0.016
Benzene	0.002	0.025	0.027
Toluene	0.000	0.042	0.042
Ethylbenzene	0.000	0.002	0.002
Xylenes	0.000	0.022	0.022
n-Hexane	0.011	0.255	0.266

58. Total Well Emissions Summary Continued

Sand Mesa South

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	26.445	0.556	27.001
CO	7.722	0.551	8.273
VOC	6.308	6.613	12.922
SO2	0.459	0.001	0.460
TSP	242.965	0.042	243.007
PM10	66.896	0.042	66.937
PM2.5	10.492	0.042	10.533
Formaldehyde	0.005	0.000	0.005
Benzene	0.001	0.003	0.004
Toluene	0.000	0.005	0.005
Ethylbenzene	0.000	0.000	0.000
Xylenes	0.000	0.003	0.003
n-Hexane	0.004	0.032	0.036

Coastal Extension

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	8.815	0.222	9.037
CO	2.574	0.220	2.795
VOC	2.103	2.645	4.748
SO2	0.153	0.000	0.153
TSP	81.461	0.017	81.478
PM10	22.535	0.017	22.552
PM2.5	3.592	0.017	3.608
Formaldehyde	0.002	0.000	0.002
Benzene	0.000	0.001	0.002
Toluene	0.000	0.002	0.002
Ethylbenzene	0.000	0.000	0.000
Xylenes	0.000	0.001	0.001
n-Hexane	0.001	0.013	0.014

Total Wellsite

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	179.908	13.988	193.896
CO	62.249	14.835	77.084
VOC	127.392	316.443	443.835
SO2	3.194	0.021	3.215
TSP	2104.317	1.040	2105.357
PM10	572.381	1.040	573.422
PM2.5	89.174	1.040	90.214
Formaldehyde	0.042	0.010	0.052
Benzene	0.016	0.267	0.284
Toluene	0.037	0.452	0.489
Ethylbenzene	0.009	0.033	0.042
Xylenes	0.005	0.161	0.166
n-Hexane	0.096	1.889	1.985

19. Total Wind Erosion (Pad and Pipeline)

Total Wind Erosion Emissions

Development Area	TSP Emissions (tons/year)	PM10 Emissions (tons/year)	PM2.5 Emissions (tons/year)
Pavillion	2.24	1.12	0.45
Muddy Ridge	5.14	2.57	1.03
Sand Mesa	2.20	1.10	0.44
Sand Mesa South	1.87	0.94	0.37
Coastal Extension	1.10	0.55	0.22
Total	**12.6**	**6.3**	**2.5**

16. Unpaved Road Fugitive Dust Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
TSP	307.278	801.718	636.834	238.813	79.604	2064.248
PM10	80.792	214.717	173.186	64.945	21.648	555.288
PM2.5	11.808	31.382	25.312	9.492	3.164	81.157

Note: Assumes a 50% success rate for Sand Mesa and Coastal areas

25. Vehicle Tailpipe Emissions Summary

Pollutant	Construction		Drilling		Completion	
	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	0.101	0.042	0.206	2.546	0.681	1.688
CO	0.458	0.191	1.127	13.918	2.967	7.357
VOC	0.060	0.025	0.123	1.525	0.407	1.008
SO2	0.005	0.002	0.011	0.130	0.032	0.080

Pollutant	Development		Total	
	Emissions (lb/hr)	Emissions (tons/yr)	Max (lb/hr)	Emissions (tons/yr)
NOx	0.181	0.069	0.681	4.344
CO	1.282	0.487	2.967	21.954
VOC	0.109	0.041	0.407	2.600
SO2	0.010	0.004	0.032	0.216

Development Area	NOx (tons/year)	CO (tons/year)	VOC (tons/year)	SO2 (tons/year)
Pavillion	1.601	8.088	0.958	0.080
Muddy Ridge	1.372	6.933	0.821	0.068
Sand Mesa	0.915	4.622	0.547	0.045
Sand Mesa South	0.343	1.733	0.205	0.017
Coastal Extension	0.114	0.578	0.068	0.006
Total	4.344	21.954	2.600	0.216

54. Well Blowdown Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
VOC	111.034	44.374	47.332	5.916	2.367	211.023
Benzene	0.014	0.006	0.007	0.001	0.000	0.029
Toluene	0.073	0.000	0.000	0.000	0.000	0.073
Ethylbenzene	0.018	0.000	0.000	0.000	0.000	0.018
Xylenes	0.010	0.000	0.000	0.000	0.000	0.010
n-Hexane	0.090	0.035	0.038	0.005	0.002	0.170

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative C Inventory Date: 7/8/2004

44. Central Facility Summary

South Pavillion

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	20.278			20.278
NO [b]	11.902			11.902
NO2 [c]	2.028			2.028
CO	40.556			40.556
VOC	20.278			20.278
SO2	0.000			0.000
TSP	1.430			1.430
PM10	1.430			1.430
PM2.5	1.430			1.430
Formaldehyde	1.419			1.419
Benzene	0.116			0.116
Toluene	0.041			0.041
Ethylbenzene	0.002			0.002
Xylenes	0.014			0.014
n-Hexane				0.000

Pavillion Plant

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]				0.000
NO [b]				0.000
NO2 [c]				0.000
CO				0.000
VOC				0.000
SO2				0.000
TSP				0.000
PM10				0.000
PM2.5				0.000
Formaldehyde				0.000
Benzene				0.000
Toluene				0.000
Ethylbenzene				0.000
Xylenes				0.000
n-Hexane				0.000

Muddy Ridge

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]				0.000
NO [b]				0.000
NO2 [c]				0.000
CO				0.000
VOC				0.000
SO2				0.000
TSP				0.000
PM10				0.000
PM2.5				0.000
Formaldehyde				0.000
Benzene				0.000
Toluene				0.000
Ethylbenzene				0.000
Xylenes				0.000
n-Hexane				0.000

NOTES

1 NOx measured as NO_2
2 Emitted NOx assumed to be 90% NO. Emissions corrected for the difference in molecular weights (30 mw NO/46 mw NO2)
3 Emitted NOx assumed to be 10% NO_2.

45. Central Facility Summary Continued

Hidden Valley

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	10.622			10.622
NO [b]	6.234			6.234
NO2 [c]	1.062			1.062
CO	21.243			21.243
VOC	10.622			10.622
SO2	0.000			0.000
TSP	0.749			0.749
PM10	0.749			0.749
PM2.5	0.749			0.749
Formaldehyde	0.744			0.744
Benzene	0.061			0.061
Toluene	0.022			0.022
Ethylbenzene	0.001			0.001
Xylenes	0.008			0.008
n-Hexane				0.000

Shoshoni Booster

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]				0.000
NO [b]				0.000
NO2 [c]				0.000
CO				0.000
VOC				0.000
SO2				0.000
TSP				0.000
PM10				0.000
PM2.5				0.000
Formaldehyde				0.000
Benzene				0.000
Toluene				0.000
Ethylbenzene				0.000
Xylenes				0.000
n-Hexane				0.000

Sand Mesa

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]				0.000
NO [b]				0.000
NO2 [c]				0.000
CO				0.000
VOC				0.000
SO2				0.000
TSP				0.000
PM10				0.000
PM2.5				0.000
Formaldehyde				0.000
Benzene				0.000
Toluene				0.000
Ethylbenzene				0.000
Xylenes				0.000
n-Hexane				0.000

46. Central Facility Summary Continued

Sand Mesa South

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]				0.000
NO [b]				0.000
NO2 [c]				0.000
CO				0.000
VOC				0.000
SO2				0.000
TSP				0.000
PM10				0.000
PM2.5				0.000
Formaldehyde				0.000
Benzene				0.000
Toluene				0.000
Ethylbenzene				0.000
Xylenes				0.000
n-Hexane				0.000

Coastal Extension

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]				0.000
NO [b]				0.000
NO2 [c]				0.000
CO				0.000
VOC				0.000
SO2				0.000
TSP				0.000
PM10				0.000
PM2.5				0.000
Formaldehyde				0.000
Benzene				0.000
Toluene				0.000
Ethylbenzene				0.000
Xylenes				0.000
n-Hexane				0.000

Total Facility

Species	Compression Emissions (tons/yr)	Heater Emissions (tons/yr)	Dehydrator Emissions (tons/yr)	Total Facility (tons/yr)
NOx [a]	30.899			30.899
NO [b]	18.137			18.137
NO2 [c]	3.090			3.090
CO	61.799			61.799
VOC	30.899			30.899
SO2	0.000			0.000
TSP	2.178			2.178
PM10	2.178			2.178
PM2.5	2.178			2.178
Formaldehyde	2.163			2.163
Benzene	0.177			0.177
Toluene	0.063			0.063
Ethylbenzene	0.003			0.003
Xylenes	0.022			0.022
n-Hexane				0.000

18. Completion Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0	miles (Estimated from project area and existing road system)
Hours of Operation	55	hours per site (Project Proponents)
Number of Heavy Diesel Truck Trips	90	(Project Proponents)
Number of Pickup Trips	65	(Project Proponents)
Diesel Fuel sulfur content	0.05	% (Typical value)
Diesel Fuel density	7.08	lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10	miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile)} * \text{\# Trips} * \text{Trip Distance (miles)}}{453.6 \text{ (g/lb)} * 2000 \text{ (lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal)} * 453.6 \text{ (g/lb)} * \text{Fuel Sulfur Content} * 2 \text{ (S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Completion Vehicles	Heavy Haul Trucks			Heavy Duty Pickups			Total [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.880	0.024	3.03	0.237	0.007	1.117	0.430
CO	17.09	1.850	0.051	33.64	2.629	0.072	4.479	1.724
VOC [c]	4.83	0.523	0.014	1.84	0.144	0.004	0.667	0.257
SO2	0.32	0.035	0.001	0.21	0.017	0.000	0.051	0.020

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate and a 50% success rate in Sand Mesa and Coastal

43. Compression Summary

Pollutant	South Pavillion (tons/yr)	Pavillion Plant (tons/yr)	Muddy Ridge (tons/yr)	Hidden Valley (tons/yr)	Shoshoni Booster (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx [1]	20.28	0.00	0.00	10.62	0.00	0.00	0.00	0.00	30.90
CO [1]	40.56	0.00	0.00	21.24	0.00	0.00	0.00	0.00	61.80
VOC [1]	20.28	0.00	0.00	10.62	0.00	0.00	0.00	0.00	30.90
PM10 [2, 5]	1.43	0.00	0.00	0.75	0.00	0.00	0.00	0.00	2.18
PM2.5 [2,5]	1.43	0.00	0.00	0.75	0.00	0.00	0.00	0.00	2.18
SO2 [3]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzene [2]	0.12	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.18
Toluene [2]	0.04	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.06
Ethylbenzene [2]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Xylenes [2]	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.02
Formaldehyde [1]	1.42	0.00	0.00	0.74	0.00	0.00	0.00	0.00	2.16

4. Construction Equipment Fugitive Dust Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
TSP	4.188	0.000	0.000	0.000	0.000	4.188
PM15	1.872	0.000	0.000	0.000	0.000	1.872
PM10	1.404	0.000	0.000	0.000	0.000	1.404
PM2.5	0.440	0.000	0.000	0.000	0.000	0.440

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative C Inventory Date: 7/8/2004

16. Construction Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0	miles (Estimated from project area and existing road system)
Hours of Construction	16	hours per site (Project proponents)
Number of Heavy Diesel Truck Trips	2	(Project proponents)
Number of Pickup Trips	2	(Project proponents)
Diesel Fuel sulfur content	0.05	% (Typical value)
Diesel Fuel density	7.08	lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10	miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile) * Number of Trips * Trip Distance (miles)}}{\text{453.6 (g/lb) * 2000 (lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal) * 453.6 (g/lb) * Fuel Sulfur Content * 2 (S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Construction Vehicles	Heavy Haul Trucks			Heavy Duty Pickups			Total [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.067	0.001	3.03	0.025	0.000	0.092	0.010
CO	17.09	0.141	0.001	33.64	0.278	0.002	0.419	0.047
VOC [c]	4.83	0.040	0.000	1.84	0.015	0.000	0.055	0.006
SO2	0.32	0.003	0.000	0.21	0.002	0.000	0.004	0.000

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate

28. Construction Emissions Summary

Pavillion

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		0.872	0.234	7.983		9.090
CO		3.992	0.056	1.830		5.878
VOC		0.521	0.011	0.235	55.606	56.373
SO2		0.042	0.007	0.135		0.183
TSP	317.750		0.018	0.133		317.902
PM10	84.550		0.018	0.133		84.702
PM2.5	13.070		0.018	0.129		13.217
Formaldehyde			0.0048			0.005
Benzene					0.007	0.007
Toluene					0.037	0.037
Ethylbenzene					0.009	0.009
Xylenes					0.005	0.005
n-Hexane					0.045	0.045

Muddy Ridge

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx						0.000
CO						0.000
VOC						0.000
SO2						0.000
TSP						0.000
PM10						0.000
PM2.5						0.000
Formaldehyde						0.000
Benzene						0.000
Toluene						0.000
Ethylbenzene						0.000
Xylenes						0.000
n-Hexane						0.000

Sand Mesa

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx						0.000
CO						0.000
VOC						0.000
SO2						0.000
TSP						0.000
PM10						0.000
PM2.5						0.000
Formaldehyde						0.000
Benzene						0.000
Toluene						0.000
Ethylbenzene						0.000
Xylenes						0.000
n-Hexane						0.000

29. Construction Emissions Summary Continued

Sand Mesa South

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx						0.000
CO						0.000
VOC						0.000
SO2						0.000
TSP						0.000
PM10						0.000
PM2.5						0.000
Formaldehyde						0.000
Benzene						0.000
Toluene						0.000
Ethylbenzene						0.000
Xylenes						0.000
n-Hexane						0.000

Coastal Extension

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx						0.000
CO						0.000
VOC						0.000
SO2						0.000
TSP						0.000
PM10						0.000
PM2.5						0.000
Formaldehyde						0.000
Benzene						0.000
Toluene						0.000
Ethylbenzene						0.000
Xylenes						0.000
n-Hexane						0.000

Total Construction

Species	Fugitive Dust (tons/yr)	Vehicle Tailpipe (tons/yr)	Heavy Equip. (tons/yr)	Drill Rig (tons/yr)	Development Venting (tons/yr)	Total Construction (tons/yr)
NOx		0.872	0.234	7.983		9.090
CO		3.992	0.056	1.830		5.878
VOC		0.521	0.011	0.235	55.606	56.373
SO2		0.042	0.007	0.135		0.183
TSP	317.750		0.018	0.133		317.902
PM10	84.550		0.018	0.133		84.702
PM2.5	13.070		0.018	0.129		13.217
Formaldehyde			0.005			0.005
Benzene					0.007	0.007
Toluene					0.037	0.037
Ethylbenzene					0.009	0.009
Xylenes					0.005	0.005
n-Hexane					0.045	0.045

19. Development & Reclamation Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0	miles (Estimated from project area and existing road system)
Hours of Operation	30	hours per site (Project Proponents)
Number of Heavy Diesel Truck Trips	3	(Project Proponents)
Number of Pickup Trips	10	(Project Proponents)
Diesel Fuel sulfur content	0.05	% (Typical value)
Diesel Fuel density	7.08	lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10	miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile)} * \text{\# Trips} * \text{Trip Distance (miles)}}{453.6\ \text{(g/lb)} * 2000\ \text{(lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal)} * 453.6\ \text{(g/lb)} * \text{Fuel Sulfur Content} * 2\ \text{(S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Development Vehicles	Heavy Haul Trucks			Heavy Duty Pickups			Total [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.054	0.001	3.03	0.067	0.001	0.121	0.025
CO	17.09	0.113	0.002	33.64	0.742	0.011	0.855	0.179
VOC [c]	4.83	0.032	0.000	1.84	0.041	0.001	0.073	0.015
SO2	0.32	0.002	0.000	0.21	0.005	0.000	0.007	0.001

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate

27. Well Development Venting Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
VOC	55.606	0.000	0.000	0.000	0.000	55.606
Benzene	0.007	0.000	0.000	0.000	0.000	0.007
Toluene	0.037	0.000	0.000	0.000	0.000	0.037
Ethylbenzene	0.009	0.000	0.000	0.000	0.000	0.009
Xylenes	0.005	0.000	0.000	0.000	0.000	0.005
n-Hexane	0.045	0.000	0.000	0.000	0.000	0.045

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative C Inventory Date: 7/8/2004

24. Drill Rig Emissions Summary

Assumptions: 1 rig will operate part of the year in Pavillion

Short-Term Emissions (lbs/hr)

Species	Pavillion	Muddy Ridge	Sand Mesa	Sand Mesa South	Coastal Extension	Maximum (lbs/hr)
NOx	5.28	0.00	0.00	0.00	0.00	5.28
CO	1.21	0.00	0.00	0.00	0.00	1.21
VOC [b]	0.16	0.00	0.00	0.00	0.00	0.16
PM10 [c]	0.09	0.00	0.00	0.00	0.00	0.09
PM2.5 [d]	0.09	0.00	0.00	0.00	0.00	0.09
SO2	0.09	0.00	0.00	0.00	0.00	0.09

Annual Emissions (tons/yr)

Species	Pavillion	Muddy Ridge	Sand Mesa	Sand Mesa South	Coastal Extension	Total (tons/yr)
NOx	7.983	0.000	0.000	0.000	0.000	7.983
CO	1.830	0.000	0.000	0.000	0.000	1.830
VOC [b]	0.235	0.000	0.000	0.000	0.000	0.235
PM10 [c]	0.133	0.000	0.000	0.000	0.000	0.133
PM2.5 [d]	0.129	0.000	0.000	0.000	0.000	0.129
SO2	0.135	0.000	0.000	0.000	0.000	0.135

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17. Drilling Tailpipe Emissions

Assumptions:

Average Round Trip Distance	30.0 miles (Estimated from project area and existing road system)
Hours of Operation	216 hours per site (Project proponents)
Number of Heavy Diesel Truck Trips	73 (Project proponents)
Number of Pickup Trips	94 (Project proponents)
Diesel Fuel sulfur content	0.05 % (Typical value)
Diesel Fuel density	7.08 lbs/gallon (Typical value)
Heavy Haul Diesel Fuel Efficiency	10 miles/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15 miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile)} * \text{\# Trips} * \text{Trip Distance (miles)}}{453.6\ \text{(g/lb)} * 2000\ \text{(lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal)} * 453.6\ \text{(g/lb)} * \text{Fuel Sulfur Content} * 2\ \text{(S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Drilling Vehicles	Heavy Haul Trucks			Heavy Duty Pickups			Total [d]	
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	E. Factor [b] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr/well)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	8.13	0.182	0.020	3.03	0.087	0.009	0.269	0.407
CO	17.09	0.382	0.041	33.64	0.968	0.105	1.350	2.042
VOC [c]	4.83	0.108	0.012	1.84	0.053	0.006	0.161	0.243
SO2	0.32	0.007	0.001	0.21	0.006	0.001	0.013	0.020

a AP-42 Append. H Table 7.1.2 - H.D. Diesel Powered Vehicles, High Altitude, 1991 - 1997 Model Year, 50,000 miles (6/95)
b AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
c Emission factor is for total Hydrocarbons.
d Assumes proponet specified development rate

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15. Fugitive Dust Summary

TSP Fugitive Dust Summary

Development Area	Construction		Pipeline		Reclamation		Unpaved Road		Wind Erosion	Max	Total
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	tons/yr	lbs/hr	tons/yr
Pavillion	37.40	4.188	22.18	2.484	18.70	2.094	404.82	307.28	1.71	404.82	317.75
Muddy Ridge	0.00	0.000	22.18	0.000	0.00	0.000	0.00	0.00	0.00	22.18	0.00
Sand Mesa	0.00	0.000	22.18	0.000	0.00	0.000	0.00	0.00	0.00	22.18	0.00
Sand Mesa South	0.00	0.000	22.18	0.000	0.00	0.000	0.00	0.00	0.00	22.18	0.00
Coastal Extension	0.00	0.000	22.18	0.000	0.00	0.000	0.00	0.00	0.00	22.18	0.00
Maximum/Total	**37.40**	**4.188**	**22.18**	**2.484**	**18.70**	**2.094**	**404.82**	**307.28**	**1.71**	**404.82**	**317.75**

PM10 Fugitive Dust Summary

Development Area	Construction		Pipeline		Reclamation		Unpaved Road		Wind Erosion	Max	Total
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	tons/yr	lbs/hr	tons/yr
Pavillion	12.54	1.404	7.14	0.799	6.27	0.702	104.64	80.79	0.85	104.64	84.55
Muddy Ridge	0.00	0.000	7.14	0.000	0.00	0.000	0.00	0.00	0.00	7.14	0.00
Sand Mesa	0.00	0.000	7.14	0.000	0.00	0.000	0.00	0.00	0.00	7.14	0.00
Sand Mesa South	0.00	0.000	7.14	0.000	0.00	0.000	0.00	0.00	0.00	7.14	0.00
Coastal Extension	0.00	0.000	7.14	0.000	0.00	0.000	0.00	0.00	0.00	7.14	0.00
Maximum/Total	**12.54**	**1.404**	**7.14**	**0.799**	**6.27**	**0.702**	**104.64**	**80.79**	**0.85**	**104.64**	**84.55**

PM2.5 Fugitive Dust Summary

Development Area	Construction		Pipeline		Reclamation		Unpaved Road		Wind Erosion	Max	Total
	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	lbs/hr	tons/yr	tons/yr	lbs/hr	tons/yr
Pavillion	3.93	0.440	2.33	0.261	1.96	0.220	15.29	11.81	0.34	15.29	13.07
Muddy Ridge	0.00	0.00	2.33	0.000	0.00	0.00	0.00	0.00	0.00	2.33	0.00
Sand Mesa	0.00	0.00	2.33	0.000	0.00	0.00	0.00	0.00	0.00	2.33	0.00
Sand Mesa South	0.00	0.00	2.33	0.000	0.00	0.00	0.00	0.00	0.00	2.33	0.00
Coastal Extension	0.00	0.00	2.33	0.000	0.00	0.00	0.00	0.00	0.00	2.33	0.00
Maximum/Total	**3.93**	**0.440**	**2.33**	**0.261**	**1.96**	**0.220**	**15.29**	**11.81**	**0.34**	**15.29**	**13.07**

31. Production Heater Summary

Pollutant	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx [a]	5.48	0.00	0.00	0.00	0.00	5.48
CO [a]	4.60	0.00	0.00	0.00	0.00	4.60
TOC [c]	0.60	0.00	0.00	0.00	0.00	0.60
VOC	0.16	0.00	0.00	0.00	0.00	0.16
SOx [b]	0.00	0.00	0.00	0.00	0.00	0.00
TSP [c]	0.42	0.00	0.00	0.00	0.00	0.42
PM10 [c]	0.42	0.00	0.00	0.00	0.00	0.42
PM2.5 [c]	0.42	0.00	0.00	0.00	0.00	0.42
Benzene [d]	0.00	0.00	0.00	0.00	0.00	0.00
Toluene [d]	0.00	0.00	0.00	0.00	0.00	0.00
Hexane [d]	0.10	0.00	0.00	0.00	0.00	0.10
Formaldehyde [d]	0.00	0.00	0.00	0.00	0.00	0.00

22. Heavy Equipment Tailpipe Emissions Summary

Development Area	NOx (tons/year)	CO (tons/year)	VOC (tons/year)	PM10 (tons/year)	PM2.5 (tons/year)	SO2 (tons/year)	Formaldehyde (tons/year)
Pavillion	0.234	0.056	0.011	0.018	0.018	0.007	0.005
Muddy Ridge	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sand Mesa	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sand Mesa South	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Coastal Extension	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.234	0.056	0.011	0.018	0.018	0.007	0.005

42. Hidden Valley Compression and Processing

Assumptions:

Total Power Requirement: 1100 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{\text{453.6 (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	2.43	10.6
CO [1]		2.0	4.85	21.2
VOC [1]		1.0	2.43	10.6
PM10 [2, 5]	0.0194	0.070	0.17	0.7
PM2.5 [2,5]	0.0194	0.070	0.17	0.7
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.01	0.1
Toluene [2]	0.000558	0.00203	0.00	0.0
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.00	0.0
Formaldehyde [1]		0.07	0.17	0.7

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average heat rate of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

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12. Wind Erosion Fugitive Dust Emissions From Well & Facility Pads

Assumptions

Threshold Friction Velocity U_t^* — 1.02 m/s (2.28 mph) for well pads (AP-42 Table 13.2.5-2 Overburden - Western Surface Coal Mine)

Exposed Surface Type — Flat

Fastest Mile Wind Speed U_{10}^+ — 23.2 meters/sec (52 mph) reported as fastest 2-minute wind speed for Lander, WY (2002)

Number soil of disturbances — 2 for well and facility pads (disturbance at construction and reclamation)

Equations

Friction Velocity $U^* = 0.053\ U_{10}^+$

Erosion Potential P (g/m²/period) = $58*(U^*-U_t^*)^2 + 25*(U^*-U_t^*)$ for $U^*>U_t^*$, P = 0 for $U^*< U_t^*$

$$\text{Emissions (tons/year)} = \frac{\text{Erosion Potential(g/m}^2\text{/period)*Disturbed Area(m}^2\text{)*Disturbances/year*(k)* Number of Wells/year}}{\text{(453.6 g/lb)*2000 lbs/ton/Develop Period*Total Number of Wells}}$$

Particle Size Multiplier (k)		
30 um	**<10 um**	**<2.5 um**
1.0	0.5	0.2

Maxium U_{10}^+ Wind Speed (m/s)	Maximum U* Friction Velocity m/s	Well/Pipeline U_t^* Threshold Velocity[a] m/s	Erosion Potential g/m²
23.20	1.23	1.02	7.79

Wind Erosion Emissions

Development Area	Disturbance (Acres)	Disturbance (meters²)	TSP Emissions (tons/year)	PM10 Emissions (tons/year)	PM2.5 Emissions (tons/year)
Pavillion	130	526,778	1.24	0.62	0.25
Muddy Ridge	0	0	0.00	0.00	0.00
Sand Mesa	0	0	0.00	0.00	0.00
Sand Mesa S.	0	0	0.00	0.00	0.00
Coastal	0	0	0.00	0.00	0.00
Total	**130**	**526,778**	**1.2**	**0.6**	**0.2**

2. Pavillion Construction Fugitive Dust Emissions

Assumptions:

Hours of Construction	2	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	16	hours per well pad
Pieces of Equipment	2	- 1 Backhoe & 1 Grader each @ 100% utilization (Project Proponent)
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	45	percent (Composit Soil Sample from Pavillion Well Pads)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 18.70 lbs TSP/hour/piece of equipment

Emissions = 8.36 lbs PM15/hour/piece of equipment

Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	37.40	0.2992	4.188
PM15	16.72	0.1337	1.872
PM10	12.54	0.1003	1.404
PM2.5	3.93	0.0314	0.440

a Assumes 100% utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

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26. Pavillion Well Development Venting

Assumptions: Following Completion, Wells are Vented prior to connnection to the gathering pipeline

Venting Period 24 hours (Project Proponents)

Amount of Vented Gas: 0.5 MMscf (Average Volume Estimated by Proponents)

Development Rate: 14 Wells per year (Project Proponents)

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/day)	COMPONENT FLOW RATE (lb/hr)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	81.960	13.149	0.589	409.800	721.848	121.271
Ethane	30.07	9.165	2.756	0.123	45.825	151.295	25.418
Propane	44.097	1.654	0.729	0.033	8.270	40.041	6.727
i-Butane	58.123	0.703	0.409	0.018	3.515	22.432	3.769
n-Butane	58.123	0.426	0.248	0.011	2.130	13.593	2.284
i-Pentane	72.15	0.377	0.272	0.012	1.885	14.933	2.509
n-Pentane	72.15	0.180	0.130	0.006	0.900	7.130	1.198
Hexanes	86.177	1.164	1.003	0.045	5.820	55.068	9.251
Heptanes	100.204	1.832	1.836	0.082	9.160	100.779	16.931
Octanes	114.231	0.813	0.929	0.042	4.065	50.984	8.565
Nonanes	128.258	0.361	0.463	0.021	1.805	25.419	4.270
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.005	0.043	0.007
Toluene	92.13	0.004	0.004	0.000	0.022	0.217	0.037
Ethylbenzene	106.16	0.001	0.001	0.000	0.005	0.052	0.009
Xylenes	106.16	0.001	0.001	0.000	0.003	0.029	0.005
n-Hexane	86.177	0.006	0.005	0.000	0.029	0.270	0.045
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	1.200	0.336	0.015	6.000	18.454	3.100
Carbon Dioxide	44.01	0.153	0.067	0.003	0.765	3.697	0.621
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**7.5224**	**6.029**	**0.270**	**37.612**	**330.989**	**55.606**
HAP SUBTOTAL		**0.0124**	**0.011**	**0.000**	**0.062**	**0.612**	**0.103**
TOTAL		**100.000**	**22.337**	**1.000**	**500**	**1226.283**	**206.016**

23. Pavillion Drill Rig Engine Emissions

Assumptions:

Hours of Operation	216	hours/well (9 days on average @ 24 hrs/day - Project Proponents)
Development Rate	14	wells/year (Project Proponents)
Load Factor	0.4	(Assumed typical value)
Rig Size	550	hp (Drilling Contractor)
Diesel Fuel Sulfur Content	0.05	% (typical value)

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (lb/hp-hr)} * \text{Rated Horsepower (hp)} * \text{Operating Hours (hrs)} * \text{Load Factor (Dimensionless)}}{\text{2000 (lb/tons)}}$$

SO2 E. Factor (lb/hp-hr) = Fuel sulfur content * 0.00809

Species	Drill Rig Emissions			
	E. Factor [d] (lb/MMBtu)	E. Factor [a] (lb/hp-hr)	Emissions (lb/hr)	Emissions [e] (tons/yr)
NOx		0.024	5.280	7.98
CO		0.0055	1.210	1.83
VOC [b]		0.000705	0.155	0.23
PM10 [c]	0.0573	0.0004011	0.088	0.13
PM2.5 [d]	0.0556	0.0003892	0.086	0.13
SO2		0.0004045	0.089	0.13

a AP-42 Volume I, Large Stationary Diesel Engines Table 3.4-1, 10/96
b Emission Factor represents total Hydrocarbon Emissions
c PM10 Emission Factor determined from Table 3.4-2, 10/96
d PM2.5 Emission Factor estimated as PM3.0 (filterable + condensable) from Table 3.4-2, 10/96
e Conversion from lb/MMBtu to lb/hp-hr assumes a BSFC of 7,000 BTU/hp-hr (Table 3.4-1, 10/96)
f Assumes a Development rate as stated by the proponents (Summarized in page 1)

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25. Pavillion Produced Gas Characteristics (Pavillion 11-10)

Gas Heat Value (wet): 1301 Btu/scf

C1-C2 Wt. Fraction:	0.712
VOC Wt. Fraction:	0.270
Non-HC Wt. Fraction:	0.018
Total:	1.000

COMPONENT	MOLE PERCENT	COMPONENT MOLE WEIGHT (lb/lb-mole)	NET MOLE WEIGHT (lb/lb-mole)	WEIGHT FRACTION	GROSS HEATING VALUE (BTU/scf)	NET DRY HEATING VALUE (BTU/scf)	LOWER HEATING VALUE (BTU/scf)	NET LOW HEATING VALUE (BTU/scf)
Methane	81.960	16.043	13.149	0.589	1010.000	827.796	910.000	745.836
Ethane	9.165	30.070	2.756	0.123	1769.800	162.202	1618.000	148.290
Propane	1.654	44.097	0.729	0.033	2516.200	41.618	2316.000	38.307
i-Butane	0.703	58.123	0.409	0.018	3252.100	22.862	3005.000	21.125
n-Butane	0.426	58.123	0.248	0.011	3262.400	13.898	3013.000	12.835
i-Pentane	0.377	72.150	0.272	0.012	4000.900	15.083	3698.000	13.941
n-Pentane	0.180	72.150	0.130	0.006	4008.800	7.216	3708.000	6.674
Hexanes+	1.164	86.177	1.003	0.045	4756.200	55.362	4404.000	51.263
Heptanes	1.832	100.204	1.836	0.082	5502.500	100.806	5100.000	93.432
Octanes	0.813	114.231	0.929	0.042	6249.100	50.805		0.000
Nonanes	0.361	128.258	0.463	0.021	6996.400	25.257		0.000
Decanes	0.000	142.285	0.000	0.000	7743.200	0.000		0.000
Benzene	0.001	78.120	0.001	0.000	3715.500	0.037		0.000
Toluene	0.004	92.130	0.004	0.000	4444.600	0.191		0.000
Ethylbenzene	0.001	106.160	0.001	0.000	5191.500	0.047		0.000
Xylenes	0.001	106.160	0.001	0.000	5183.500	0.026		0.000
n-Hexane	0.006	86.177	0.005	0.000	4756.200	0.271		0.000
Helium	0.000	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	1.200	28.013	0.336	0.015	0.000	0.000	0.000	0.000
Carbon Dioxide	0.153	44.010	0.067	0.003	0.000	0.000	0.000	0.000
Oxygen	0.000	32.000	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	0.000	34.080	0.000	0.000	637.100	0.000	588.000	0.000
TOTAL	100.000		22.337	1.000		1323.478		1131.703

Relative Mole Weight (lb/lb-mole) = [Mole Percent * Molecular weight (lb/lb-mole)] / 100

Weight Fraction = Net Mole Weight / Total Mole Weight

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30. Pavillion Production Heater Emissions

Assumptions

Number of new producing wells	100	(Reported by Project Proponents)
Separator Size	500	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour (Est.from fuel usage reported by Proponents)
	6	months/year (Nov. thru April - Project Proponents)
	2190	hours/year
Net Low Fuel Gas Heat Content	1132	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.270	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * \text{1,000 (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * \text{1,000,000 (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{\text{2,000 (lbs/ton)} * \text{1,000 (Btu/scf - Standard Fuel Heating Value)}}$$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Species	Separator Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr/well)	Emissions [e] (tons/yr)
NOx [a]	100	0.013	5.475
CO [a]	84	0.011	4.599
TOC [c]	11	0.001	0.602
VOC	N.A.	0.000	0.163
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.001	0.416
PM10 [c]	7.6	0.001	0.416
PM2.5 [c]	7.6	0.001	0.416
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.099
Formaldehyde [d]	0.075	0.000	0.004

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

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21. Pavillion Construction Heavy Equipment Tailpipe Emissions

Assumptions:

Hours of Operation	16	hours/site (Project Proponents)
Development Rate	14	wells per year
Load Factor	0.5	(Assumed typical value)
Backhoe Size	84	hp (Contractor)
Backhoe Utilization	100	percent
Motor Grader Size	170	hp (Contractor)
Motor Grader Utilization	100	percent

Equations:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/hp-hr) * Rated Hp (hp)* Operating Hours (hrs) * Load Factor (Dimensionless) * Utilization}}{\text{453.6 (g/lb) * 2000 (lb/tons)}}$$

Heavy Const. Vehicles	Backhoe			Grader		
	E. Factor [a] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)	E. Factor [b] (g/hp-hr)	Emissions (lb/hr/well)	Emissions[e] (tons/yr)
NOx	8.15	0.755	0.085	7.14	1.338	0.150
CO	2.28	0.211	0.024	1.54	0.289	0.032
VOC [c]	0.37	0.034	0.004	0.36	0.067	0.008
PM10 [d]	0.5	0.046	0.005	0.63	0.118	0.013
PM2.5 [d]	0.5	0.046	0.005	0.63	0.118	0.013
SO2	0.22	0.020	0.002	0.22	0.041	0.005
Formaldehyde	0.22	0.020	0.002	0.12	0.022	0.003

Heavy Const. Vehicles	Total	
	Emissions (lb/hr/well)	Emissions[e] (tons/yr)
NOx	2.093	0.234
CO	0.500	0.056
VOC [c]	0.102	0.011
PM10 [d]	0.164	0.018
PM2.5 [d]	0.164	0.018
SO2	0.062	0.007
Formaldehyde	0.043	0.005

a AP-42 Volume II, Mobile Sources, Nonroad Vehicles, Table 11-7.1 Off-highway truck
b AP-42 Volume II, Mobile Sources, Nonroad Vehicles, Table 11-7.1 Motor Grader
c Emission Factor represents total Hydrocarbon Emissions
d All emitted particulate matter assumed to be PM2.5
e Assumes a proponet specified maximum development rate

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7. Pavillion Reclamation Fugitive Dust Emissions

Assumptions:

Hours of Construction	2	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	16	hours per well pad
Pieces of Equipment	1	- 1 Grader @ 100% utilization (Project Proponent)
Equivalent Equipment Utilization	1	
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	45	percent (Composite soil sample)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for
Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 18.70 lbs TSP/hour/piece of equipment

Emissions = 8.36 lbs PM15/hour/piece of equipment

Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	18.70	0.1496	2.094
PM15	8.36	0.0669	0.936
PM10	6.27	0.0501	0.702
PM2.5	1.96	0.0157	0.220

a Assumes Proponent specified equipment utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

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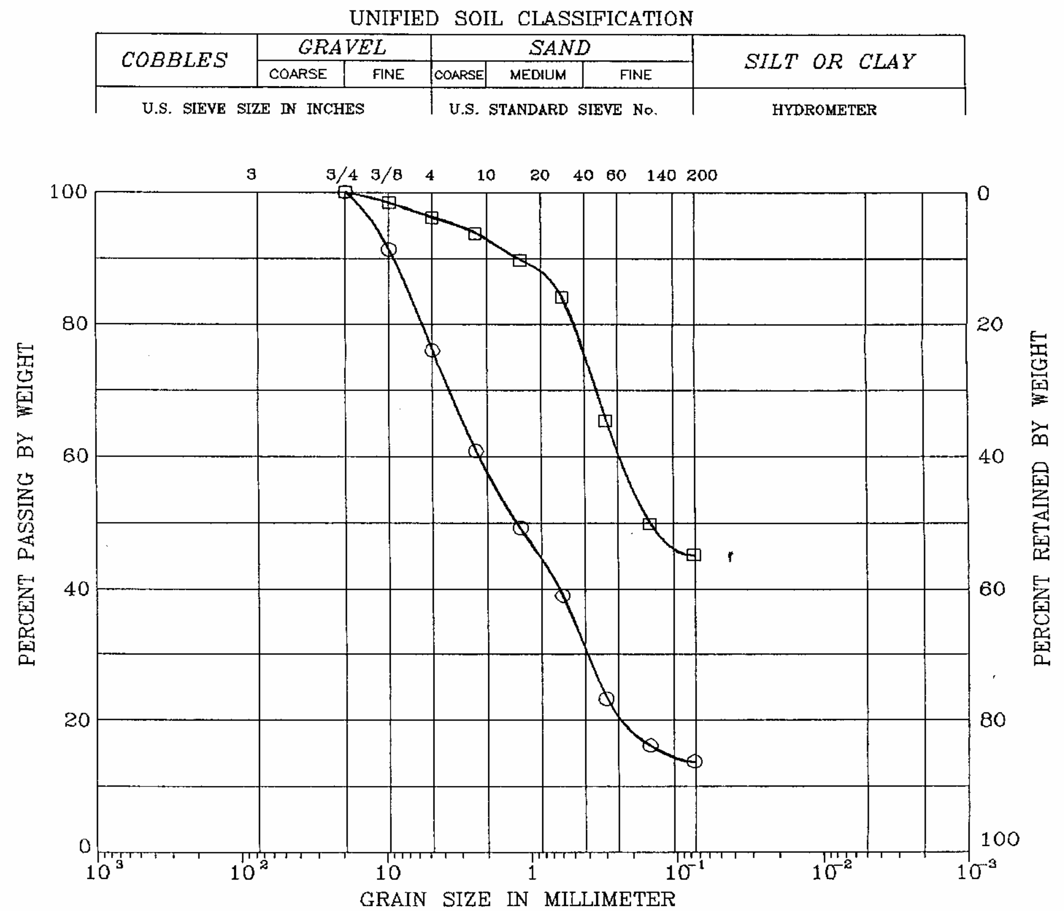
3. Pavillion Road and Pad Silt Content



SYMBOL	BORING	DEPTH (ft)	LL (%)	PI (%)	DESCRIPTION	
○	Road	–			Silty Sand (SM)	24% grvl, 62% sand, 14% silt
□	Pad	–			Very Silty Sand (SM)	4% grvl, 51% sand, 45% silt

GRAIN SIZE DISTRIBUTION

Pavillion Field, Wyoming

Project No.
For Buys & Assoc.

Resource Engineering, Inc.

32. Pavillion Condensate Storage Tank Emissions

Assumptions:

Average Condensate Production Rate :	0.25	bbls per day (Average production for existing wells - WOGCC)
Expected Successful Producting Wells:	100	
Predicted Condensate Production:	25	bbls/day
Separator Conditions :		200 psi and 130 F (Specified by Proponent)
Condensate Composition:		Analysis from Pavillion 11-10 well

Calculations:

Stock tank flash emissions estimated with E&P Tanks software

Emissions:

Component	Flash Emissions (tons/yr)
Benzene	0.002
Toluene	0.004
Ethylbenzene	0.001
Xylenes	0.003
n-Hexane	0.017
Total HAPS	0.026
Total VOC	1.165

Buys & Associates, Inc.
Environmental Consultants

Project: Wind River Alternative C Inventory
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10. Pavillion Unpaved Road Fugitive Dust Emissions

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity*
Const. & Drilling Activities				
Semi: Rig Transport	60,000	10		
Haul Truck: Water/Fuel	20,000	29		
Haul Truck: Other	48,000	34		
HD Pickup Truck: Misc.	7,000	94		
Total Const. & Drilling	20,778	167	15	240

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	8.16	85.14	10.22	143.0
PM10	2.18	22.72	2.73	38.2
PM2.5	0.32	3.32	0.40	5.6

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity*
Completion Activities				
Haul Truck: Water	20,000	12		
Haul Truck: Other	48,000	78		
HD Pickup Truck: Misc.	7,000	65		
Total Completion	28,639	155	15	55

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	9.58	404.82	11.13	155.9
PM10	2.48	104.64	2.88	40.3
PM2.5	0.36	15.29	0.42	5.9

Vehicle Type	Ave. Weight (lbs)	Round Trips per Well	Average Miles Per Trip	Hours Per Activity*
Development & Reclamation				
Haul Truck: Water	20,000	0		
Haul Truck: Other	48,000	2		
HD Pickup Truck: Misc.	7,000	10		
Total Dev. & Reclamation	13,833	12	15	30

Particulate Matter Scale	Emission Factor (lbs/VMT)	Emissions (lbs/hr)	Emissions (Tons/well)	Emissions (Tons/year)
TSP	6.66	39.93	0.60	8.4
PM10	1.85	11.10	0.17	2.3
PM2.5	0.27	1.62	0.02	0.3

Pavillion Total

Particulate Matter Scale	Emission Factor (lbs/VMT)	Max Emissions (lbs/hr)	Total Emissions (Tons/well)	Total Emissions (Tons/year)
TSP		404.82	21.95	307.3
PM10		104.64	5.77	80.8
PM2.5		15.29	0.84	11.8

* Const. & Drilling Assumes 10 24-hr days
Completion assumes 5.5 10-hr days
Development & Reclamation assumes 3 10-hr days

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative C Inventory Date: 7/8/2004

35. Pavillion Well Blowdown Emissions

Assumptions: During Production, a percentage of the wells are periodically blown down to unload fluids

# of New Producing Wells	100	
% Wells Requiring Blowdown	20	% (Estimated by Project Proponents)
# of Blowdown wells	20	Wells
Blowdown Frequency	1	per week for a period of 1 hour each (Project Proponents)
Blowdown Volume	14	Mscf/event (Estimated from Production Data)
Annual Blowdown Volume	14.6	MMscf/year

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/hr)	COMPONENT FLOW RATE (lb/hr/well)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	81.960	13.149	0.589	11.474	485.082	252.243
Ethane	30.07	9.165	2.756	0.123	1.283	101.670	52.868
Propane	44.097	1.654	0.729	0.033	0.232	26.907	13.992
i-Butane	58.123	0.703	0.409	0.018	0.098	15.074	7.839
n-Butane	58.123	0.426	0.248	0.011	0.060	9.135	4.750
i-Pentane	72.15	0.377	0.272	0.012	0.053	10.035	5.218
n-Pentane	72.15	0.180	0.130	0.006	0.025	4.791	2.491
Hexanes	86.177	1.164	1.003	0.045	0.163	37.006	19.243
Heptanes	100.204	1.832	1.836	0.082	0.256	67.723	35.216
Octanes	114.231	0.813	0.929	0.042	0.114	34.261	17.816
Nonanes	128.258	0.361	0.463	0.021	0.051	17.081	8.882
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.000	0.029	0.015
Toluene	92.13	0.004	0.004	0.000	0.001	0.146	0.076
Ethylbenzene	106.16	0.001	0.001	0.000	0.000	0.035	0.018
Xylenes	106.16	0.001	0.001	0.000	0.000	0.020	0.010
n-Hexane	86.177	0.006	0.005	0.000	0.001	0.181	0.094
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	1.200	0.336	0.015	0.168	12.401	6.449
Carbon Dioxide	44.01	0.153	0.067	0.003	0.021	2.484	1.292
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**7.5224**	**6.029**	**0.270**	**1.053**	**222.425**	**115.661**
HAP SUBTOTAL		**0.0124**	**0.011**	**0.000**	**0.002**	**0.411**	**0.214**
TOTAL		**100.000**	**22.337**	**1.000**	**14**	**824.062**	**428.512**

5. Pipeline Construction Fugitive Dust Emissions

Assumptions:

Number of Completed Wells/Year	14	Assumes 100% success rate in Pavillion & Muddy Ridge, 50% success rate in Sand Mesa and Coastal
Hours of Construction	2	days per well pad (Project Proponents)
	8	hours/day (Project Proponents)
	16	hours per well pad
Pieces of Equipment	3	- 1 Grader @ 30% utilization (Project Sub-Contractor) - 1 Backhoe @ 50% utilization - 1 Trencher @ 60% utilization
Equivalent Equipment Utilization	1.4	
Watering Control Efficiency	50	percent (Recommended by Wy DEQ)
Soil Moisture Content	7.9	percent (AP-42 Table 11.9-3, 10/98)
Soil Silt Content	39.2	percent (Weighted soil sample analysis)
PM10 Multiplier	0.75 * PM15	(AP-42 Table 11.9-1, 10/98)
PM2.5 Multiplier	0.105 * TSP	(AP-42 Table 11.9-1, 10/98)

Equations: From AP-42 tables 11.9-1 and 11.9-3 for Bulldozing Overburden Emissions, Western Surface Coal Mining, 10/98

Emissions (TSP lbs/hr) = 5.7 * (soil silt content %)^1.2 * (soil moisture content %)^-1.3 * (1-Control Efficiency)

Emissions (PM15 lbs/hr) = 1.0 * (soil silt content %)^1.5 * (soil moisture content %)^-1.4 * (1-Control Efficiency)

Emissions = 15.84 lbs TSP/hour/piece of equipment

Emissions = 6.80 lbs PM15/hour/piece of equipment

Species	Const. Equipment Emissions[a]		
	lbs/hr	tons/well	tons/yr [b]
TSP	22.18	0.1775	2.484
PM15	9.51	0.0761	1.066
PM10	7.14	0.0571	0.799
PM2.5	2.33	0.0186	0.261

a Assumes Proponent specified equipment utilization. Backhoe and Grader emissions are conservatively estimated as equivalent to Dozer emissions.

b Assumes a construction rate stated by Proponent (Summarized in #1)

6. Pipeline Fugitive Dust Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
TSP	2.484	0.000	0.000	0.000	0.000	2.484
PM15	1.066	0.000	0.000	0.000	0.000	1.066
PM10	0.799	0.000	0.000	0.000	0.000	0.799
PM2.5	0.261	0.000	0.000	0.000	0.000	0.261

13. Wind Erosion Fugitive Dust Emissions From Pipeline ROWs

Assumptions

Threshold Friction Velocity U_t*	1.02	m/s (2.28 mph) for well pads (AP-42 Table 13.2.5-2 Overburden - Western Surface Coal Mine
Exposed Surface Type	Flat	
Fastest Mile Wind Speed U_{10}^+	23.2	meters/sec (52 mph) reported as fastest 2-minute wind speed for Lander, WY (2002)
Number soil of disturbances	2	for well and facility pads (disturbance at construction and reclamation)

Equations

Friction Velocity $U^* = 0.053\ U_{10}^+$

Erosion Potential P (g/m^2/period) = $58^*(U^*-U_t^*)^2 + 25^*(U^*-U_t^*)$ for $U^*>U_t^*$, P = 0 for $U^*< U_t^*$

$$\text{Emissions (tons/year)} = \frac{\text{Erosion Potential(g/m}^2\text{/period)*Disturbed Area(m}^2\text{)*Disturbances/year*(k)* Number of Wells/year}}{\text{(453.6 g/lb)*2000 lbs/ton/Develop Period*Total Number of Wells}}$$

Particle Size Multiplier (k)		
30 um	**<10 um**	**<2.5 um**
1.0	0.5	0.2

Maxium U_{10}^+ Wind Speed (m/s)	**Maximum U* Friction Velocity m/s**	**Well/Pipeline U_t* Threshold Velocity[a] m/s**	**Erosion Potential g/m^2**
23.20	1.23	1.02	7.79

Wind Erosion Emissions

Development Area	**Disturbance (Acres)**	**Disturbance (meters^2)**	**TSP Emissions (tons/year)**	**PM10 Emissions (tons/year)**	**PM2.5 Emissions (tons/year)**
Pavillion	49	198,296	0.47	0.23	0.09
Muddy Ridge	0	0	0.00	0.00	0.00
Sand Mesa	0	0	0.00	0.00	0.00
Sand Mesa S.	0	0	0.00	0.00	0.00
Coastal	0	0	0.00	0.00	0.00
Total	**49**	**198,296**	**0.5**	**0.2**	**0.1**

48. Point Source Locations and Stack Parameters

Facility	UTM Easting (meters)	UTM Northing (meters)	UTM Zone	Lambert Easting (km)	Lambert Northing (km)	Ground Elevation (meters)
South Pavillion	696600	4790560	12	-2.236	74.561	1615.1
Pavillion Plant	699450	4792200	12	0.564	76.065	1613.9
Muddy Ridge	697950	4794950	12	-0.807	78.764	1654.8
Hidden Valley	722050	4782150	12	22.114	65.718	1549.0
Shoshoni Booster	734850	4788000	12	34.644	71.009	1499.0
Sand Mesa	715975	4798000	12	16.692	81.201	1514.9
Sand Mesa South	715125	4795469	12	15.800	78.780	1501.2
Coastal Extension	705976	4799569	12	7.078	83.000	1550.2

Note: Proposed locations for Shoshoni, Sand Mesa South, and Coastal facilities estimated from pipeline routes

Measurement System	Stack Height (ft or m)	Stack Diameter (ft or m)	Exhaust Velocity (ft/sec or m/s)	Exhaust Temp. (F or K)
Imperial	30	1	114.8	1000
Metric	9.144	0.3048	35	811

37. Production Emissions Summary

Pavillion

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	5.475		0.000		5.475
CO	4.599		0.000		4.599
VOC	0.163	1.165	0.000	115.661	116.989
SO2	0.000		0.000		0.000
TSP	0.416				0.416
PM10	0.416				0.416
PM2.5	0.416				0.416
Formaldehyde	0.004				0.004
Benzene	0.000	0.0019355		0.015	0.017
Toluene	0.000	0.003859		0.076	0.080
Ethylbenzene		0.0006452		0.018	0.019
Xylenes		0.0032258		0.010	0.013
n-Hexane	0.099	0.0167742		0.094	0.210

Muddy Ridge

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx					0.000
CO					0.000
VOC					0.000
SO2					0.000
TSP					0.000
PM10					0.000
PM2.5					0.000
Formaldehyde					0.000
Benzene					0.000
Toluene					0.000
Ethylbenzene					0.000
Xylenes					0.000
n-Hexane					0.000

Sand Mesa

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx					0.000
CO					0.000
VOC					0.000
SO2					0.000
TSP					0.000
PM10					0.000
PM2.5					0.000
Formaldehyde					0.000
Benzene					0.000
Toluene					0.000
Ethylbenzene					0.000
Xylenes					0.000
n-Hexane					0.000

38. Production Emissions Summary Continued

Sand Mesa South

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx					0.000
CO					0.000
VOC					0.000
SO2					0.000
TSP					0.000
PM10					0.000
PM2.5					0.000
Formaldehyde					0.000
Benzene					0.000
Toluene					0.000
Ethylbenzene					0.000
Xylenes					0.000
n-Hexane					0.000

Coastal Extension

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx					0.000
CO					0.000
VOC					0.000
SO2					0.000
TSP					0.000
PM10					0.000
PM2.5					0.000
Formaldehyde					0.000
Benzene					0.000
Toluene					0.000
Ethylbenzene					0.000
Xylenes					0.000
n-Hexane					0.000

Total Production

Species	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx	5.475				5.475
CO	4.599				4.599
VOC	0.163	1.165		115.661	116.989
SO2	0.000				0.000
TSP	0.416				0.416
PM10	0.416				0.416
PM2.5	0.416				0.416
Formaldehyde	0.004				0.004
Benzene	0.000	0.002		0.015	0.017
Toluene	0.000	0.004		0.076	0.080
Ethylbenzene		0.001		0.018	0.019
Xylenes		0.003		0.010	0.013
n-Hexane	0.099	0.017		0.094	0.210

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative C Inventory Date: 7/8/2004

1. Alternative C Development Summary (No Action)

Well Development

Field	Total Wells To Be Drilled	Wells Drilled Per Year	Total Producing Wells	Pad Disturbance (acres)	Pipeline Distrubance (acres)	Development Area Size (acres)
Pavillion	100	14	100	130	49	11,774
Muddy Ridge	0	0	0	0	0	0
Sand Mesa	0	0	0	0	0	0
Sand Mesa South	0	0	0	0	0	0
Coastal Extension	0	0	0	0	0	0
Total	**100**	**14**	**100**	**130**	**49**	**11,774**

Additional Compression/Treatment/Generation Capacity (hp)

Facility	Compression	Treatment	Generation	Total
South Pavillion	2,100	0	0	**2,100**
Pavillion Plant	0	0	0	**0**
Muddy Ridge	0	0	0	**0**
Hidden Valley	1,100	0	0	**1,100**
Shoshoni Booster	0	0	0	**0**
Sand Mesa	0	0	0	**0**
Sand Mesa South	0	0	0	**0**
Coastal Extension	0	0	0	**0**
Total	**3,200**	**0**	**0**	**3,200**

Additional Facility Heater Capacity (MMbtu)

Facility	Dehydration	Separation	Total
South Pavillion	0.00	0.00	**0.00**
Pavillion Plant	0.00	0.00	**0.00**
Muddy Ridge	0.00	0.00	**0.00**
Hidden Valley	0.00	0.00	**0.00**
Shoshoni Booster	0.00	0.00	**0.00**
Sand Mesa	0.00	0.00	**0.00**
Sand Mesa South	0.00	0.00	**0.00**
Coastal Extension	0.00	0.00	**0.00**
Total	**0.00**	**0.00**	**0.00**

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Alternative C Inventory Date: 7/8/2004

34. Pumper Tailpipe Emissions

Assumptions:

Number of New Pumpers:	0	(Estimated by Project Proponent)
Pumper Mileage:	2,500	miles/pumper/month (Project Proponents)
Total Annual New Pumper Mileage:	0	miles/year
Hours of Pumper Operation:	8	hours per day (Project Proponents)
Hours of Pumper Operation:	2080	hours per year
Fuel sulfur content	0.05	% (Typical value)
Fuel density	7.08	lbs/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile) * Vehicle Miles Traveled (miles/yr)}}{\text{453.6 (g/lb) * 2000 (lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal) * 453.6 (g/lb) * Fuel Sulfur Content * 2 (S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Pumper Vehicles	Heavy Duty Pickups		
	E. Factor [a] (g/mile)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	3.03	0.000	0.000
CO	33.64	0.000	0.000
VOC [b]	1.84	0.000	0.000
SO2	0.21	0.000	0.000

a AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
b Emission factor is for total Hydrocarbons.

Pumper Vehicles	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx	0.000	0.000	0.000	0.000	0.000	0.000
CO	0.000	0.000	0.000	0.000	0.000	0.000
VOC	0.000	0.000	0.000	0.000	0.000	0.000
SO2	0.000	0.000	0.000	0.000	0.000	0.000

8. Reclamation Fugitive Dust Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
TSP	2.094	0.000	0.000	0.000	0.000	2.094
PM15	0.936	0.000	0.000	0.000	0.000	0.936
PM10	0.702	0.000	0.000	0.000	0.000	0.702
PM2.5	0.220	0.000	0.000	0.000	0.000	0.220

9. Vehicle Unpaved Road Fugitive Dust Emissions

Assumptions:

Precipitation	73	days per year (NCDC data for Lander, WY - 2002)
Road Silt Content	12	percent (Average value of composit samples)
Road Moisture	0.9	percent (Average value of composit samples)

Equation: From AP-42 13.2.2, Unpaved Roads, 9/98

$$E \text{ Size Spec. Factor (lb/VMT)} = \frac{k * (s/12)^a * (W/3)^b * [(365-p)/365]}{(M/0.2)^c}$$

Where k, a, b, and c are empirical constants listed below and

E = particle size specific emission factor (lbs/VMT)
s = surface material silt content (%)
W = mean vehicle weight (tons)
M = surface material moisture content (%)
p = number of days with at least 0.01 in of precipitation per year

Empirical Constants			
Constant	**PM2.5**	**PM10**	**PM30/TSP**
k	0.38	2.6	10.0
a	0.8	0.8	0.8
b	0.4	0.4	0.5
c	0.3	0.3	0.4

Emission Factor Constant K S/12^a [(365-p)/365]/M/.02^c

PM2.5	PM10	PM30/TSP
0.194	1.325	4.383

41. South Pavillion Compression and Processing

Assumptions:

Total Power Requirement: 2100 Horsepower

Equations:

$$\text{Emissions (lbs/hr)} = \frac{\text{Emission Factor (g/hp-hr)} * \text{Power (hp)}}{453.6 \text{ (g/lb)}}$$

Emission Factor (g/hp-hr) = Emission Factor (lb/MMBtu) * 0.008 (MMBtu/hp-hr) * 453.6 (g/lb)

Pollutant	Emission Factor [4] (lb/MMBtu)	Emission Factor (g/hp-hr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx [1]		1.0	4.63	20.3
CO [1]		2.0	9.26	40.6
VOC [1]		1.0	4.63	20.3
PM10 [2, 5]	0.0194	0.070	0.33	1.4
PM2.5 [2,5]	0.0194	0.070	0.33	1.4
SO2 [3]	0.0	0.0	0.00	0.0
Benzene [2]	0.001580	0.00574	0.03	0.1
Toluene [2]	0.000558	0.00203	0.01	0.0
Ethylbenzene [2]	0.000025	0.00009	0.00	0.0
Xylenes [2]	0.000195	0.00071	0.00	0.0
Formaldehyde [1]		0.07	0.32	1.4

1 - Average emission rate as a result of the WY BACT process (Worst case lean- and rich-burn engines)
2 - AP-42 Table 3.2-3 Uncontrolled Emission Factors for 4-Stroke Rich-Burn Engines, 7/00
3 - Fuel gas is assumed to be free from sulfur compounds
4 - Conversion from lb/MMBtu to g/hp-hr assumes an average BSFC of 8,000 Btu/hp-hr (*3.632)
5 - PM = sum of PM filterable and PM condensable

33. Condensate Tank Emissions Summary

Component	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
Benzene	0.002	0.000	0.000	0.000	0.000	0.002
Toluene	0.004	0.000	0.000	0.000	0.000	0.004
Ethylbenzene	0.001	0.000	0.000	0.000	0.000	0.001
Xylenes	0.003	0.000	0.000	0.000	0.000	0.003
n-Hexane	0.017	0.000	0.000	0.000	0.000	0.017
Total HAPS	0.026	0.000	0.000	0.000	0.000	0.026
Total VOC	1.165	0.000	0.000	0.000	0.000	1.165

47. Total Emissions

Species	Wellsite Emissions (tons/yr)	Facility Emissions (tons/yr)	Total Project Emissions (tons/yr)
NOx [a]	14.565	30.899	45.464
NO [b]	8.549	18.137	26.686
NO2 [c]	1.456	3.090	4.546
CO	10.477	61.799	72.276
VOC	173.362	30.899	204.261
SO2	0.183	0.000	0.183
TSP	318.318	2.178	320.497
PM10	85.118	2.178	87.296
PM2.5	13.634	2.178	15.812
Formaldehyde	0.009	2.163	2.172
Benzene	0.024	0.177	0.202
Toluene	0.117	0.063	0.179
Ethylbenzene	0.028	0.003	0.031
Xylenes	0.018	0.022	0.040
n-Hexane	0.255	0.000	0.255

NOTES

a **NOx measured as NO_2**

b **Emitted NOx assumed to be 90% NO. Emissions corrected for the difference in molecular weights (30 mw NO/46 mw NO2)**

c **Emitted NOx assumed to be 10% NO_2.**

39. Total Well Emissions Summary

Pavillion

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	9.090	5.475	14.565
CO	5.878	4.599	10.477
VOC	56.373	116.989	173.362
SO2	0.183	0.000	0.183
TSP	317.902	0.416	318.318
PM10	84.702	0.416	85.118
PM2.5	13.217	0.416	13.634
Formaldehyde	0.005	0.004	0.009
Benzene	0.007	0.017	0.024
Toluene	0.037	0.080	0.117
Ethylbenzene	0.009	0.019	0.028
Xylenes	0.005	0.013	0.018
n-Hexane	0.045	0.210	0.255

Muddy Ridge

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	0.000	0.000	0.000
CO	0.000	0.000	0.000
VOC	0.000	0.000	0.000
SO2	0.000	0.000	0.000
TSP	0.000	0.000	0.000
PM10	0.000	0.000	0.000
PM2.5	0.000	0.000	0.000
Formaldehyde	0.000	0.000	0.000
Benzene	0.000	0.000	0.000
Toluene	0.000	0.000	0.000
Ethylbenzene	0.000	0.000	0.000
Xylenes	0.000	0.000	0.000
n-Hexane	0.000	0.000	0.000

Sand Mesa

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	0.000	0.000	0.000
CO	0.000	0.000	0.000
VOC	0.000	0.000	0.000
SO2	0.000	0.000	0.000
TSP	0.000	0.000	0.000
PM10	0.000	0.000	0.000
PM2.5	0.000	0.000	0.000
Formaldehyde	0.000	0.000	0.000
Benzene	0.000	0.000	0.000
Toluene	0.000	0.000	0.000
Ethylbenzene	0.000	0.000	0.000
Xylenes	0.000	0.000	0.000
n-Hexane	0.000	0.000	0.000

40. Total Well Emissions Summary Continued

Sand Mesa South

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	0.000	0.000	0.000
CO	0.000	0.000	0.000
VOC	0.000	0.000	0.000
SO2	0.000	0.000	0.000
TSP	0.000	0.000	0.000
PM10	0.000	0.000	0.000
PM2.5	0.000	0.000	0.000
Formaldehyde	0.000	0.000	0.000
Benzene	0.000	0.000	0.000
Toluene	0.000	0.000	0.000
Ethylbenzene	0.000	0.000	0.000
Xylenes	0.000	0.000	0.000
n-Hexane	0.000	0.000	0.000

Coastal Extension

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	0.000	0.000	0.000
CO	0.000	0.000	0.000
VOC	0.000	0.000	0.000
SO2	0.000	0.000	0.000
TSP	0.000	0.000	0.000
PM10	0.000	0.000	0.000
PM2.5	0.000	0.000	0.000
Formaldehyde	0.000	0.000	0.000
Benzene	0.000	0.000	0.000
Toluene	0.000	0.000	0.000
Ethylbenzene	0.000	0.000	0.000
Xylenes	0.000	0.000	0.000
n-Hexane	0.000	0.000	0.000

Total Wellsite

Species	Construction Emissions (tons/yr)	Production Emissions (tons/yr)	Total Well (tons/yr)
NOx	9.090	5.475	14.565
CO	5.878	4.599	10.477
VOC	56.373	116.989	173.362
SO2	0.183	0.000	0.183
TSP	317.902	0.416	318.318
PM10	84.702	0.416	85.118
PM2.5	13.217	0.416	13.634
Formaldehyde	0.005	0.004	0.009
Benzene	0.007	0.017	0.024
Toluene	0.037	0.080	0.117
Ethylbenzene	0.009	0.019	0.028
Xylenes	0.005	0.013	0.018
n-Hexane	0.045	0.210	0.255

14. Total Wind Erosion (Pad and Pipeline)

Total Wind Erosion Emissions

Development Area	TSP Emissions (tons/year)	PM10 Emissions (tons/year)	PM2.5 Emissions (tons/year)
Pavillion	1.71	0.85	0.34
Muddy Ridge	0.00	0.00	0.00
Sand Mesa	0.00	0.00	0.00
Sand Mesa South	0.00	0.00	0.00
Coastal Extension	0.00	0.00	0.00
Total	**1.7**	**0.9**	**0.3**

11. Unpaved Road Fugitive Dust Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
TSP	307.278	0.000	0.000	0.000	0.000	307.278
PM10	80.792	0.000	0.000	0.000	0.000	80.792
PM2.5	11.808	0.000	0.000	0.000	0.000	11.808

20. Vehicle Tailpipe Emissions Summary

Pollutant	Construction		Drilling		Completion	
	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (lb/hr)	Emissions (tons/yr)	Emissions (lb/hr)	Emissions (tons/yr)
NOx	0.092	0.010	0.269	0.407	1.117	0.430
CO	0.419	0.047	1.350	2.042	4.479	1.724
VOC	0.055	0.006	0.161	0.243	0.667	0.257
SO2	0.004	0.000	0.013	0.020	0.051	0.020

Pollutant	Development		Total	
	Emissions (lb/hr)	Emissions (tons/yr)	Max (lb/hr)	Emissions (tons/yr)
NOx	0.121	0.025	1.117	0.872
CO	0.855	0.179	4.479	3.992
VOC	0.073	0.015	0.667	0.521
SO2	0.007	0.001	0.051	0.042

Development Area	NOx (tons/year)	CO (tons/year)	VOC (tons/year)	SO2 (tons/year)
Pavillion	0.872	3.992	0.521	0.042
Muddy Ridge	0.000	0.000	0.000	0.000
Sand Mesa	0.000	0.000	0.000	0.000
Sand Mesa South	0.000	0.000	0.000	0.000
Coastal Extension	0.000	0.000	0.000	0.000
Total	0.872	3.992	0.521	0.042

36. Well Blowdown Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
VOC	115.661	0.000	0.000	0.000	0.000	115.661
Benzene	0.015	0.000	0.000	0.000	0.000	0.015
Toluene	0.076	0.000	0.000	0.000	0.000	0.076
Ethylbenzene	0.018	0.000	0.000	0.000	0.000	0.018
Xylenes	0.010	0.000	0.000	0.000	0.000	0.010
n-Hexane	0.094	0.000	0.000	0.000	0.000	0.094

28. Existing Facility Summary

Pollutant	Tribal Pavillion 23-2 (tons/yr)	Tribal Pavillion 11-14 (tons/yr)	Pavillion Booster (tons/yr)	West Pavillion (tons/yr)	Hidden Valley (tons/yr)	Sand Mesa (tons/yr)	Total (tons/yr)
NOx [a]	0.22	8.35	476.10	32.40	13.80	2.80	533.67
NO [b]	0.13	4.90	279.45	19.02	8.10	1.64	313.24
NO2 [c]	0.02	0.84	47.61	3.24	1.38	0.28	53.37
CO	0.05	1.67	145.80	81.00	51.40	7.00	286.92
VOC	0.02	0.81	78.60	34.80	25.70	9.40	149.33
PM10	0.03	negl.	negl.	negl.	negl.	negl.	0.03
PM2.5	0.03	negl.	negl.	negl.	negl.	negl.	0.03
SO2	0.00	negl.	negl.	negl.	negl.	negl.	0.00
Benzene	negl.	negl.					
Toluene	negl.	negl.					
Ethylbenzene	negl.	negl.					
Xylenes	negl.	negl.					
Formaldehyde	negl.	negl.		2.00	1.40	1.00	4.40

NOTES

a **NOx measured as NO_2**
b **Emitted NOx assumed to be 90% NO. Emissions corrected for the difference in molecular weights (30 mw NO/46 mw NO2)**
c **Emitted NOx assumed to be 10% NO_2.**

10. Production Heater Summary

Pollutant	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx	5.42	5.75	0.33	0.00	0.00	11.50
CO	4.55	4.83	0.28	0.00	0.00	9.66
TOC	0.60	0.63	0.04	0.00	0.00	1.26
VOC	0.16	0.16	0.01	0.00	0.00	0.33
SOx	0.00	0.00	0.00	0.00	0.00	0.00
TSP	0.41	0.44	0.02	0.00	0.00	0.87
PM10	0.41	0.44	0.02	0.00	0.00	0.87
PM2.5	0.41	0.44	0.02	0.00	0.00	0.87
Benzene	0.00	0.00	0.00	0.00	0.00	0.00
Toluene	0.00	0.00	0.00	0.00	0.00	0.00
Hexane	0.10	0.10	0.01	0.00	0.00	0.21
Formaldehyde	0.00	0.00	0.00	0.00	0.00	0.01

26. Hidden Valley (Permit CT-2091)

Pollutant	Emissions (tons/yr)
NOx	13.80
CO	51.40
VOC	25.70
PM10	negl.
PM2.5	negl.
SO2	negl.
Benzene	
Toluene	
Ethylbenzene	
Xylenes	
Formaldehyde	1.40

negl. = negligible

ry

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5. Muddy Ridge Produced Gas Characteristics (MR 24-42)

Gas Heat Value (wet): 1267 Btu/scf

C1-C2 Wt. Fraction:	0.735
VOC Wt. Fraction:	0.250
Non-HC Wt. Fraction:	0.015
Total:	1.000

COMPONENT	MOLE PERCENT	COMPONENT MOLE WEIGHT (lb/lb-mole)	NET MOLE WEIGHT (lb/lb-mole)	WEIGHT FRACTION	GROSS HEATING VALUE (BTU/scf)	NET DRY HEATING VALUE (BTU/scf)	LOWER HEATING VALUE (BTU/scf)	NET LOW HEATING VALUE (BTU/scf)
Methane	79.318	16.043	12.725	0.590	1010.000	801.112	910.000	721.794
Ethane	10.453	30.070	3.143	0.146	1769.800	184.997	1618.000	169.130
Propane	3.927	44.097	1.732	0.080	2516.200	98.811	2316.000	90.949
i-Butane	1.456	58.123	0.846	0.039	3252.100	47.351	3005.000	43.753
n-Butane	1.069	58.123	0.621	0.029	3262.400	34.875	3013.000	32.209
i-Pentane	1.136	72.150	0.820	0.038	4000.900	45.450	3698.000	42.009
n-Pentane	0.759	72.150	0.548	0.025	4008.800	30.427	3708.000	28.144
Hexanes+	0.865	86.177	0.745	0.035	4756.200	41.141	4404.000	38.095
Heptanes	0.080	100.204	0.080	0.004	5502.500	4.402	5100.000	4.080
Octanes	0.000	114.231	0.000	0.000	6249.100	0.000		0.000
Nonanes	0.000	128.258	0.000	0.000	6996.400	0.000		0.000
Decanes	0.000	142.285	0.000	0.000	7743.200	0.000		0.000
Benzene	0.001	78.120	0.001	0.000	3715.500	0.037		0.000
Toluene	0.000	92.130	0.000	0.000	4444.600	0.000		0.000
Ethylbenzene	0.000	106.160	0.000	0.000	5191.500	0.000		0.000
Xylenes	0.000	106.160	0.000	0.000	5183.500	0.000		0.000
n-Hexane	0.005	86.177	0.004	0.000	4756.200	0.238		0.000
Helium	0.000	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	0.605	28.013	0.169	0.008	0.000	0.000	0.000	0.000
Carbon Dioxide	0.328	44.010	0.144	0.007	0.000	0.000	0.000	0.000
Oxygen	0.000	32.000	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	0.000	34.080	0.000	0.000	637.100	0.000	588.000	0.000
TOTAL	100.000		21.579	1.000		1288.841		1170.162

Relative Mole Weight (lb/lb-mole) = [Mole Percent * Molecular weight (lb/lb-mole)] / 100

Weight Fraction = Net Mole Weight / Total Mole Weight

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12. Muddy Ridge Condensate Storage Tank Emissions

Assumptions:

Average Condensate Production Rate :	1.7	bbls per day (Average production for existing wells - WOGCC)
Producting Wells:	70	
Condensate Production:	119	bbls/day
Separator Conditions :		200 psi and 130 F (Specified by Proponent)
Condensate Composition:		Analysis from Pavillion 11-10 well

Calculations:

Stock tank flash emissions estimated with E&P Tanks software

Emissions:

Component	Flash Emissions (tons/yr)
Benzene	0.377
Toluene	0.570
Ethylbenzene	0.022
Xylenes	0.214
n-Hexane	2.264
Total HAPS	3.447
Total VOC	170.394

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Environmental Consultants

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8. Muddy Ridge Production Heater Emissions

Assumptions

Existing producing wells	70	(Reported by Project Proponents)
Separator Size	750	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour (Est.from fuel usage reported by Proponents)
	6	months/year (Nov. thru April - Project Proponents)
	2190	hours/year
Net Low Fuel Gas Heat Content	1267	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * \text{1,000 (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * \text{1,000,000 (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{\text{2,000 (lbs/ton)} * \text{1,000 (Btu/scf - Standard Fuel Heating Value)}}$$

$$\text{VOC Emissions (tons/yr)} = \text{TOC Emissions (tons/yr)} * \text{VOC wt. fraction}$$

Pollutant	Separator Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr/well)	Emissions [e] (tons/yr)
NOx [a]	100	0.019	5.749
CO [a]	84	0.016	4.829
TOC [c]	11	0.002	0.632
VOC	N.A.	0.001	0.158
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.001	0.437
PM10 [c]	7.6	0.001	0.437
PM2.5 [c]	7.6	0.001	0.437
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.103
Formaldehyde [d]	0.075	0.000	0.004

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Existing Source Inventory Date: 7/8/2004

17. Muddy Ridge Well Blowdown Emissions

Assumptions:		During Production, a percentage of the wells are periodically blown down to unload fluids
# of Producing Wells	70	
% Wells Requiring Blowdown	20	% (Estimated by Project Proponents)
# of Blowdown wells	14	Wells
Blowdown Frequency	1	per week for a period of 1 hour each (Project Proponents)
Blowdown Volume	15	Mscf/event (Estimated from Production Data)
Annual Blowdown Volume	10.9	MMscf/year

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/hr)	COMPONENT FLOW RATE (lb/hr/well)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	79.318	12.725	0.590	11.898	502.977	183.084
Ethane	30.07	10.453	3.143	0.146	1.568	124.241	45.224
Propane	44.097	3.927	1.732	0.080	0.589	68.448	24.915
i-Butane	58.123	1.456	0.846	0.039	0.218	33.450	12.176
n-Butane	58.123	1.069	0.621	0.029	0.160	24.559	8.940
i-Pentane	72.15	1.136	0.820	0.038	0.170	32.397	11.793
n-Pentane	72.15	0.759	0.548	0.025	0.114	21.646	7.879
Hexanes	86.177	0.865	0.745	0.035	0.130	29.464	10.725
Heptanes	100.204	0.080	0.080	0.004	0.012	3.169	1.153
Octanes	114.231	0.000	0.000	0.000	0.000	0.000	0.000
Nonanes	128.258	0.000	0.000	0.000	0.000	0.000	0.000
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.000	0.031	0.011
Toluene	92.13	0.000	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	106.16	0.000	0.000	0.000	0.000	0.000	0.000
Xylenes	106.16	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	86.177	0.005	0.004	0.000	0.001	0.170	0.062
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	0.605	0.169	0.008	0.091	6.699	2.438
Carbon Dioxide	44.01	0.328	0.144	0.007	0.049	5.706	2.077
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**9.298**	**5.397**	**0.250**	**1.395**	**213.335**	**77.654**
HAP SUBTOTAL		**0.006**	**0.005**	**0.000**	**0.001**	**0.201**	**0.073**
TOTAL		**100.002**	**21.579**	**1.000**	**15**	**852.958**	**310.477**

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Existing Source Inventory Date: 7/8/2004

4. Pavillion Produced Gas Characteristics (Pavillion 11-10)

Gas Heat Value (wet): 1301 Btu/scf

C1-C2 Wt. Fraction:	0.712
VOC Wt. Fraction:	0.270
Non-HC Wt. Fraction:	0.018
Total:	1.000

COMPONENT	MOLE PERCENT	COMPONENT MOLE WEIGHT (lb/lb-mole)	NET MOLE WEIGHT (lb/lb-mole)	WEIGHT FRACTION	GROSS HEATING VALUE (BTU/scf)	NET DRY HEATING VALUE (BTU/scf)	LOWER HEATING VALUE (BTU/scf)	NET LOW HEATING VALUE (BTU/scf)
Methane	81.960	16.043	13.149	0.589	1010.000	827.796	910.000	745.836
Ethane	9.165	30.070	2.756	0.123	1769.800	162.202	1618.000	148.290
Propane	1.654	44.097	0.729	0.033	2516.200	41.618	2316.000	38.307
i-Butane	0.703	58.123	0.409	0.018	3252.100	22.862	3005.000	21.125
n-Butane	0.426	58.123	0.248	0.011	3262.400	13.898	3013.000	12.835
i-Pentane	0.377	72.150	0.272	0.012	4000.900	15.083	3698.000	13.941
n-Pentane	0.180	72.150	0.130	0.006	4008.800	7.216	3708.000	6.674
Hexanes+	1.164	86.177	1.003	0.045	4756.200	55.362	4404.000	51.263
Heptanes	1.832	100.204	1.836	0.082	5502.500	100.806	5100.000	93.432
Octanes	0.813	114.231	0.929	0.042	6249.100	50.805		0.000
Nonanes	0.361	128.258	0.463	0.021	6996.400	25.257		0.000
Decanes	0.000	142.285	0.000	0.000	7743.200	0.000		0.000
Benzene	0.001	78.120	0.001	0.000	3715.500	0.037		0.000
Toluene	0.004	92.130	0.004	0.000	4444.600	0.191		0.000
Ethylbenzene	0.001	106.160	0.001	0.000	5191.500	0.047		0.000
Xylenes	0.001	106.160	0.001	0.000	5183.500	0.026		0.000
n-Hexane	0.006	86.177	0.005	0.000	4756.200	0.271		0.000
Helium	0.000	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	1.200	28.013	0.336	0.015	0.000	0.000	0.000	0.000
Carbon Dioxide	0.153	44.010	0.067	0.003	0.000	0.000	0.000	0.000
Oxygen	0.000	32.000	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	0.000	34.080	0.000	0.000	637.100	0.000	588.000	0.000
TOTAL	100.000		22.337	1.000		1323.478		1131.703

Relative Mole Weight (lb/lb-mole) = [Mole Percent * Molecular weight (lb/lb-mole)] / 100

Weight Fraction = Net Mole Weight / Total Mole Weight

7. Pavillion Production Heater Emissions

Assumptions

Existing Producing wells	99	(Reported by Project Proponents)
Separator Size	500	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour (Est.from fuel usage reported by Proponents)
	6	months/year (Nov. thru April - Project Proponents)
	2190	hours/year
Net Low Fuel Gas Heat Content	1132	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.270	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * \text{1,000 (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * \text{1,000,000 (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{\text{2,000 (lbs/ton)} * \text{1,000 (Btu/scf - Standard Fuel Heating Value)}}$$

$$\text{VOC Emissions (tons/yr)} = \text{TOC Emissions (tons/yr)} * \text{VOC wt. fraction}$$

Species	Separator Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr/well)	Emissions [e] (tons/yr)
NOx [a]	100	0.013	5.420
CO [a]	84	0.011	4.553
TOC [c]	11	0.001	0.596
VOC	N.A.	0.000	0.161
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.001	0.412
PM10 [c]	7.6	0.001	0.412
PM2.5 [c]	7.6	0.001	0.412
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.098
Formaldehyde [d]	0.075	0.000	0.004

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

24. Pavillion Booster (AIRS ID 56-013-00027)

Pollutant	Emissions (tons/yr)
NOx	476.10
CO	145.80
VOC	78.60
PM10	negl.
PM2.5	negl.
SO2	negl.
Benzene	
Toluene	
Ethylbenzene	
Xylenes	
Formaldehyde	

negl. = negligible

ry

11. Pavillion Condensate Storage Tank Emissions

Assumptions:

Average Condensate Production Rate :	0.25	bbls per day (Average production for existing wells - WOGCC)
Producting Wells:	99	
Condensate Production:	24.75	bbls/day
Separator Conditions :		200 psi and 130 F (Specified by Proponent)
Condensate Composition:		Analysis from Pavillion 11-10 well

Calculations:

Stock tank flash emissions estimated with E&P Tanks software

Emissions:

Component	Flash Emissions (tons/yr)
Benzene	0.002
Toluene	0.004
Ethylbenzene	0.001
Xylenes	0.003
n-Hexane	0.017
Total HAPS	0.026
Total VOC	1.152

Buys & Associates, Inc.
Environmental Consultants

Project: Wind River Existing Source Inventory
Date: 7/8/2004

16. Pavillion Well Blowdown Emissions

Assumptions: During Production, a percentage of the wells are periodically blown down to unload fluids

# of Producing Wells	99	
% Wells Requiring Blowdown	20	% (Estimated by Project Proponents)
# of Blowdown wells	20	Wells
Blowdown Frequency	1	per week for a period of 1 hour each (Project Proponents)
Blowdown Volume	14	Mscf/event (Estimated from Production Data)
Annual Blowdown Volume	14.4	MMscf/year

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/hr)	COMPONENT FLOW RATE (lb/hr/well)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	81.960	13.149	0.589	11.474	485.082	249.720
Ethane	30.07	9.165	2.756	0.123	1.283	101.670	52.340
Propane	44.097	1.654	0.729	0.033	0.232	26.907	13.852
i-Butane	58.123	0.703	0.409	0.018	0.098	15.074	7.760
n-Butane	58.123	0.426	0.248	0.011	0.060	9.135	4.702
i-Pentane	72.15	0.377	0.272	0.012	0.053	10.035	5.166
n-Pentane	72.15	0.180	0.130	0.006	0.025	4.791	2.466
Hexanes	86.177	1.164	1.003	0.045	0.163	37.006	19.051
Heptanes	100.204	1.832	1.836	0.082	0.256	67.723	34.864
Octanes	114.231	0.813	0.929	0.042	0.114	34.261	17.638
Nonanes	128.258	0.361	0.463	0.021	0.051	17.081	8.793
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.000	0.029	0.015
Toluene	92.13	0.004	0.004	0.000	0.001	0.146	0.075
Ethylbenzene	106.16	0.001	0.001	0.000	0.000	0.035	0.018
Xylenes	106.16	0.001	0.001	0.000	0.000	0.020	0.010
n-Hexane	86.177	0.006	0.005	0.000	0.001	0.181	0.093
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	1.200	0.336	0.015	0.168	12.401	6.384
Carbon Dioxide	44.01	0.153	0.067	0.003	0.021	2.484	1.279
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**7.5224**	**6.029**	**0.270**	**1.053**	**222.425**	**114.504**
HAP SUBTOTAL		**0.0124**	**0.011**	**0.000**	**0.002**	**0.411**	**0.212**
TOTAL		**100.000**	**22.337**	**1.000**	**14**	**824.062**	**424.227**

30. Point Source Locations and Stack Parameters

Facility	UTM Easting (meters)	UTM Northing (meters)	UTM Zone	Lambert Easting (km)	Lambert Northing (km)	Ground Elevation (meters)
Tribal Pavillion 23-2	693980	4792680	12	-4.707	76.684	1633.7
Tribal Pavillion 11-14	693785	4790390	12	-4.961	74.477	1633.7
Pavillion Plant	699450	4792200	12	0.564	76.065	1613.9
West Pavillion	695300	4792530	12	-3.436	76.501	1639.8
Hidden Valley	722050	4782150	12	22.114	65.718	1549.0
Sand Mesa	715975	4798000	12	16.692	81.201	1514.9

Facility	Stack Height (feet)	Stack Diameter (feet)	Exhaust Velocity (ft/sec)	Exhaust Temp. (F)
Tribal Pavillion 23-2	25.00	0.50	42.4	1070
Tribal Pavillion 11-14	21.33	1.10	22.6	460
Pavillion Plant	30.00	1.00	114.8	1000
West Pavillion	35.00	1.67	57.3	1150
Hidden Valley	37.50	1.50	153.0	750
Sand Mesa	20.10	1.44	30.7	465

Facility	Stack Height (meters)	Stack Diameter (meters)	Exhaust Velocity (m/sec)	Exhaust Temp. (K)
Tribal Pavillion 23-2	7.62	0.152	12.92	850
Tribal Pavillion 11-14	6.50	0.335	6.89	511
Pavillion Plant	9.14	0.305	34.99	811
West Pavillion	10.67	0.508	17.47	894
Hidden Valley	11.43	0.457	46.63	672
Sand Mesa	6.13	0.439	9.36	514

20. Existing Production Emissions Summary

Pavillion

Species	Unpaved Road Fugitive Dust (tons/yr)	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx		5.420		0.346		5.766
CO		4.553		3.842		8.395
VOC		0.161	1.152	0.210	114.504	116.027
SO2		0.000		0.024		0.024
TSP	245.261	0.412				245.672
PM10	72.984	0.412				73.396
PM2.5	10.667	0.412				11.079
Formaldehyde		0.004				0.004
Benzene		0.000	0.002		0.015	0.017
Toluene		0.000	0.004		0.075	0.079
Ethylbenzene			0.001		0.018	0.019
Xylenes			0.003		0.010	0.013
n-Hexane		0.098	0.017		0.093	0.207

Muddy Ridge

Species	Unpaved Road Fugitive Dust (tons/yr)	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx		5.749		0.245		5.993
CO		4.829		2.716		7.545
VOC		0.158	170.394	0.149	77.654	248.355
SO2		0.000		0.017		0.017
TSP	173.417	0.437				173.853
PM10	51.605	0.437				52.042
PM2.5	7.542	0.437				7.979
Formaldehyde		0.004				0.004
Benzene		0.000	0.377		0.011	0.388
Toluene		0.000	0.570		0.000	0.570
Ethylbenzene			0.022		0.000	0.022
Xylenes			0.214		0.000	0.214
n-Hexane		0.103	2.264		0.062	2.429

Sand Mesa

Species	Unpaved Road Fugitive Dust (tons/yr)	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx		0.329		0.010		0.339
CO		0.276		0.116		0.392
VOC		0.009	0.406	0.006	3.550	3.971
SO2		0.000		0.001		0.001
TSP	7.432	0.025				7.457
PM10	2.212	0.025				2.237
PM2.5	0.323	0.025				0.348
Formaldehyde		0.000				0.000
Benzene		0.000	0.001		0.001	0.002
Toluene		0.000	0.003		0.000	0.003
Ethylbenzene			0.000		0.000	0.000
Xylenes			0.002		0.000	0.002
n-Hexane		0.006	0.010		0.003	0.019

21. Existing Production Emissions Summary Continued

Total Production

Species	Unpaved Road Fugitive Dust (tons/yr)	Production Heaters (tons/yr)	Storage Tanks (tons/yr)	Pumper Vehicle (tons/yr)	Well Blowdown (tons/yr)	Total (tons/yr)
NOx [a]		11.498		0.601		12.099
NO [b]		6.749		0.353		7.101
NO2 [c]		1.150		0.060		1.210
CO		9.658		6.675		16.333
VOC		0.328	171.952	0.365	195.708	368.353
SO2		0.000		0.042		0.042
TSP	426.109	0.874				426.983
PM10	126.800	0.874				127.674
PM2.5	18.532	0.874				19.406
Formaldehyde		0.009				0.009
Benzene		0.000	0.380		0.027	0.407
Toluene		0.000	0.577		0.075	0.652
Ethylbenzene			0.023		0.018	0.041
Xylenes			0.219		0.010	0.229
n-Hexane		0.207	2.291		0.158	2.656

NOTES

a NOx measured as NO_2

b Emitted NOx assumed to be 90% NO. Emissions corrected for the difference in molecular weights (30 mw NO/46 mw NO2)

c Emitted NOx assumed to be 10% NO_2.

1. Existing Development Summary

Existing Wells by Area

Field	Total Wells To Be Drilled	Wells Drilled Per Year	Existing Producing Wells
Pavillion	0	0	99
Muddy Ridge	0	0	70
Sand Mesa	0	0	3
Sand Mesa South	0	0	0
Coastal Extension	0	0	0
Total	**0**	**0**	**172**

15. Pumper Tailpipe Emissions

Assumptions:

Total Annual New Pumper Mileage:	180,000	miles/year
Fuel sulfur content	0.05	% (Typical value)
Fuel density	7.08	lbs/gallon (Typical value)
Heavy Duty Pickup Fuel Efficiency	15	miles/gallon (Typical value)

Equations:

For NOx, CO and VOC:

$$\text{Emissions (tons/year)} = \frac{\text{Emission Factor (g/mile)} * \text{Vehicle Miles Traveled (miles/yr)}}{453.6 \text{ (g/lb)} * 2000 \text{ (lb/tons)}}$$

The NOx, CO and VOC emission factors for the above equation are from AP-42, while the SO2 emissions are calculated on a mass balance basis utilizing the following equation:

$$\text{SO2 E. Factor (g/mi)} = \frac{\text{Fuel Density (lb/gal)} * 453.6 \text{ (g/lb)} * \text{Fuel Sulfur Content} * 2 \text{ (S / SO2)}}{\text{Vehicle Fuel Efficiency (miles/gal)}}$$

Pumper Vehicles	Heavy Duty Pickups E. Factor [a] (g/mile)	Heavy Duty Pickups Emissions (tons/yr)
NOx	3.03	0.601
CO	33.64	6.675
VOC [b]	1.84	0.365
SO2	0.21	0.042

a AP-42 Append H Table 4.1A.2 - H.D. Gasoline Vehicles, High Altitude, 1991 - 1997 Vehicle Year, 50,000 miles (6/95)
b Emission factor is for total Hydrocarbons.

Pumper Vehicles	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
NOx	0.346	0.245	0.010	0.000	0.000	0.601
CO	3.842	2.716	0.116	0.000	0.000	6.675
VOC	0.210	0.149	0.006	0.000	0.000	0.365
SO2	0.024	0.017	0.001	0.000	0.000	0.042

2. Vehicle Unpaved Road Fugitive Dust Emissions

Assumptions:

Precipitation	73	days per year (NCDC data for Lander, WY - 2002)
Road Silt Content	12	percent (Average value of composit samples)
Road Moisture	0.9	percent (Average value of composit samples)

Equation: From AP-42 13.2.2, Unpaved Roads, 9/98

$$E \text{ Size Spec. Factor (lb/VMT)} = \frac{k * (s/12)^a * (W/3)^b * [(365-p)/365]}{(M/0.2)^c}$$

Where k, a, b, and c are empirical constants listed below and

E = particle size specific emission factor (lbs/VMT)
s = surface material silt content (%)
W = mean vehicle weight (tons)
M = surface material moisture content (%)
p = number of days with at least 0.01 in of precipitation per year

Empirical Constants			
Constant	**PM2.5**	**PM10**	**PM30/TSP**
k	0.38	2.6	10.0
a	0.8	0.8	0.8
b	0.4	0.4	0.5
c	0.3	0.3	0.4

27. Sand Mesa (Waiver AP-7D1)

Ajax DPC 2802

Pollutant	Emissions (tons/yr)
NOx	2.80
CO	7.00
VOC	9.40
PM10	negl.
PM2.5	negl.
SO2	negl.
Benzene	
Toluene	
Ethylbenzene	
Xylenes	
Formaldehyde	1.00

negl. = negligible

ry

13. Sand Meas and Coastal Condensate Storage Tank Emissions

Assumptions:

Average Condensate Production Rate :	0.32	bbls per day (Average production for existing wells - WOGCC)
Producting Wells:	3	
Condensate Production:	0.96	bbls/day
Separator Conditions :		200 psi and 130 F (Specified by Proponent)
Condensate Composition:		Sample from Grayling 29-33

Calculations:

Stock tank flash emissions estimated with E&P Tanks software

Emissions:

Component	Flash Emissions (tons/yr)
Benzene	0.001
Toluene	0.003
Ethylbenzene	0.000
Xylenes	0.002
n-Hexane	0.010
Total HAPS	0.017
Total VOC	0.406

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Existing Source Inventory Date: 7/8/2004

6. Sand Mesa and Coastal Produced Gas Characteristics

Gas Heat Value (wet): 1267 Btu/scf

C1-C2 Wt. Fraction:	0.735
VOC Wt. Fraction:	0.250
Non-HC Wt. Fraction:	0.015
Total:	1.000

COMPONENT	MOLE PERCENT	COMPONENT MOLE WEIGHT (lb/lb-mole)	NET MOLE WEIGHT (lb/lb-mole)	WEIGHT FRACTION	GROSS HEATING VALUE (BTU/scf)	NET DRY HEATING VALUE (BTU/scf)	LOWER HEATING VALUE (BTU/scf)	NET LOW HEATING VALUE (BTU/scf)
Methane	79.318	16.043	12.725	0.590	1010.000	801.112	910.000	721.794
Ethane	10.453	30.070	3.143	0.146	1769.800	184.997	1618.000	169.130
Propane	3.927	44.097	1.732	0.080	2516.200	98.811	2316.000	90.949
i-Butane	1.456	58.123	0.846	0.039	3252.100	47.351	3005.000	43.753
n-Butane	1.069	58.123	0.621	0.029	3262.400	34.875	3013.000	32.209
i-Pentane	1.136	72.150	0.820	0.038	4000.900	45.450	3698.000	42.009
n-Pentane	0.759	72.150	0.548	0.025	4008.800	30.427	3708.000	28.144
Hexanes+	0.865	86.177	0.745	0.035	4756.200	41.141	4404.000	38.095
Heptanes	0.080	100.204	0.080	0.004	5502.500	4.402	5100.000	4.080
Octanes	0.000	114.231	0.000	0.000	6249.100	0.000		0.000
Nonanes	0.000	128.258	0.000	0.000	6996.400	0.000		0.000
Decanes	0.000	142.285	0.000	0.000	7743.200	0.000		0.000
Benzene	0.001	78.120	0.001	0.000	3715.500	0.037		0.000
Toluene	0.000	92.130	0.000	0.000	4444.600	0.000		0.000
Ethylbenzene	0.000	106.160	0.000	0.000	5191.500	0.000		0.000
Xylenes	0.000	106.160	0.000	0.000	5183.500	0.000		0.000
n-Hexane	0.005	86.177	0.004	0.000	4756.200	0.238		0.000
Helium	0.000	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	0.605	28.013	0.169	0.008	0.000	0.000	0.000	0.000
Carbon Dioxide	0.328	44.010	0.144	0.007	0.000	0.000	0.000	0.000
Oxygen	0.000	32.000	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	0.000	34.080	0.000	0.000	637.100	0.000	588.000	0.000
TOTAL	100.000		21.579	1.000		1288.841		1170.162

Relative Mole Weight (lb/lb-mole) = [Mole Percent * Molecular weight (lb/lb-mole)] / 100

Weight Fraction = Net Mole Weight / Total Mole Weight

Buys & Associates, Inc. **Environmental Consultants**	Project: Wind River Existing Source Inventory Date: 7/8/2004

9. Sand Mesa and Coastal Production Heater Emissions

Assumptions

Existing producing wells	3	(Reported by Project Proponents)
Separator Size	1,000	MBTU/hr (Reported by Project Proponents)
Firing Rate	30	Minutes/hour (Est.from fuel usage reported by Proponents)
	6	months/year (Nov. thru April - Project Proponents)
	2190	hours/year
Net Low Fuel Gas Heat Content	1267	Btu/scf (Gas Analyses from Existing Wells)
Fuel Gas VOC Content	0.250	by weight (Gas Analyses from Existing Wells)

Equations

$$\text{Fuel Consumption (MMscf/yr)} = \frac{\text{Heater Size (MBtu/hr)} * 1{,}000 \text{ (Btu/MBtu)} * \text{Hours of Operation (hrs/yr)}}{\text{Fuel Heat Value (Btu/scf)} * 1{,}000{,}000 \text{ (scf/MMscf)}}$$

$$\text{NOx/CO/TOC Emissions (tons/yr)} = \frac{\text{AP-42 E.Factor (lbs/MMscf)} * \text{Fuel Consumption (MMscf/yr)} * \text{Fuel heating Value (Btu/scf)}}{2{,}000 \text{ (lbs/ton)} * 1{,}000 \text{ (Btu/scf - Standard Fuel Heating Value)}}$$

VOC Emissions (tons/yr) = TOC Emissions (tons/yr) * VOC wt. fraction

Pollutant	Separator Emissions		
	Emission Factor (lb/MMscf)	Emissions (lb/hr/well)	Emissions [e] (tons/yr)
NOx [a]	100	0.025	0.329
CO [a]	84	0.021	0.276
TOC [c]	11	0.003	0.036
VOC	N.A.	0.001	0.009
SOx [b]	0.00	0.000	0.000
TSP [c]	7.6	0.002	0.025
PM10 [c]	7.6	0.002	0.025
PM2.5 [c]	7.6	0.002	0.025
Benzene [d]	0.0021	0.000	0.000
Toluene [d]	0.0034	0.000	0.000
Hexane [d]	1.8	0.000	0.006
Formaldehyde [d]	0.075	0.000	0.000

a AP-42 Table 1.4-1, Emission Factors for Small Boilers - Natural Gas Combustion, 7/98
b Assumes produced gas contains no sulfur
c AP-42 Table 1.4-2, Emission Factors for Natural Gas Combustion, 7/98 (All Particulates are PM1.0)
d AP-42 Table 1.4-3, Emission Factors for Organic Compounds from Natural Gas Combustion, 7/98
e Assumes a Proponent specified development rate

Buys & Associates, Inc. Environmental Consultants	Project: Wind River Existing Source Inventory Date: 7/8/2004

18. Sand Mesa and Coastal Well Blowdown Emissions

Assumptions: During Production, a percentage of the wells are periodically blown down to unload fluids

# of Producing Wells	3	
% Wells Requiring Blowdown	20	% (Estimated by Project Proponents)
# of Blowdown wells	1	Wells
Blowdown Frequency	1	per week for a period of 1 hour each (Project Proponents)
Blowdown Volume	16	Mscf/event (Estimated from Production Data)
Annual Blowdown Volume	0.5	MMscf/year

COMPONENT	MOLECULAR WEIGHT (lb/lb-mole)	MOLE PERCENT	RELATIVE MOLE WEIGHT (lb/lb-mole)	WEIGHT Fraction	COMPONENT FLOW RATE (Mscf/hr)	COMPONENT FLOW RATE (lb/hr/well)	COMPONENT FLOW RATE (tons/yr)
Methane	16.043	79.318	12.725	0.590	12.691	536.509	8.370
Ethane	30.07	10.453	3.143	0.146	1.672	132.524	2.067
Propane	44.097	3.927	1.732	0.080	0.628	73.011	1.139
i-Butane	58.123	1.456	0.846	0.039	0.233	35.680	0.557
n-Butane	58.123	1.069	0.621	0.029	0.171	26.197	0.409
i-Pentane	72.15	1.136	0.820	0.038	0.182	34.557	0.539
n-Pentane	72.15	0.759	0.548	0.025	0.121	23.089	0.360
Hexanes	86.177	0.865	0.745	0.035	0.138	31.429	0.490
Heptanes	100.204	0.080	0.080	0.004	0.013	3.380	0.053
Octanes	114.231	0.000	0.000	0.000	0.000	0.000	0.000
Nonanes	128.258	0.000	0.000	0.000	0.000	0.000	0.000
Decanes +	142.285	0.000	0.000	0.000	0.000	0.000	0.000
Benzene	78.12	0.001	0.001	0.000	0.000	0.033	0.001
Toluene	92.13	0.000	0.000	0.000	0.000	0.000	0.000
Ethylbenzene	106.16	0.000	0.000	0.000	0.000	0.000	0.000
Xylenes	106.16	0.000	0.000	0.000	0.000	0.000	0.000
n-Hexane	86.177	0.005	0.004	0.000	0.001	0.182	0.003
Helium	4.003	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen	28.013	0.605	0.169	0.008	0.097	7.146	0.111
Carbon Dioxide	44.01	0.328	0.144	0.007	0.052	6.086	0.095
Oxygen	32	0.000	0.000	0.000	0.000	0.000	0.000
Hydrogen Sulfide	34.08	0.000	0.000	0.000	0.000	0.000	0.000
VOC SUBTOTAL		**9.298**	**5.397**	**0.250**	**1.488**	**227.557**	**3.550**
HAP SUBTOTAL		**0.006**	**0.005**	**0.000**	**0.001**	**0.215**	**0.003**
TOTAL		**100.002**	**21.579**	**1.000**	**16**	**909.821**	**14.193**

14. Condensate Tank Emissions Summary

Component	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
Benzene	0.002	0.377	0.001	0.000	0.000	0.380
Toluene	0.004	0.570	0.003	0.000	0.000	0.577
Ethylbenzene	0.001	0.022	0.000	0.000	0.000	0.023
Xylenes	0.003	0.214	0.002	0.000	0.000	0.219
n-Hexane	0.017	2.264	0.010	0.000	0.000	2.291
Total HAPS	0.026	3.447	0.017	0.000	0.000	3.490
Total VOC	1.152	170.394	0.406	0.000	0.000	171.952

29. Total Existing Emissions

Species	Production Emissions (tons/yr)	Facility Emissions (tons/yr)	Total Existing Emissions (tons/yr)
NOx [a]	12.099	533.670	545.769
NO [b]	7.101	313.241	320.342
NO2 [c]	1.210	53.367	54.577
CO	16.333	286.920	303.253
VOC	368.353	149.330	517.683
SO2	0.042	0.000	0.042
TSP	426.983		426.983
PM10	127.674	0.030	127.704
PM2.5	19.406	0.030	19.436
Formaldehyde	0.009	4.400	4.409
Benzene	0.407		0.407
Toluene	0.652		0.652
Ethylbenzene	0.041		0.041
Xylenes	0.229		0.229
n-Hexane	2.656		2.656

NOTES

a NOx measured as NO_2

b Emitted NOx assumed to be 90% NO. Emissions corrected for the difference in molecular weights (30 mw NO/46 mw NO2)

c Emitted NOx assumed to be 10% NO_2.

23. Tribal Pavillion 11-14 Compressor (Waiver AP-917)

Ajax DPC-180

Pollutant	Emissions (tons/yr)
NOx	8.35
CO	1.67
VOC	0.81
PM10	negl.
PM2.5	negl.
SO2	negl.
Benzene	negl.
Toluene	negl.
Ethylbenzene	negl.
Xylenes	negl.
Formaldehyde	negl.

negl. = negligible

22. Tribal Pavillion 23-2 Compressor (Waiver AP-917)

Waukesha F1197G Compressor

Pollutant	Emissions (tons/yr)
NOx	0.22
CO	0.05
VOC	0.02
PM10	0.03
PM2.5	0.03
SO2	0.00
Benzene	negl.
Toluene	negl.
Ethylbenzene	negl.
Xylenes	negl.
Formaldehyde	negl.

negl. = negligible

3. Unpaved Road Fugitive Dust Emissions

Assumptions

Annual pumper mileage: 180000 miles/year (Project Proponent)

Vehicle Type	Ave. Weight (lbs)	Vehicle Miles per Year	Particulate Matter Species	Emission Factor (lbs/VMT)	Emissions (Tons/year)
Pumper Runs			TSP	4.73	426.11
HD Pickup Truck	7,000	180000	PM10	1.41	126.80
			PM2.5	0.21	18.53

Particulate Matter Scale	Pavillion Emissions (Tons/year)	Muddy Ridge Emissions (Tons/year)	Sand Mesa Emissions (Tons/year)	Total Emisisons (Tons/year)
TSP	245.26	173.42	7.43	426.1
PM10	72.98	51.60	2.21	126.8
PM2.5	10.67	7.54	0.32	18.5

19. Well Blowdown Summary

Species	Pavillion (tons/yr)	Muddy Ridge (tons/yr)	Sand Mesa (tons/yr)	Sand Mesa South (tons/yr)	Coastal Extension (tons/yr)	Total (tons/yr)
VOC	114.504	77.654	3.550	0.000	0.000	195.708
Benzene	0.015	0.011	0.001	0.000	0.000	0.027
Toluene	0.075	0.000	0.000	0.000	0.000	0.075
Ethylbenzene	0.018	0.000	0.000	0.000	0.000	0.018
Xylenes	0.010	0.000	0.000	0.000	0.000	0.010
n-Hexane	0.093	0.062	0.003	0.000	0.000	0.158

25. West Pavillion (Permit CT-2089)

Pollutant	Emissions (tons/yr)
NOx	32.40
CO	81.00
VOC	34.80
PM10	negl.
PM2.5	negl.
SO2	negl.
Benzene	
Toluene	
Ethylbenzene	
Xylenes	
Formaldehyde	2.00

negl. = negligible

Global_ID	State	State_FIPS	County_Name	County_FIPS	Company
15600362	WY	56	Big Horn	3	Devon Energy Production Company, L.P.
15600009	WY	56	Big Horn	3	M-I Drilling Fluids Company
15600266	WY	56	Big Horn	3	Mountain Construction Company
15600222	WY	56	Fremont	13	Burlington Resources Oil and Gas Co
15600259	WY	56	Hot Springs	17	Wyoming Department of Transportation
					TOTAL Western Gas Resources
					TOTAL KLT Gas Incorporated
					TOTAL Rowdy Pipeline, LLC
15600651	WY	56	Johnson	19	Rowdy Pipeline, LLC
15600652	WY	56	Johnson	19	Rowdy Pipeline, LLC
15600711	WY	56	Johnson	19	Western Gas Resources
15600696	WY	56	Johnson	19	Western Gas Resources
15600731	WY	56	Johnson	19	Western Gas Resources
15600609	WY	56	Johnson	19	Quaneco LLC
15600610	WY	56	Johnson	19	Quaneco LLC
15600718	WY	56	Johnson	19	Western Gas Resources
15600352	WY	56	Johnson	19	Anadarko Petroleum Company
15600611	WY	56	Johnson	19	Quaneco LLC
15600351	WY	56	Johnson	19	Anadarko Petroleum Company
					TOTAL Anadarko Petroleum Company
15600624	WY	56	Johnson	19	Rowdy Pipeline, LLC
15600625	WY	56	Johnson	19	Rowdy Pipeline, LLC
15600626	WY	56	Johnson	19	Rowdy Pipeline, LLC
15600347	WY	56	Johnson	19	Anadarko Petroleum Company
15600666	WY	56	Johnson	19	Thunder Creek Gas Services
15600700	WY	56	Johnson	19	Western Gas Resources
15600692	WY	56	Johnson	19	Western Gas Resources
15600690	WY	56	Johnson	19	Western Gas Resources

15600240	WY	56	Johnson	19	Evans Construction
15600258	WY	56	Johnson	19	Woodrow Barstad
15600545	WY	56	Johnson	19	Comet Energy, LLC
15600544	WY	56	Johnson	19	Comet Energy, LLC
15600583	WY	56	Johnson	19	Northwest Energy, LLC
15600584	WY	56	Johnson	19	Northwest Energy, LLC
15600585	WY	56	Johnson	19	Northwest Energy, LLC
15600589	WY	56	Johnson	19	Northwest Energy, LLC
15600586	WY	56	Johnson	19	Northwest Energy, LLC
15600527	WY	56	Johnson	19	Bitter Creek Pipelines LLC
15600588	WY	56	Johnson	19	Northwest Energy, LLC
15600526	WY	56	Johnson	19	Bitter Creek Pipelines LLC
15600522	WY	56	Johnson	19	Bitter Creek Pipelines LLC
15600587	WY	56	Johnson	19	Northwest Energy, LLC
15600543	WY	56	Johnson	19	Comet Energy, LLC
15600533	WY	56	Johnson	19	CMS Field Service
15600581	WY	56	Johnson	19	Northwest Energy, LLC
15600582	WY	56	Johnson	19	Northwest Energy, LLC
15600542	WY	56	Johnson	19	Comet Energy, LLC
15600577	WY	56	Johnson	19	Northwest Energy, LLC
15600578	WY	56	Johnson	19	Northwest Energy, LLC
15600579	WY	56	Johnson	19	Northwest Energy, LLC
15600243	WY	56	Johnson	19	Riverside Contracting, Inc.
15600602	WY	56	Johnson	19	Northwest Energy, LLC
15600263	WY	56	Johnson	19	Wyoming Department of Transportation
15600580	WY	56	Johnson	19	Northwest Energy, LLC
15600215	WY	56	Laramie	21	Wyoming Department of Transportation
15600006	WY	56	Laramie	21	Meridian Granite Company
					TOTAL Frontier Oil and Refining Company
15600253	WY	56	Laramie	21	Recycled Materials Company, Inc.
15600301	WY	56	Lincoln	23	Williams Field Services

15600023	WY	56	Lincoln	23	Lincoln County Wyoming
15600260	WY	56	Natrona	25	71 Construction
15600204	WY	56	Natrona	25	Carl D. Underwood Oil & Gas
15600389	WY	56	Natrona	25	Merit Energy Company
					TOTAL Lee Excavation , Inc.&Rissler and McMurry Compa
					TOTAL 71 Construction
15600274	WY	56	Natrona	25	71 Construction
15600245	WY	56	Natrona	25	Umetco Minerals
15600242	WY	56	Natrona	25	Natrona County International Airport
15600221	WY	56	Natrona	25	Bill Barrett Corporation
15600532	WY	56	Natrona	25	Chevron USA, Inc.
15600227	WY	56	Natrona	25	Bill Barrett Corporation
15600381	WY	56	Natrona	25	Chevron USA, Inc.
15600098	WY	56	Natrona	25	Chevron USA, Inc.
15600570	WY	56	Natrona	25	JTL Group Incorporated
15600401	WY	56	Park	29	Saga Petroleum LLC
15600572	WY	56	Park	29	Marathon Oil Company
15600267	WY	56	Park	29	Wyoming Department of Transportation
15600353	WY	56	Park	29	EnRe LP
15600251	WY	56	Park	29	Wyoming Department of Transportation
15600564	WY	56	Sheridan	33	JM Huber
15600549	WY	56	Sheridan	33	Federated Oil and Gas
15600550	WY	56	Sheridan	33	Federated Oil and Gas
15600255	WY	56	Sheridan	33	Wyoming Department of Transportation
15600657	WY	56	Sheridan	33	SRW, Inc.
15600320	WY	56	Sheridan	33	CMS Field Services
15600361	WY	56	Sheridan	33	CMS Field Services
15600597	WY	56	Sheridan	33	Northwest Energy, LLC
15600660	WY	56	Sheridan	33	SRW, Inc.
15600659	WY	56	Sheridan	33	SRW, Inc.
15600658	WY	56	Sheridan	33	SRW, Inc.

15600601	WY	56	Sheridan	33	Northwest Energy, LLC
15600603	WY	56	Sheridan	33	Northwest Energy, LLC
15600593	WY	56	Sheridan	33	Northwest Energy, LLC
15600541	WY	56	Sheridan	33	CMS Field Services
15600596	WY	56	Sheridan	33	Northwest Energy, LLC
15600358	WY	56	Sheridan	33	CMS Field Services
15600599	WY	56	Sheridan	33	Northwest Energy, LLC
15600591	WY	56	Sheridan	33	Northwest Energy, LLC
15600342	WY	56	Sheridan	33	CMS Field Services
15600595	WY	56	Sheridan	33	Northwest Energy, LLC
15600600	WY	56	Sheridan	33	Northwest Energy, LLC
15600607	WY	56	Sheridan	33	Northwest Energy, LLC
15600604	WY	56	Sheridan	33	Northwest Energy, LLC
15600605	WY	56	Sheridan	33	Northwest Energy, LLC
15600590	WY	56	Sheridan	33	Northwest Energy, LLC
15600606	WY	56	Sheridan	33	Northwest Energy, LLC
15600552	WY	56	Sheridan	33	Federated Oil and Gas
15600592	WY	56	Sheridan	33	Northwest Energy, LLC
15600732	WY	56	Sheridan	33	Western Gas Resources
15600594	WY	56	Sheridan	33	Northwest Energy, LLC
15600598	WY	56	Sheridan	33	Northwest Energy, LLC
15600556	WY	56	Sheridan	33	JM Huber
15600566	WY	56	Sheridan	33	JM Huber
					TOTAL CMS Field Services
15600554	WY	56	Sheridan	33	JM Huber
15600558	WY	56	Sheridan	33	JM Huber
15600559	WY	56	Sheridan	33	JM Huber
15600677	WY	56	Sheridan	33	Thunder Creek Gas Services
15600699	WY	56	Sheridan	33	Western Gas Resources
15600567	WY	56	Sheridan	33	JM Huber
15600565	WY	56	Sheridan	33	JM Huber

15600538	WY	56	Sheridan	33	CMS Field Services
15600555	WY	56	Sheridan	33	JM Huber
15600539	WY	56	Sheridan	33	CMS Field Services
15600310	WY	56	Sheridan	33	CMS Field Services
15600557	WY	56	Sheridan	33	JM Huber
15600341	WY	56	Sheridan	33	CMS Field Services
15600568	WY	56	Sheridan	33	JM Huber
15600339	WY	56	Sheridan	33	CMS Field Services
15600340	WY	56	Sheridan	33	CMS Field Services
15600529	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600338	WY	56	Sheridan	33	CMS Field Services
15600337	WY	56	Sheridan	33	CMS Field Services
15600531	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600336	WY	56	Sheridan	33	CMS Field Services
15600523	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600530	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600335	WY	56	Sheridan	33	CMS Field Services
15600333	WY	56	Sheridan	33	CMS Field Services
15600334	WY	56	Sheridan	33	CMS Field Services
15600512	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600520	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600519	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600525	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600331	WY	56	Sheridan	33	CMS Field Services
15600524	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600332	WY	56	Sheridan	33	CMS Field Services
15600576	WY	56	Sheridan	33	MegaEnergy Generating, LLC
15600479	WY	56	Sheridan	33	Bear Paw Energy Incorporated
15600574	WY	56	Sheridan	33	MegaEnergy Generating, LLC
15600476	WY	56	Sheridan	33	Bear Paw Energy Incorporated
15600575	WY	56	Sheridan	33	MegaEnergy Generating, LLC

15600573	WY	56	Sheridan	33	MegaEnergy Generating, LLC
15600477	WY	56	Sheridan	33	Bear Paw Energy Incorporated
15600390	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600478	WY	56	Sheridan	33	Bear Paw Energy Incorporated
15600517	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600516	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600513	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600528	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600515	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600521	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600514	WY	56	Sheridan	33	Bitter Creek Pipelines LLC
15600223	WY	56	Sublette	35	EOG Resources
					TOTAL Jonah Gas Gathering Company
15600302	WY	56	Sublette	35	Williams Field Services
15600303	WY	56	Sublette	35	Williams Field Services
15600092	WY	56	Sublette	35	Mountain Gas Resources
15600286	WY	56	Sublette	35	LeGrand Johnson
15600136	WY	56	Sublette	35	Infinity Oil & Gas of Wyoming
15600403	WY	56	Sublette	35	Shell Rocky Mountain Production Company LLC
15600041	WY	56	Sublette	35	Infinity Oil & Gas of Wyoming
					TOTAL Jonah Gas Gathering Company
15600220	WY	56	Sublette	35	Yates Petroleum Corporation
15600250	WY	56	Sublette	35	NERD Gas Company, LLC
15600029	WY	56	Sublette	35	Jonah Gas Gathering Company
15600028	WY	56	Sublette	35	Questar Gas Management Company
15600045	WY	56	Sublette	35	Questar Gas Management Company
15600044	WY	56	Sublette	35	Questar Gas Management Company
15600216	WY	56	Sublette	35	Questar Exploration Production Co.
15600001	WY	56	Teton	39	Kiewit Western Company
15600252	WY	56	Teton	39	Evans Construction
15600282	WY	56	Teton	39	RST Excavation

15600209	WY	56	Uinta	41	Kern River Gas Transmission
15600304	WY	56	Uinta	41	BP America Production Company
15600213	WY	56	Uinta	41	Questar Pipeline Company
15600088	WY	56	Uinta	41	Questar Gas Management Company
15600553	WY	56	Washakie	43	Hiland Partners, L.L.C.
	ID	16	JEFFERSON	051	
	ID	16	MADISON	065	
	MT				Bitter Creek Pipelines LLC
	MT				Bitter Creek Pipelines LLC
	MT				Bitter Creek Pipelines LLC
	MT				Bitter Creek Pipelines LLC
	MT				Bitter Creek Pipelines LLC
	MT				Bitter Creek Pipelines LLC
	MT				Bitter Creek Pipelines LLC
	MT				Stillwater Mining Company
	MT				Stillwater Mining Company
	MT				Stillwater Mining Company

Facility	Facility_Class	Permit_Number	Permit_Date
Worland Field Compressor Station	Compressor Station	CT-2677	11-Jan-02
Greybull Plant	Bentonite Plant	MD-658	21-Aug-01
CT-3302	Crushing and Screening	CT-3302	13-May-03
MBE Compressor	Compressor Station	CT-2735	01-Mar-02
Rabbit Pit	Crushing and Screening	CT-3036	01-Oct-02
Bullwacker/Pine Ridge Compressor Station	Compressor Station	CT-2448&MD-801	
Jepsen Compressor Station	Compressor Station	MD-565&MD-565&MD-755	
Pumpkin Creek Central Compressor Station	Compressor Station	CT-2242&MD-751	
Pumpkin Creek Pod 1 Station	Compressor Station	CT-2243	30-Jan-01
Pumpkin Creek Pod 2 Station	Compressor Station	CT-2244	30-Jan-01
Pumpkin/Bruno	Compressor Station	CT-2472	28-Aug-01
Hollywood Compressor Station	Compressor Station	CT-3207	21-Jan-03
Whiskey Draw/Jack Daniels Compressor Station	Compressor Station	CT-3266	25-Mar-03
Walker Draw Low Pressure Compressor Station	Compressor Station	CT-2449	31-Jul-01
Walker Draw Main Compressor Station	Compressor Station	CT-2451	31-Jul-01
SG Palo/Big Mike	Compressor Station	CT-3010	17-Sep-02
Tim Pod Compressor Station	Compressor Station	CT-2577	06-Nov-01
Wallows Creek Low Pressure Compressor Station	Compressor Station	CT-2450	31-Jul-01
Neil Pod Compressor Station	Compressor Station	CT-2576	06-Nov-01
County Line Central Compressor Station	Compressor Station	CT-2357&CT-2357&MD-833	
Burger Draw Central Compressor Station	Compressor Station	CT-3327	10-Jun-03
Burger Draw Satellite 1	Compressor Station	CT-3298	13-May-03
Burger Draw Satellite 2	Compressor Station	CT-3279	15-Apr-03
Jeff Pod Compressor Station	Compressor Station	CT-2575	06-Nov-01
Juniper Draw Compressor Station	Compressor Station	CT-2507	18-Sep-01
Juniper/Aspen Compressor Station	Compressor Station	CT-2367	22-May-01
Flying Creek/Bridge Draw Compressor Station	Compressor Station	CT-2369	22-May-01
Deer Gulch Compressor Station	Compressor Station	CT-2368	22-May-01

Jackson Yard	Crushing and Screening	MD-745	18-Mar-02
Barstad Pit	Crushing and Screening	CT-2711	07-Feb-02
Lawrence 33 CPF Compressor Station	Compressor Station	CT-2955	12-Aug-02
Lawrence 28 Compressor Station	Compressor Station	CT-2954	14-Aug-02
Clear Creek Borgelli Booster 1	Compressor Station	CT-2847	04-Jun-02
Clear Creek Esponda Booster 1	Compressor Station	CT-2840	04-Jun-02
Clear Creek Esponda Booster 2	Compressor Station	CT-2848	04-Jun-02
Clear Creek Watt Booster 1	Compressor Station	CT-2859	24-Jun-02
Clear Creek Esponda Booster 3	Compressor Station	CT-2841	04-Jun-02
Texaco 922 Battery	Compressor Station	CT-3183	15-Jan-03
Clear Creek Texaco Booster 1	Compressor Station	CT-2895	09-Jul-02
Texaco 522 Battery	Compressor Station	CT-3184	15-Jan-03
Piney Creek Central Station	Compressor Station	MD-654	31-Jul-01
Clear Creek Quinn CPF	Compressor Station	CT-2842	04-Jun-02
Belus #32	Compressor Station	CT-3034	01-Oct-02
KHUN 35 Compressor Station	Compressor Station	CT-3340	24-Jun-03
Box Elder Quinn CPF	Compressor Station	CT-2846	04-Jun-02
Box Elder Quinn CPF #2	Compressor Station	CT-3102	12-Nov-02
Belus #28 CPF	Compressor Station	CT-2869	25-Jul-02
Box Elder Quinn Booster 1	Compressor Station	CT-2829	21-May-02
Box Elder Quinn Booster 2	Compressor Station	CT-2828	21-May-02
Box Elder Quinn Booster 3	Compressor Station	CT-3130	26-Nov-02
Portable Hot Mix Plant CT-3009	Asphalt Plant	CT-3009	17-Sep-02
North Piney B9-2	Compressor Station	CT-2894	09-Jul-02
Piney Creek #2	Crushing and Screening	CT-2766	26-Mar-02
Box Elder Quinn Booster 4	Compressor Station	CT-3206	21-Jan-03
Portable Hot Mix Plant	Asphalt Plant	CT-2303	30-Apr-01
Granite Canyon Quarry	Crushing and Screening	MD-737	05-Mar-02
Frontier Refinery	Petroleum Refinery	MD-674&MD-798	
portable crushing and screening plant	Crushing and Screening	CT-3093	07-Nov-02
LaBarge Compressor Station	Compressor Station	MD-675	23-Oct-01

Municipal Solid Waste Combustor	Incineration	MD-809	23-Oct-02
487 Pit	Crushing and Screening	CT-2756	14-Mar-02
Burnt Wagon Gas Processing Plant	Sweet Gas Plant	CT-2370	25-May-01
SRMGU 27-32	Production Site	MD-620	08-May-01
Crushing and Screening Plant	Crushing and Screening	CT-2407&CT-2407&CT-3225	
71 Pitt	Crushing and Screening	CT-2738&CT-3094	
Henrie Pit	Crushing and Screening	CT-2896	11-Jul-02
Rattlesnake Quarry	Crushing and Screening	MD-625	10-May-01
Airport	Miscellaneous	MD-760	14-May-02
Cooper Reservoir Unit	Compressor Station	CT-2467	24-Aug-01
Bullfrog Compressor Station	Compressor Station	MD-351A	04-Apr-01
Cave Gulch Gas Conditioning Plant		MD-874	13-May-03
Waltman #23	Production Site	MD-668	11-Sep-01
Waltman 44 Compression Facility	Compressor Station	MD-659	21-Aug-01
Portable Asphalt Hot Mix Plant	Asphalt Plant	CT-2989	19-Aug-02
YU Bench Compressor Station	Compressor Station	MD-651	30-Jul-01
South Chugwater Booster	Compressor Station	CT-2517	27-Sep-01
Windy Flat Pit	Crushing and Screening	CT-2932	26-Jul-02
Skull Creek Pipeline	Compressor Station	CT-2723	21-Feb-02
Clark Pit	Crushing and Screening	CT-2331	07-May-01
Town Draw Compressor Station	Compressor Station	CT-3148	10-Dec-02
Box Elder Creek Main Compressor Station	Compressor Station	CT-2289	10-Apr-01
Box Elder Creek Pod 2 Compressor Station	Compressor Station	CT-2291	10-Apr-01
crushing, hot mix plant, stockpiling site	Crushing and Screening	CT-2225	23-Jan-01
Ellenwood, Krezelok, & Ruzila CPF Compressor Station	Compressor Station	CT-3151	10-Dec-02
Cottonwood Creek Prospect F	Compressor Station	CT-2446	25-Jul-01
Kuhn #2 Compressor Station	Compressor Station	CT-2683	29-May-02
North Piney B4-2	Compressor Station	CT-2855	04-Jun-02
Ellenwood, Krezelok, & Ruzila Pod 3	Compressor Station	CT-3159	10-Dec-02
Ellenwood, Krezelok, & Ruzila Pod 2 Compressor Station	Compressor Station	CT-3158	10-Dec-02
Ellenwood, Krezelok, & Ruzila Pod 1 Compressor Station	Compressor Station	CT-3157	10-Dec-02

North Piney B8	Compressor Station	CT-2857	03-Jun-02
North Piney C1	Compressor Station	CT-2771	09-Apr-02
North Piney B12	Compressor Station	CT-2853	04-Jun-02
Rhoades Ranch Compressor Station	Compressor Station	CT-3065	25-Oct-02
North Piney B2	Compressor Station	CT-2856	04-Jun-02
OK Creek 25 Compressor Station	Compressor Station	CT-2463	14-Aug-01
North Piney B6	Compressor Station	CT-2831	04-Jun-02
North Piney B10	Compressor Station	CT-2852	04-Jun-02
Wild Horse Compressor Station	Compressor Station	MD-827	26-Nov-02
North Piney B14	Compressor Station	CT-2850	04-Jun-02
North Piney B7	Compressor Station	CT-2832	04-Jun-02
Wild Horse	Compressor Station	CT-2863	18-Jun-02
North Piney C2	Compressor Station	CT-2772	09-Apr-02
North Piney C3	Compressor Station	CT-2780	04-Jun-02
North Piney B1	Compressor Station	CT-2854	04-Jun-02
North Piney C4	Compressor Station	CT-2851	04-Jun-02
Wild Horse Creek Compressor Station	Compressor Station	CT-3208	21-Jan-03
North Piney B11	Compressor Station	CT-2893	05-Jul-02
Wild Ho/Middle Prong Compressor Station	Compressor Station	CT-2656	14-Dec-01
North Piney B13	Compressor Station	CT-2849	04-Jun-02
North Piney B5	Compressor Station	CT-2892	05-Jul-02
Dutch Creek Compressor Station	Compressor Station	CT-3040	07-Oct-02
Upper Spring Creek Compressor Station	Compressor Station	CT-3038	07-Oct-02
Hank Williams-Malli Compressor Station	Compressor Station	MD-600&MD-600A	
Beaver Creek Compressor Station	Compressor Station	CT-3039	07-Oct-02
Middle Creek Compressor Station	Compressor Station	CT-3031	27-Sep-02
Roode Compressor Station	Compressor Station	CT-3032	27-Sep-02
SC-2956	Compressor Station	CT-2392	05-Jun-01
Joe Compressor Station	Compressor Station	CT-2931	30-Jul-02
Whitmeyer Compressor Station	Compressor Station	CT-3154	10-Dec-02
Twin Buttes Compressor Station	Compressor Station	CT-3153	10-Dec-02

Hey Joe Creek Prospect A Compressor Station	Compressor Station	CT-2254	27-Feb-01
Buffalo Creek Compressor Station	Compressor Station	CT-3152	10-Dec-02
Hey Joe Creek Prospect D Compressor Station	Compressor Station	CT-2257	27-Feb-01
Ivy Creek Gibbs - 18	Compressor Station	CT-2502	11-Sep-01
Jones Draw Compressor Station	Compressor Station	CT-3028	24-Sep-02
Prairie Dog G Compressor Station	Compressor Station	CT-2635	29-Nov-01
Wyarno Compressor Station	Compressor Station	CT-3027	24-Sep-02
Prairie Dog F Compressor Station	Compressor Station	CT-2634	29-Nov-01
Prairie Dog E Compressor Station	Compressor Station	CT-2633	29-Nov-01
Wrench Ranch #11 Battery	Compressor Station	CT-2330	04-May-01
Badger Creek C Compressor Station	Compressor Station	CT-2611	27-Nov-01
Badger Creek E Compressor Station	Compressor Station	CT-2613	27-Nov-01
Wrench Ranch 49 Battery	Compressor Station	CT-2329	04-May-01
Badger Creek D Compressor Station	Compressor Station	CT-2612	27-Nov-01
Seven Brothers 1 Battery	Compressor Station	CT-3182	03-Jan-03
Wrench Ranch #2 Battery	Compressor Station	CT-2328	04-May-01
Prairie Dog C Compressor Station	Compressor Station	CT-2631	29-Nov-01
Badger Creek B Compressor Station	Compressor Station	CT-2610	27-Nov-01
Badger Creek A Compressor Station	Compressor Station	CT-2609	27-Nov-01
Beatty Gulch Central Compressor Station	Compressor Station	CT-2325	04-May-01
Koltiska 32 Battery	Compressor Station	CT-2865	17-Jun-02
Koltiska 31 Battery	Compressor Station	CT-2864	17-Jun-02
State #36 Battery	Compressor Station	CT-2327	04-May-01
Prairie Dog B Compressor Station	Compressor Station	CT-2630	29-Nov-01
State #26 Battery	Compressor Station	CT-2326	04-May-01
Prairie Dog A Compressor Station	Compressor Station	CT-2629	29-Nov-01
Prairie Dog Gen Site 4	Generation	CT-2987	19-Aug-02
Prairie Dog Pod P	Compressor Station	CT-2794	04-Oct-02
Prairie Dog Gen Site 2	Generation	CT-2985	19-Aug-02
Prairie Dog Pod EE Compressor Station	Compressor Station	CT-3261	20-Mar-03
Prairie Dog Gen Site 3	Generation	CT-2986	19-Aug-02

Prairie Dog Gen Site 1	Generation	CT-2984	19-Aug-02
Prairie Dog Pod F	Compressor Station	CT-2322	07-May-01
Gladewater Central Station	Compressor Station	MD-670	18-Sep-01
Prairie Dog Pod N	Compressor Station	CT-2793	23-Apr-02
Dunning 32 Battery	Compressor Station	CT-2508	18-Sep-01
Dewey 28 Battery	Compressor Station	CT-2509	18-Sep-01
DeLapp 27 Compressor Station	Compressor Station	CT-2514	18-Sep-01
Trembath 25 Battery	Compressor Station	CT-2512	18-Sep-01
Dewey 27 Battery	Compressor Station	CT-2511	18-Sep-01
Mischke 24 Battery	Compressor Station	CT-2513	18-Sep-01
Dewey 21 Battery	Compressor Station	CT-2510	18-Sep-01
North LaBarge Shallow Unit Tract 16	Compressor Station	MD-696	11-Dec-01
Bird Canyon/County Line Compressor Station	Compressor Station	CT-2252&MD-856	
Saddle Ridge Compressor Station	Compressor Station	MD-676	23-Oct-01
Big Piney Compressor Station	Compressor Station	MD-677	23-Oct-01
Jonah Compressor Station	Compressor Station	CT-2280	03-Apr-01
Asphalt Plant CT-771	Asphalt Plant	CT-771A	06-Nov-02
Thompson Compressor Station	Compressor Station	CT-3300	13-May-03
Rainbow 11-32-30-107D, 12-32-30-107D & 13-32-30-107	Production Site	CT-3269	25-Mar-03
Riley Ridge Compressor Facility #1 and Pod Compressor Stations	Compressor Station	MD-808	10-Sep-02
Falcon Compressor Station	Compressor Station	CT-2251&MD-815	
Blue Rim State #1	Compressor Station	CT-3114	19-Nov-02
Mesa Road Mine	Crushing and Screening	CT-3274	08-Apr-03
Paradise Compressor Station	Compressor Station	CT-2250	23-Feb-01
Pinedale Compressor Station	Compressor Station	CT-2466	21-Aug-01
Mesa 2 Compressor Station	Compressor Station	CT-2465	21-Aug-01
Mesa 1 Compressor Station	Compressor Station	CT-2464	21-Aug-01
Stewart Pt Wells 9-29 &16-29 Pad	Production Well	CT-3321	10-Jun-03
Portable Hot Mix Asphalt Plant	Asphalt Plant	CT-3301	13-May-03
Asphalt Plant	Asphalt Plant	MD-813	01-Oct-02
Temporary Jackson Gravel Operation	Crushing and Screening	MD-647	10-Jul-01

Coyote Creek	Compressor Station	CT-3003	18-Sep-02
Anschutz Ranch East	Sweet Gas Plant	MD-878	28-May-03
Eakin Compressor Station	Compressor Station	MD-615	01-May-01
Blacks Fork Gas Plant	Sweet Gas Plant	MD-638	29-May-01
Cottonwood Compressor Station	Compressor Station	MD-886	24-Jun-03
IDAHO PACIFIC CORP		51	17-Oct-01
BRIGHAM YOUNG UNIVERSITY IDAHO		65	09-Apr-03
CX24	Compressor Station	3036	
CX25	Compressor Station	3037	
Squirrel Creek	Compressor Station	3038	
State Line Batt.	Compressor Station	3070	
Connor 33 Batt.	Compressor Station	3140	
CX-14 Battery	Compressor Station	3141	
Symons Central Compressor Station	Compressor Station	3250	
Nye Mine	Mine	2459b	
Nye Mine	Mine	2459a	
E. Boulder Mine	Mine	2653	

Start_Date	Operating_Status	Section	Township	Range	UTM Zone	UTM_E_Meters	UTM_N_Meters	Elevation_m	Latitude
17-Sep-02	operational	35	49	93	12	740584	4895137	1280.0	44 deg 10' 18.3
	RFD	5	52	93	13	256560	4933932	1155.0	
	RFD	34	53	94	13	258753	4934797	1219.9	
29-Jun-02	operational	2	38	90	13	288344	4796047	1678.2	
	RFD	8	43	94	13	244850	4844261	1314.6	
		9	42	77	13	409700	4830800	1516.4	
		22	44	77	13	411295	4847201	1462.8	
		36	47	77	13	415103	4872475	1325.8	
30-Jan-03	operational	35	47	77	13	414725	4872510	1335.0	
30-Jan-03	operational	36	47	77	13	415689	4872930	1339.2	
	RFD	28	47	77	13	410500	4874800	1296.5	
	RFD	36	48	77	13	415750	4881960	1328.4	
	RFD	32	48	78	13	399735	4882640	1293.1	
	RFD	27	48	80	13	383457	4884309	1402.1	
	RFD	27	48	80	13	383356	4884511	1403.1	
	RFD	19	48	77	13	407200	4886000	1252.0	
24-Jan-03	operational	21	48	77	13	409496	4886322	1280.0	44deg 07' 28.2"
	RFD	17	48	80	13	379515	4886333	1342.3	
27-Aug-02	operational	15	48	77	13	412377	4887506	1282.6	44deg 08' 07.8"
		16	48	77	13	410466	4887576	1273.7	
	RFD	13	48	77	13	414477	4887726	1375.4	
	RFD	12	48	77	13	415550	4888144	1402.0	
	RFD	11	48	77	13	413643	4888477	1348.6	
10-Apr-02	operational	9	48	77	13	410043	4888859	1279.2	44deg 08' 50.64"
21-Apr-03	operational	22	49	78	13	402596	4895608	1356.0	
22-May-03	operational	15	49	77	13	411800	4896800	1221.5	
22-May-03	operational	29	50	77	13	408000	4903800	1208.0	
22-May-03	operational	6	50	77	13	406900	4910200	1211.2	

	RFD				13	363702	4911623	1440.1	
	RFD	23	51	82	13	365391	4914845	1408.8	
	RFD	33	52	81	13	371952	4921138	1393.3	
	RFD	28	52	81	13	372101	4923147	1395.7	
	RFD	22	52	81	13	374200	4923500	1350.9	
	RFD	24	52	81	13	377100	4923800	1335.1	
	RFD	13	52	81	13	377300	4925700	1339.9	
	RFD	9	52	81	13	371800	4926900	1411.2	
	RFD	7	52	80	13	378500	4927800	1333.4	
	RFD	9	52	82	13	362963	4927972	1463.0	
	RFD	2	52	81	13	374600	4929300	1395.6	
	RFD	5	52	82	13	360366	4929686	1416.3	
03-Sep-02	operational	1	52	83	13	357396	4929766	1441.3	
	RFD	35	53	81	13	374556	4930000	1341.0	
	RFD	32	53	81	13	369582	4931138	1339.1	
	RFD	35	53	77	13	414182	4931430	1172.5	
	RFD	26	53	81	13	374954	4932218	1343.1	
	RFD	29	53	80	13	378609	4932250	1287.5	
	RFD	28	53	81	13	371087	4932315	1385.6	
	RFD	26	53	81	13	374700	4932400	1341.0	
	RFD	25	53	81	13	375900	4932500	1290.7	
	RFD	29	53	80	13	378579	4932697	1280.4	
	RFD	26	53	83	13	355271	4932845	1429.4	
	RFD	23	53	81	13	374200	4933200	1402.0	
	RFD	22	53	83	13	353678	4934497	1455.1	
	RFD	14	53	80	13	383818	4935523	1274.0	
22-May-01	operational	18	13	69	13	486250	4549245	2195.0	
22-Feb-02	operational				13	485099	4550364	2255.0	
					13	517500	4551000	1829.0	
	RFD	36	14	67	13	513955	4553979	1875.1	
26-Mar-02	operational	14	26	113	12	563058	4676100	2058.2	

	RFD	36	34	119	12	499773	4754656	1820.7	
	RFD	4	31	81	13	372944	4726570	1656.6	
10-Oct-01	operational	19	32	84	13	340775	4732435	2029.1	
13-Jul-01	operational	27	33	86	13	324662	4741524	2007.8	42.48.30
		16	33	79	13	391556	4742315	1626.3	
		6	33	79	13	388408	4745571	1581.4	
	RFD	32	34	77	13	409171	4747066	1575.0	
01-Jul-00	operational	31	34	88	13	301440	4749660	2109.3	
	RFD				13	380556	4750248	1627.0	
	RFD	3	35	87	13	316494	4766898	1848.7	
18-Dec-01	operational	1	36	87	13	319855	4776286	1912.3	
	RFD	1	36	87	13	320500	4776500	1890.0	
	RFD	31	37	86	13	320360	4777714	1878.6	43deg 07' 58.15
14-Sep-01	operational	36	37	87	13	318630	4777816	1900.7	
01-Oct-02	operational	16	37	79	13	391082	4780976	1632.8	
	RFD	2	51	100	12	660349	4873817	2085.0	44.00000
15-Jan-02	operational	32	50	100	12	666443	4913268	1737.5	
	RFD	28	52	101	12	658704	4914014	1769.5	
18-Jan-02	operational	6	54	102	12	642610	4950983	1644.3	44.7 deg
	assume operational	26	55	100	12	669161	4953686	1397.4	
	RFD	28	55	80	13	380900	4851200	1463.0	
	RFD	9	53	81	13	370935	4936984	1280.0	
10-Apr-03	operational	10	53	81	13	372642	4937258	1276.0	
	assume operational	11	53	82	13	364974	4937421	1332.2	
	RFD	12	53	82	13	366823	4937642	1305.9	
17-Jan-03	operational	1	53	77	13	414392	4938039	1136.6	44deg35'33.2
08-Aug-02	operational	2	53	77	13	413281	4939081	1149.5	44 deg 36' 6.5
	RFD	2	53	80	13	383500	4939100	1280.0	
	RFD	3	53	82	13	364150	4939250	1402.0	
	RFD	1	53	82	13	366274	4939528	1402.0	
	RFD	1	53	82	13	366479	4939545	1401.1	

	RFD	36	54	81	13	376100	4940000	1348.9	
	RFD	34	54	80	13	382756	4940097	1281.2	
	RFD	33	54	81	13	371456	4941098	1401.4	
	RFD	28	54	79	13	390600	4941300	1219.2	
	RFD	27	54	80	13	383100	4941700	1299.3	
15-May-02	operational	25	54	77	13	414356	4941998	1147.1	44 deg 37' 41.5
	RFD	30	54	80	13	377900	4942500	1402.0	
	RFD	27	54	81	13	373548	4942519	1393.1	
	RFD	29	54	76	13	418832	4942637	1155.6	44deg 38' 4.0
	RFD	19	54	80	13	378500	4942700	1360.3	
	RFD	24	54	81	13	376300	4942800	1402.0	
15-Aug-02	operational	19	54	76	13	417100	4942800	1164.5	
	RFD	24	54	81	13	376604	4942879	1401.1	
	RFD	21	54	81	13	371318	4943138	1402.0	
	RFD	24	54	80	13	385900	4943200	1219.0	
	RFD	19	54	80	13	378571	4943211	1341.2	
	RFD	19	54	76	13	417300	4943669	1142.2	
	RFD	22	54	81	13	373100	4944200	1402.0	
	RFD	16	54	76	13	419600	4944500	1210.7	
	RFD	17	54	81	13	369580	4944948	1341.1	
	RFD	17	54	80	13	380000	4945500	1302.7	
	RFD	4	54	81	13	371000	4948500	1361.1	
	RFD	6	54	81	13	368400	4949200	1381.5	
		32	55	76	13	417781	4949201	1165.4	
	RFD	31	55	81	13	368700	4950300	1334.2	
	RFD	36	55	81	13	371200	4950600	1314.8	
	RFD	25	55	82	13	367500	4951500	1394.0	
05-Jun-03	operational	29	55	76	13	417821	4951612	1228.6	
	RFD	21	55	76	13	419000	4952500	1243.9	
	RFD	17	55	80	13	380200	4954700	1402.0	
	RFD	7	55	80	13	377800	4955600	1419.3	

14-May-02	operational	7	55	76	13	417098	4956112	1216.9	
	RFD	5	55	80	13	379500	4958100	1401.9	
14-May-02	operational	36	56	77	13	414327	4958932	1097.0	
	RFD	18	56	76	13	415985	4963529	1097.0	44deg49'19.8
	RFD	16	56	82	13	362200	4964900	1280.0	
	RFD	16	56	83	13	353136	4965365	1158.0	44deg 49' 42.8"
	RFD	18	56	82	13	359200	4965800	1220.4	
	RFD	17	56	83	13	352012	4966082	1158.0	44deg 50' 5.1"
	RFD	9	56	83	13	353136	4966841	1146.9	44deg 50' 30.6"
04-May-03	operational	11	56	84	13	346480	4967251	1158.0	
	RFD	8	56	82	13	361585	4967426	1337.4	44deg 50' 55.6"
	RFD	2	56	82	13	366568	4967519	1369.1	44deg 51' 2.0"
	assume operational	9	56	84	13	343171	4967788	1157.7	
	RFD	3	56	82	13	364400	4968185	1338.8	44deg 51' 22.1"
	RFD	1	56	84	13	348657	4968700	1200.8	
17-Jul-02	operational	2	56	84	13	346251	4968878	1188.6	
	RFD	4	56	83	13	352809	4969229	1134.8	44deg 51' 47.7"
	RFD	36	57	82	13	366478	4969570	1362.4	44deg 52' 8.4"
	RFD	33	57	82	13	362224	4969907	1283.0	44deg 52' 16.4"
04-Mar-02	operational	36	57	84	13	347116	4970108	1190.2	
13-May-03	operational	32	57	83	13	350222	4970540	1161.9	
	RFD	31	57	83	13	348866	4970732	1205.8	
04-Mar-02	operational	36	57	84	13	346439	4971047	1188.6	
	RFD	28	57	83	13	351968	4971695	1158.0	44deg 53' 6.9"
04-Mar-02	operational	26	57	84	13	345792	4972600	1158.0	
	RFD	22	57	83	13	353004	4972834	1118.8	44deg 53' 44.6"
	RFD	20	57	83	13	351168	4973648	1141.6	
	RFD	18	57	83	13	349260	4974840	1123.3	
	RFD	9	57	83	13	352024	4976964	1108.8	
	RFD	11	57	83	13	355180	4977247	1117.6	
	RFD	6	57	83	13	349170	4978443	1097.0	

	RFD	2	57	83	13	355838	4978886	1109.3	
07-May-03	operational	2	57	83	13	355800	4978900	1107.2	
13-Jan-03	operational	33	58	83	13	351607	4979611	1149.3	44.95638
	RFD	36	58	84	13	347500	4980100	1096.5	
06-Jun-02	operational	32	58	83	13	349927	4980782	1077.2	
12-Sep-02	operational	28	58	83	13	351880	4980919	1121.4	
	RFD	27	58	84	13	343402	4981227	1161.8	
31-Dec-02	operational	25	58	83	13	356997	4981510	1131.8	
11-Oct-02	operational	27	58	83	13	353239	4981693	1108.2	
13-Dec-02	operational	24	58	83	13	356384	4982931	1073.3	
20-Sep-02	operational	21	58	83	13	352562	4983358	1092.5	
	RFD	16	27	113	12	560119	4677976	2121.7	42deg 19' 51"
		34	27	111	12	579930	4681316	2225.0	
04-Feb-02	operational	32	28	113	12	558400	4690300	2256.0	
01-Apr-02	operational	20	28	113	12	558500	4694600	2256.0	
03-Apr-03	operational	34	29	108	12	606220	4698500	2187.3	
	RFD	32	29	111	12	574367	4700209	2073.0	
	RFD	1	29	114	12	552100	4707800	2269.2	
	RFD	32	30	107	12	612264	4708237	2224.1	42.5203
	RFD	5	29	114	12	545994	4708775	2560.0	
		36	30	108	12	609636	4709062	2240.1	
	RFD	16	30	108	12	605322	4714137	2226.2	42.57444
	RFD	5	30	109	12	593522	4717169	2097.4	
23-Feb-03	operational	2	31	109	12	598265	4726644	2134.0	42.41.12
09-Aug-02	operational	2	31	109	12	597260	4727158	2157.3	
	RFD	16	32	109	12	594892	4733300	2256.0	
	RFD	7	32	109	12	592320	4735120	2256.0	
	RFD	29	33	109	12	591365	4738529	2266.0	
	RFD	33	39	116	12	519085	4793989	1801.1	
	RFD	34	41	116	12	520036	4812179	2302.0	
	RFD				12	518389	4813133	1907.6	

03-Apr-03	operational	36	13	121	12	499012	4545244	2230.5	
	RFD	35	13	121	12	497044	4545291	2248.2	
	assume operational	24	17	114	12	563243	4587905	1993.0	41 deg 26' 25
13-Jun-03	operational	10	18	112	12	579279	4600540	1920.0	
	RFD	12	47	91	13	282418	4881927	1442.5	
	OPERATING				12	462499	4802381		43.3753
	OPERATING				12	462322	4814099		43.4808
					13	350880	4987732	1091	
					13	350070	4986300	1103	
					13	351921	4986863		
					13	351379	4984558	1074	
					13	355020	4984420	1097	
					13	348490	4989160	1158	
					13	357575	4984300		
					12	588013	5025995	1536	
					12	588013	5025995	1536	
					12	570667	5040457	1850	

Longitude	Facility_Permit_Delta_NOx_TPY	Facility_Permit_Delta_SO2_TPY	Facility_Permit_Delta_PM10_TPY	List of Origin	Stack_Data_Source	SIC_Description
107 deg 59' 26.4	16			N	EPA SIC code 4923	Compressor Station
	0		-1496.5	N	General Assumption	
	9.1	0.9	1.4	check location	EPA SIC code 1442	Construction Sand and Gravel
	25.6			Y	EPA SIC code 4923	Compressor Station
			2.5	check location	EPA SIC code 1442	Construction Sand and Gravel
	101.2				Lowest M value	
	25.5				Site stack parameters	
	48				EPA SIC code 4923	Compressor Station
	5.1			N	EPA SIC code 4923	Compressor Station
	5.1			N	EPA SIC code 4923	Compressor Station
	68.8			facilities w/o emissions	EPA SIC code 4923	Compressor Station
	22.3			N	EPA SIC code 4923	Compressor Station
	85.5			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	65.6			N	EPA SIC code 4923	Compressor Station
	108.2			N	EPA SIC code 4923	Compressor Station
106deg 07' 52.32"	11			N	EPA SIC code 4923	Compressor Station
	11.7			N	EPA SIC code 4923	Compressor Station
106deg 05' 43.44"	11			N	EPA SIC code 4923	Compressor Station
	86.5				EPA SIC code 4923	Compressor Station
	91.3			permitted after 5/30/2003	EPA SIC code 4923	Compressor Station
	24.6			N	EPA SIC code 4923	Compressor Station
	24.6			N	EPA SIC code 4923	Compressor Station
106deg 07' 29.28"	11			N	EPA SIC code 4923	Compressor Station
	158.6			N	EPA SIC code 4923	Compressor Station
	57.6			N	EPA SIC code 4923	Compressor Station
	57.6			N	EPA SIC code 4923	Compressor Station
	25.2			N	EPA SIC code 4923	Compressor Station

	25.4	4	24.7	check location	EPA SIC code 1442	Construction Sand and Gravel
	5.4	0.9	2.6	check location	EPA SIC code 1442	Construction Sand and Gravel
	11.5			check location	EPA SIC code 4923	Compressor Station
	15.4			check location	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	49.2			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	11.6			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	11.6			N	EPA SIC code 4923	Compressor Station
	11.4			N	EPA SIC code 4923	Compressor Station
	116.4			N	EPA SIC code 4923	Compressor Station
	22.4			N	EPA SIC code 4923	Compressor Station
	10.3			permitted after 5/30/2003	EPA SIC code 4923	Compressor Station
	116.4			N	EPA SIC code 4923	Compressor Station
	116.3			N	EPA SIC code 4923	Compressor Station
	19.5			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	30.7			N	EPA SIC code 4923	Compressor Station
	39.3	12.3	21.8	check location	EPA SIC Code 3531	Asphalt Plants; including travel-mix t
	30.6			N	EPA SIC code 4923	Compressor Station
			1.8	check location	EPA SIC code 1442	Construction Sand and Gravel
	30.7			N	EPA SIC code 4923	Compressor Station
	11.5	3.6	32.7	check location	EPA SIC Code 3531	Asphalt Plants; including travel-mix t
	148.35		60.9	check location	EPA SIC code 1442	Construction Sand and Gravel
	-212.7	-1024	-173.8		EPA SIC code 2911	Petroleum Refinery
	17.3	1.1	3.7	check location	EPA SIC code 1442	Construction Sand and Gravel
	2.7			check location	EPA SIC code 4923	Compressor Station

	-3.8	2.3	5.7	check location		
			2.4	check location	EPA SIC code 1442	Construction Sand and Gravel
	2.5			check location		
107.08.40	17.8			production facilities	EPA SIC code 1311	Crude Oil / Natural Gas Production
	39.9	5.8	11		EPA SIC code 1442	Construction Sand and Gravel
	1.3		1.2		EPA SIC code 1442	Construction Sand and Gravel
			0.6	check location	EPA SIC code 1442	Construction Sand and Gravel
			9.3	facilities w/o emissions	EPA SIC code 1442	Construction Sand and Gravel
	0.7	0.2	22.6	check location	EPA SIC code 4581	Airports
	11.8			facilities w/o emissions	EPA SIC code 4923	Compressor Station
	2.3			N	EPA SIC code 4923	Compressor Station
	40.2			Y		
107deg 12' 31.47	11.6			production facilities	EPA SIC code 1311	Crude Oil / Natural Gas Production
	11.6			check location		
	86.8			facilities w/o emissions	EPA SIC Code 3531	Asphalt Plants; including travel-mix t
109.0000	5.4			N	EPA SIC code 4923	Compressor Station
	7.6			facilities w/o emissions	EPA SIC code 4923	Compressor Station
			1.3	check location	EPA SIC code 1442	Construction Sand and Gravel
109.2 deg	7.5			N	EPA SIC code 4923	Compressor Station
			3.8	check location	EPA SIC code 1442	Construction Sand and Gravel
	30.9			N	EPA SIC code 4923	Compressor Station
	28.7			N	EPA SIC code 4923	Compressor Station
	3.9			N	EPA SIC code 4923	Compressor Station
			2.9	check location	EPA SIC code 1442	Construction Sand and Gravel
	30.5			N	EPA SIC code 4923	Compressor Station
106deg4'42.7	15.4			N	EPA SIC code 4923	Compressor Station
106 deg 5' 33.8	15.4			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	6.1			N	EPA SIC code 4923	Compressor Station
	4.1			N	EPA SIC code 4923	Compressor Station
	4.1			N	EPA SIC code 4923	Compressor Station

	30.6			N	EPA SIC code 4923	Compressor Station
	116.5			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	44.9			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
106 deg 4' 46.7	20.5			facilities w/o emissions	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
106deg 1' 24	15.3			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	3.9			N	EPA SIC code 4923	Compressor Station
	116.5			N	EPA SIC code 4923	Compressor Station
	116.5			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	116.4			N	EPA SIC code 4923	Compressor Station
	19.4			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	70.8			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	30.6			N	EPA SIC code 4923	Compressor Station
	109.2			N	EPA SIC code 4923	Compressor Station
	19.5			N	EPA SIC code 4923	Compressor Station
	61				EPA SIC code 4923	Compressor Station
	97.5			N	EPA SIC code 4923	Compressor Station
	19.5			N	EPA SIC code 4923	Compressor Station
	19.5			N	EPA SIC code 4923	Compressor Station
	11.4			N	EPA SIC code 4923	Compressor Station
	38.4			N	EPA SIC code 4923	Compressor Station
	23.2			N	EPA SIC code 4923	Compressor Station
	186.2			N	EPA SIC code 4923	Compressor Station

	44.4			N	EPA SIC code 4923	Compressor Station
	30.9			N	EPA SIC code 4923	Compressor Station
	44.4			N	EPA SIC code 4923	Compressor Station
106deg03'45.6	53.8			N	EPA SIC code 4923	Compressor Station
	58.7			N	EPA SIC code 4923	Compressor Station
106deg 51' 28.1"	44.9			N	EPA SIC code 4923	Compressor Station
	58.7			N	EPA SIC code 4923	Compressor Station
106deg 52' 20"	44.9			N	EPA SIC code 4923	Compressor Station
106deg 51' 29.6"	44.9			N	EPA SIC code 4923	Compressor Station
	11.7			N	EPA SIC code 4923	Compressor Station
106deg 45' 5.5"	44.9			N	EPA SIC code 4923	Compressor Station
106deg 41' 18.7"	44.9			N	EPA SIC code 4923	Compressor Station
	11.7			N	EPA SIC code 4923	Compressor Station
106deg 42' 58.1"	44.9			N	EPA SIC code 4923	Compressor Station
	11.6			N	EPA SIC code 4923	Compressor Station
	15.5			N	EPA SIC code 4923	Compressor Station
106deg 51' 47.0"	44.9			N	EPA SIC code 4923	Compressor Station
106deg 41' 24.8"	44.9			N	EPA SIC code 4923	Compressor Station
106deg 44' 38.9"	44.9			N	EPA SIC code 4923	Compressor Station
	81.6			N	EPA SIC code 4923	Compressor Station
	11.7			N	EPA SIC code 4923	Compressor Station
	11.7			N	EPA SIC code 4923	Compressor Station
	11.6			N	EPA SIC code 4923	Compressor Station
106deg 52' 27.9"	44.9			N	EPA SIC code 4923	Compressor Station
	11.6			N	EPA SIC code 4923	Compressor Station
106deg 51' 41.9"	44.9			N	EPA SIC code 4923	Compressor Station
	79			N	EPA SIC code 4911	Electric power generation
	43.8			N	EPA SIC code 4923	Compressor Station
	144.4			N	EPA SIC code 4911	Electric power generation
	11.6			N	EPA SIC code 4923	Compressor Station
	144.4			N	EPA SIC code 4911	Electric power generation

	144.4			N	EPA SIC code 4911	Electric power generation
	38.6			N	EPA SIC code 4923	Compressor Station
106.88134	64.8			N	EPA SIC code 4923	Compressor Station
	43.8			N	EPA SIC code 4923	Compressor Station
	11.7			N	EPA SIC code 4923	Compressor Station
	11.7			N	EPA SIC code 4923	Compressor Station
	11.7			N	EPA SIC code 4923	Compressor Station
	11.7			N	EPA SIC code 4923	Compressor Station
	11.7			N	EPA SIC code 4923	Compressor Station
	11.7			facilities w/o emissions	EPA SIC code 4923	Compressor Station
	11.7			N	EPA SIC code 4923	Compressor Station
110deg 16' 16.5"	1.7			Y	EPA SIC code 4923	Compressor Station
	66.3				Stack parameter from highest emission rate	
	2.2			check location	EPA SIC code 4923	Compressor Station
	3.1			check location	EPA SIC code 4923	Compressor Station
	54.9			Y		
	0	29.6	0	check location	EPA SIC Code 3531	Asphalt Plants; including travel-mix t
	12.6			Y		
109.6333	3.2			production facilities	EPA SIC code 1311	Crude Oil / Natural Gas Production
	20.6			check location		
	96.1				Stack parameter from highest emission rate	
109.716660	2.4			Y	EPA SIC code 4923	Compressor Station
			4.8	check location	EPA SIC code 1442	Construction Sand and Gravel
109.41.33	83.7			Y		
	88			Y		
	31.5			Y		
	62.9			Y		
	3.6			production facilities	EPA SIC Code 1311	Crude Petroleum and natural gas
	33.8	5.7	12.9	check location		
	6.9	7.3	3.7	check location	EPA SIC Code 3531	Asphalt Plants; including travel-mix t
	9.2	0.4	0.2	check location	EPA SIC code 1442	Construction Sand and Gravel

	44			Y		
	-300.7			check location	General Assumption	
110 deg 14' 35	-122			Y		
	32.4			Y		
	-0.2	60.8		permitted after 5/30/2003	EPA SIC code 4923	Compressor Station
111.4629	38.62	6.8	2.98			
111.4659	30.22	85.85	10.12			
	7.73	0.01	0.13			
	8.06	0.01	0.13			
	8.06	0.01	0.13			
	7.73	0.01	0.13			
	30.92	0.04	0.55			
	23.19	0.03	0.42			
	113.46	0.28	4.28			
	68.02	9.76	1.24			
			18.76			
	-4.41	-0.1	5.46			

Stack_Ht_m	Stack_Temp_K	Stack_Diam_m	Stack_Vel_mps	M	Stacks_Comments
9.0549	510	0.76	12.5		outside stack domain
15	422	0.31	10.0		outside stack domain
11.6768	326	0.73	15.4		
9.0549	510	0.76	12.5		
11.6768	326	0.73	15.4		
8	900	0.30	54.9		
6.86	730	0.31	47.7		
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		
9.0549	510	0.76	12.5		
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain

11.6768	326	0.73	15.4		
11.6768	326	0.73	15.4		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
14.1159	350	0.91	10.0		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
11.6768	326	0.73	15.4		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
14.1159	350	0.91	10.0		
11.6768	326	0.73	15.4		
17.7744	389	1.83	5.2		
11.6768	326	0.73	15.4		
9.0549	510	0.76	12.5		

9.1	422	0.98	8.2		
11.6768	326	0.73	15.4		
3.6576	422	0.15	10.0		
11.7683	451	0.82	9.5		
11.6768	326	0.73	15.4		
11.6768	326	0.73	15.4		
11.6768	326	0.73	15.4		
11.6768	326	0.73	15.4		
11.6159	358	0.76	9.5		
9.0549	510	0.76	12.5		
9.0549	510	0.76	12.5		outside stack domain
14.4	735	0.30	41.2		
11.7683	451	0.82	9.5		
5.94	649	0.30	52.7		
14.1159	350	0.91	10.0		
9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		
11.6768	326	0.73	15.4		outside stack domain
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11.6768	326	0.73	15.4		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
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9.0549	510	0.76	12.5		outside stack domain
11.6768	326	0.73	15.4		outside stack domain
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60.2134	432	2.74	16.7		outside stack domain
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60.2134	432	2.74	16.7		outside stack domain
9.0549	510	0.76	12.5		outside stack domain
60.2134	432	2.74	16.7		outside stack domain

60.2134	432	2.74	16.7		outside stack domain
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9.0549	510	0.76	12.5		outside stack domain
9.0549	510	0.76	12.5		
7.9248	422	0.70	142.0		
9.0549	510	0.76	12.5		
9.0549	510	0.76	12.5		
7.62	904	0.41	28.7		
14.1159	350	0.91	10.0		
7.32	403	0.20	33.9		
11.7683	451	0.82	9.5		
7.32	797	0.30	45.2		
7.9248	422	0.71	142.0		
9.0549	510	0.76	12.5		
11.6768	326	0.73	15.4		
7.9248	422	0.71	142.0		
15.24	714	0.46	72.5		
15.24	711	0.46	54.0		
15.24	711	0.46	54.0		
11.7683	451	0.82	9.5		
7.0866	422	0.10	30.1		
14.1159	350	0.91	10.0		
11.6768	326	0.73	15.4		

5.39496	422	0.41	12.5		
15	422	0.31	10.0		
10.52	700	0.61	28.0		
9.14	869	0.46	69.2		
9.0549	510	0.76	12.5		
10.668	273	0.96	13.9		
19.5072	273	1.07	16.0		
6.096	766	0.204216	34.62528	10.55378534	
6.096	766	0.204216	34.62528	10.55378534	
6.096	766	0.204216	34.62528	10.55378534	
6.096	766	0.204216	34.62528	10.55378534	
6.096	766	0.204216	34.62528	34.62528	
6.096	766	0.204216	34.62528	10.55378534	
8.950185087	818	0.386105341	30.32296668	30.32296668	
3	750	0.3	30	30	
		23.25581395	2.325581395	2.325581395	
		225.8231198	2.325581395	2.325581395	

Include_in_Inventory	Comments	PM25Cat	Facility_Permit_Delta_PM25_TPY	Facility_Actual_Delta_PM25_TPY
T		Zero Value		
RFD	Decrease at major source	Other	-1496.5	10
RFD		Other	1.4	
T		Zero Value		
RFD		Other	2.5	
T		Zero Value		
T		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
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T		Zero Value		

RFD		Other	24.7	
RFD		Other	2.6	
RFD		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD	Crushing, no stack parameters.	Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
T		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Other	21.8	
RFD		Zero Value		
RFD		Other	1.8	
RFD		Zero Value		
T		Other	32.7	
T		Other	60.9	29
			-173.8	-6.7
RFD		Other	3.7	
T		Zero Value		

RFD	Location edited based on QA/QC.	Other	5.7	
RFD		Other	2.4	
T		Zero Value		
T		Zero Value		
			5.8	
			1.2	
RFD	Increase < 1 TPY.	Other	0.6	
T		Other	9.3	
RFD		Other	22.6	
RFD		Zero Value		
T	Location edited based on QA/QC.	Zero Value		
RFD		Zero Value		
RFD		Zero Value		
T		Zero Value		
T		Zero Value		
RFD		Zero Value		
T		Zero Value		
RFD		Other	1.3	
T		Zero Value		
T		Other	3.8	
RFD		Zero Value		
RFD	RFD based on WDEQ information.	Zero Value		
T		Zero Value		
T		Other	2.9	
RFD		Zero Value		
T		Zero Value		
T		Zero Value		
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T		Zero Value		
RFD		Zero Value	0	
RFD		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Other	4.8	
T		Zero Value		
T		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Zero Value		
RFD		Other	12.9	
RFD		Other	3.7	
RFD		Other	0.2	

T		Zero Value		
RFD	Decrease at major source	Zero Value		
T		Zero Value		
T		Zero Value		
RFD		Zero Value		

stack parameters aggregated according to NOx emission ratio
Combine point sources. Stack Parameters used from two air compressors.
assume y = 100m, z=5m. Combine area sources.
Total mine area = 233 acres. Assume eqaul x and y. Assume z = 5m

State	State FIPS	County_Name	County FIPS	Permit	Number	Facility	Stack_ID	Operating Status
ID	16	JEFFERSON	051	51	13	IDAHO PACIFIC CORP	1	OPERATING
ID	16	MADISON	065	65	11	BRIGHAM YOUNG UNIVERSITY IDAHO	1	OPERATING

Permit_Date	Latitude	Longitude	UTM Zone	UTM_E_Meters	UTM_N_Meters	Facility_Permit_Delta_NOx_TPY
17-Oct-01	433753	1114629	12	462499.1408	4802381.174	38.62
09-Apr-03	434808	1114659	12	462321.5971	4814098.894	30.22

Facility_Permit_Delta_SO2_TPY	Facility_Permit_Delta_PM10_TPY	Flowrate_acfm	Stack_Ht_m	Stack_Temp_K	Stack_Diam_m
6.8	2.98	21230	10.668	273.15	0.957072
85.85	10.12	30316	19.5072	273.15	1.0668

Stack_Vel_mps
13.93428707
16.01510776

	A	B	C	D	E	F	G	H	I	J	K	M	O	P	Q	S
1	**Plant Name**	**Source Type**	**Permit#**	**UTM X**	**UTM Y**	**Zone**	**Elev**	**NOX (tpy)**	**PM10 (tpy**	**PM2.5 (tpy)**	**Sox (tpy)**	**Stack Height (m)**	**Stack Exit Temp (K)**	**Stack Diameter (ft) (or Sigma y for area source)**	**Stack Diameter (m) (or Sigma y for area source)**	**Stack Velocity (m/s) (or sigma z for area source)**
2	Stillwater Mining Company - Nye Mine	POINT	2459b	588013	5025995	12	1536	68.02	1.24		9.76	3	750		0.3	30
3	Stillwater Mining Company - Nye Mine	AREA	2459a	588013	5025995	12	1536		18.76						23.255814	2.325581
4	Bitter Creek Pipelines, LLC - Symons Central Compressor Station	POINT	3250	357575	4984300	13		113.46	4.28		0.28	8.950185	817.8503437		0.3861053	30.32297
5	Bitter Creek Pipelines, LLC - CX-14 Battery	POINT	3141	348490	4989160	13	1158	23.19	0.42	0.42	0.03	6.096	766.3333333	0.67	0.204216	34.62528
6	Bitter Creek Pipelines, LLC - Connor 33 Batt.	POINT	3140	355020	4984420	13	1097	30.92	0.55	0.55	0.04	6.096	766.3333333	0.67	0.204216	34.62528
7	Bitter Creek Pipelines, LLC - State Line Batt.	POINT	3070	351379	4984558	13	1074	7.73	0.13	0.13	0.01	6.096	766.3333333	0.67	0.204216	34.62528
8	Bitter Creek Pipelines, LLC - Squirrel Creek	POINT	3038	351921	4986863	13		8.06	0.13		0.01	6.096	766.3333333	0.67	0.204216	34.62528
9	Bitter Creek Pipelines, LLC - CX25	POINT	3037	350070	4986300	13	1103	8.06	0.13		0.01	6.096	766.3333333	0.67	0.204216	34.62528
10	Bitter Creek Pipelines, LLC - CX24	POINT	3036	350880	4987732	13	1091	7.73	0.13	0.13	0.01	6.096	766.3333333	0.67	0.204216	34.62528
11	Stillwater Mining Company - E. Boulder Mine	AREA	2653	570667	5040457	12	1850	-4.41	5.46	2.07	-0.1				225.82312	2.325581

Table F-1
Operating Permitted Source Inventory

Permit Number	Operating Status	UTM Zone	UTM Easting (meters)	UTM Northing (meters)	Source Elevation (meters)	Permitted NOx Emissions (tons/yr)	Permitted SO2 Emissions (tons/yr)	Permitted PM10 Emissions (tons/yr)	Permitted PM2.5 Emissions (tons/yr)	Stack Height (meters)	Stack Diameter (meters)	Stack Velocity (meters/sec)	Stack Temperature (degrees K)
51	Operational	12	462499	4802381	1875.0	38.62	6.8	2.98		10.67	0.96	13.93	326
65	Operational	12	462322	4814099	1800.0	30.22	85.85	10.12		19.51	1.07	16.02	326
2459	Assume Operational	12	588013	5025995	1536.0	68.02	9.76	20		3.00	0.30	30.00	750
3036	Assume Operational	13	350880	4987732	1091.0	7.73	0.01	0.13		6.10	0.20	34.63	766
3037	Assume Operational	13	350070	4986300	1103.0	8.06	0.01	0.13		6.10	0.20	34.63	766
3038	Assume Operational	13	351921	4986863	1036.0	8.06	0.01	0.13		6.10	0.20	34.63	766
3070	Assume Operational	13	351379	4984558	1074.0	7.73	0.01	0.13		6.10	0.20	34.63	766
3140	Assume Operational	13	355020	4984420	1097.0	30.92	0.04	0.55		6.10	0.20	34.63	766
3141	Assume Operational	13	348490	4989160	1158.0	23.19	0.03	0.42		6.10	0.20	34.63	766
3250	Assume Operational	13	357575	4984300	1055.0	113.46	0.28	4.28		8.95	0.39	30.32	818
CT-2225	Assume Operational	13	364974	4937421	1332.2			2.9	2.9	11.68	0.73	15.37	326
CT-2242&MD-751	Assume Operational	13	415103	4872475	1325.8	48				9.05	0.76	12.50	510
CT-2243	Operational	13	414725	4872510	1335.0	5.1				9.05	0.76	12.50	510
CT-2244	Operational	13	415689	4872930	1339.2	5.1				9.05	0.76	12.50	510
CT-2250	Operational	12	598265	4726644	2134.0	83.7				7.92	0.71	142.04	422
CT-2251&MD-815	Assume Operational	12	609636	4709062	2240.1	96.1				7.92	0.71	142.04	422
CT-2252&MD-856	Assume Operational	12	579930	4681316	2225.0	66.3				7.92	0.70	142.04	422
CT-2254	Operational	13	417098	4956112	1216.9	44.4				9.05	0.76	12.50	510
CT-2257	Operational	13	414327	4958932	1097.0	44.4				9.05	0.76	12.50	510
CT-2280	Operational	12	606220	4698500	2187.3	54.9				7.62	0.41	28.66	904
CT-2291	Operational	13	372642	4937258	1276.0	3.9				9.05	0.76	12.50	510
CT-2322	Operational	13	355800	4978900	1107.2	38.6				9.05	0.76	12.50	510
CT-2325	Operational	13	347116	4970108	1190.2	81.6				9.05	0.76	12.50	510
CT-2326	Operational	13	345792	4972600	1158.0	11.6				9.05	0.76	12.50	510
CT-2327	Operational	13	346439	4971047	1188.6	11.6				9.05	0.76	12.50	510
CT-2328	Operational	13	346251	4968878	1188.6	15.5				9.05	0.76	12.50	510
CT-2329	Assume Operational	13	343171	4967788	1157.7	11.7				9.05	0.76	12.50	510
CT-2330	Operational	13	346480	4967251	1158.0	11.7				9.05	0.76	12.50	510
CT-2331	Assume Operational	12	669161	4953686	1397.4			3.8	3.8	11.68	0.73	15.37	326
CT-2357&CT-2357&MD-833	Assume Operational	13	410466	4887576	1273.7	86.5				9.05	0.76	12.50	510
CT-2367	Operational	13	411800	4896800	1221.5	57.6				9.05	0.76	12.50	510
CT-2368	Operational	13	406900	4910200	1211.2	25.2				9.05	0.76	12.50	510
CT-2369	Operational	13	408000	4903800	1208.0	57.6				9.05	0.76	12.50	510
CT-2370	Operational	13	340775	4732435	2029.1	2.5				3.66	0.15	10.00	422
CT-2392	Operational	13	417821	4951612	1228.6	11.4				9.05	0.76	12.50	510
CT-2407&CT-2407&CT-3225	Assume Operational	13	391556	4742315	1626.3	39.9	5.8	11	5.8	11.68	0.73	15.37	326
CT-2446	Operational	13	414392	4938039	1136.6	15.4				9.05	0.76	12.50	510
CT-2448&MD-801	Assume Operational	13	409700	4830800	1516.4	101.2				8.00	0.30	54.86	900
CT-2463	Operational	13	414356	4941998	1147.1	20.5				9.05	0.76	12.50	510
CT-2466	Operational	12	597260	4727158	2157.3	88				15.24	0.46	72.54	714
CT-2507	Operational	13	402596	4895608	1356.0	158.6				9.05	0.76	12.50	510
CT-2508	Operational	13	349927	4980782	1077.2	11.7				9.05	0.76	12.50	510
CT-2509	Operational	13	351880	4980919	1121.4	11.7				9.05	0.76	12.50	510
CT-2510	Operational	13	352562	4983358	1092.5	11.7				9.05	0.76	12.50	510
CT-2511	Operational	13	353239	4981693	1108.2	11.7				9.05	0.76	12.50	510
CT-2512	Operational	13	356997	4981510	1131.8	11.7				9.05	0.76	12.50	510
CT-2513	Operational	13	356384	4982931	1073.3	11.7				9.05	0.76	12.50	510
CT-2517	Operational	12	666443	4913268	1737.5	7.6				9.05	0.76	12.50	510

Table F-1
Operating Permitted Source Inventory

Permit Number	Operating Status	UTM Zone	UTM Easting (meters)	UTM Northing (meters)	Source Elevation (meters)	Permitted NOx Emissions (tons/yr)	Permitted SO2 Emissions (tons/yr)	Permitted PM10 Emissions (tons/yr)	Permitted PM2.5 Emissions (tons/yr)	Stack Height (meters)	Stack Diameter (meters)	Stack Velocity (meters/sec)	Stack Temperature (degrees K)
CT-2575	Operational	13	410043	4888859	1279.2	11				9.05	0.76	12.50	510
CT-2576	Operational	13	412377	4887506	1282.6	11				9.05	0.76	12.50	510
CT-2577	Operational	13	409496	4886322	1280.0	11				9.05	0.76	12.50	510
CT-2677	Operational	12	740584	4895137	1280.0	16				9.05	0.76	12.50	510
CT-2683	Operational	13	413281	4939081	1149.5	15.4				9.05	0.76	12.50	510
CT-2723	Operational	12	642610	4950983	1644.3	7.5				9.05	0.76	12.50	510
CT-2735	Operational	13	288344	4796047	1678.2	25.6				9.05	0.76	12.50	510
CT-2738&CT-3094	Assume Operational	13	388408	4745571	1581.4	1.3		1.2	1.2	11.68	0.73	15.37	326
CT-2863	Operational	13	417100	4942800	1164.5	3.9				9.05	0.76	12.50	510
CT-2865	Operational	13	350222	4970540	1161.9	11.7				9.05	0.76	12.50	510
CT-2989	Operational	13	391082	4780976	1632.8	86.8				14.12	0.91	10.03	350
MD-351A	Operational	13	319855	4776286	1912.3	2.3				9.05	0.76	12.50	510
MD-565&MD-565&MD-755	Assume Operational	13	411295	4847201	1462.8	25.5				6.86	0.31	47.71	730
MD-600&MD-600A	Assume Operational	13	417781	4949201	1165.4	61				9.05	0.76	12.50	510
MD-620	Operational	13	324662	4741524	2007.8	17.8				11.77	0.82	9.51	451
MD-625	Operational	13	301440	4749660	2109.3			9.3	9.3	11.68	0.73	15.37	326
MD-654	Operational	13	357396	4929766	1441.3	11.4				9.05	0.76	12.50	510
MD-659	Operational	13	318630	4777816	1900.7	11.6				5.94	0.30	52.70	649
MD-670	Operational	13	351607	4979611	1149.3	64.8				9.05	0.76	12.50	510
MD-675	Operational	12	563058	4676100	2058.2	2.7				9.05	0.76	12.50	510
MD-676	Operational	12	558400	4690300	2256.0	2.2				9.05	0.76	12.50	510
MD-677	Operational	12	558500	4694600	2256.0	3.1				9.05	0.76	12.50	510
TOTAL	**Number of Sources**	**70**				**2116.0**	**108.6**	**67.1**	**23.0**				

Table F-2
RFFA Permitted But Not Yet Operating Source Inventory

Permit Number	Operating Status	UTM Zone	UTM Easting (meters)	UTM Northing (meters)	Source Elevation (meters)	Permitted NOx Emissions (tons/yr)	Permitted SO2 Emissions (tons/yr)	Permitted PM10 Emissions (tons/yr)	Permitted PM2.5 Emissions (tons/yr)	Stack Height (meters)	Stack Diameter (meters)	Stack Velocity (meters/sec)	Stack Temperature (degrees K)
CT-2289	RFD	13	370935	4936984	1280.0	28.7				9.05	0.76	12.50	510
CT-2449	RFD	13	383457	4884309	1402.1	30.6				9.05	0.76	12.50	510
CT-2450	RFD	13	379515	4886333	1342.3	11.7				9.05	0.76	12.50	510
CT-2451	RFD	13	383356	4884511	1403.1	65.6				9.05	0.76	12.50	510
CT-2464	RFD	12	592320	4735120	2256.0	62.9				15.24	0.46	53.95	711
CT-2465	RFD	12	594892	4733300	2256.0	31.5				15.24	0.46	53.95	711
CT-2467	RFD	13	316494	4766898	1848.7	11.8				9.05	0.76	12.50	510
CT-2472	RFD	13	410500	4874800	1296.5	68.8				9.05	0.76	12.50	510
CT-2502	RFD	13	415985	4963529	1097.0	53.8				9.05	0.76	12.50	510
CT-2514	RFD	13	343402	4981227	1161.8	11.7				9.05	0.76	12.50	510
CT-2609	RFD	13	362224	4969907	1283.0	44.9				9.05	0.76	12.50	510
CT-2610	RFD	13	366478	4969570	1362.4	44.9				9.05	0.76	12.50	510
CT-2611	RFD	13	361585	4967426	1337.4	44.9				9.05	0.76	12.50	510
CT-2612	RFD	13	364400	4968185	1338.8	44.9				9.05	0.76	12.50	510
CT-2613	RFD	13	366568	4967519	1369.1	44.9				9.05	0.76	12.50	510
CT-2629	RFD	13	353004	4972834	1118.8	44.9				9.05	0.76	12.50	510
CT-2630	RFD	13	351968	4971695	1158.0	44.9				9.05	0.76	12.50	510
CT-2631	RFD	13	352809	4969229	1134.8	44.9				9.05	0.76	12.50	510
CT-2633	RFD	13	353136	4966841	1146.9	44.9				9.05	0.76	12.50	510
CT-2634	RFD	13	352012	4966082	1158.0	44.9				9.05	0.76	12.50	510
CT-2635	RFD	13	353136	4965365	1158.0	44.9				9.05	0.76	12.50	510
CT-2656	RFD	13	419600	4944500	1210.7	70.8				9.05	0.76	12.50	510
CT-2711	RFD	13	365391	4914845	1408.8	5.4	0.9	2.6	2.6	11.68	0.73	15.37	326
CT-2756	RFD	13	372944	4726570	1656.6			2.4	2.4	11.68	0.73	15.37	326
CT-2766	RFD	13	353678	4934497	1455.1			1.8	1.8	11.68	0.73	15.37	326
CT-2771	RFD	13	382756	4940097	1281.2	116.5				9.05	0.76	12.50	510
CT-2772	RFD	13	376604	4942879	1401.1	116.5				9.05	0.76	12.50	510
CT-2780	RFD	13	371318	4943138	1402.0	116.5				9.05	0.76	12.50	510
CT-2793	RFD	13	347500	4980100	1096.5	43.8				9.05	0.76	12.50	510
CT-2794	RFD	13	349260	4974840	1123.3	43.8				9.05	0.76	12.50	510
CT-2828	RFD	13	375900	4932500	1290.7	30.6				9.05	0.76	12.50	510
CT-2829	RFD	13	374700	4932400	1341.0	30.6				9.05	0.76	12.50	510
CT-2831	RFD	13	377900	4942500	1402.0	30.6				9.05	0.76	12.50	510
CT-2832	RFD	13	376300	4942800	1402.0	30.6				9.05	0.76	12.50	510
CT-2840	RFD	13	377100	4923800	1335.1	49.2				9.05	0.76	12.50	510
CT-2841	RFD	13	378500	4927800	1333.4	30.6				9.05	0.76	12.50	510
CT-2842	RFD	13	374556	4930000	1341.0	116.4				9.05	0.76	12.50	510
CT-2846	RFD	13	374954	4932218	1343.1	116.4				9.05	0.76	12.50	510
CT-2847	RFD	13	374200	4923500	1350.9	30.6				9.05	0.76	12.50	510
CT-2848	RFD	13	377300	4925700	1339.9	30.6				9.05	0.76	12.50	510

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Permit Number	Operating Status	UTM Zone	UTM Easting (meters)	UTM Northing (meters)	Source Elevation (meters)	Permitted NOx Emissions (tons/yr)	Permitted SO2 Emissions (tons/yr)	Permitted PM10 Emissions (tons/yr)	Permitted PM2.5 Emissions (tons/yr)	Stack Height (meters)	Stack Diameter (meters)	Stack Velocity (meters/sec)	Stack Temperature (degrees K)
CT-2849	RFD	13	369580	4944948	1341.1	30.6				9.05	0.76	12.50	510
CT-2850	RFD	13	378500	4942700	1360.3	30.6				9.05	0.76	12.50	510
CT-2851	RFD	13	378571	4943211	1341.2	116.4				9.05	0.76	12.50	510
CT-2852	RFD	13	373548	4942519	1393.1	30.6				9.05	0.76	12.50	510
CT-2853	RFD	13	371456	4941098	1401.4	30.6				9.05	0.76	12.50	510
CT-2854	RFD	13	385900	4943200	1219.0	30.6				9.05	0.76	12.50	510
CT-2855	RFD	13	383500	4939100	1280.0	30.6				9.05	0.76	12.50	510
CT-2856	RFD	13	383100	4941700	1299.3	30.6				9.05	0.76	12.50	510
CT-2857	RFD	13	376100	4940000	1348.9	30.6				9.05	0.76	12.50	510
CT-2859	RFD	13	371800	4926900	1411.2	30.6				9.05	0.76	12.50	510
CT-2864	RFD	13	348866	4970732	1205.8	11.7				9.05	0.76	12.50	510
CT-2869	RFD	13	371087	4932315	1385.6	19.5				9.05	0.76	12.50	510
CT-2892	RFD	13	380000	4945500	1302.7	30.6				9.05	0.76	12.50	510
CT-2893	RFD	13	373100	4944200	1402.0	30.6				9.05	0.76	12.50	510
CT-2894	RFD	13	374200	4933200	1402.0	30.6				9.05	0.76	12.50	510
CT-2895	RFD	13	374600	4929300	1395.6	30.6				9.05	0.76	12.50	510
CT-2896	RFD	13	409171	4747066	1575.0			0.6	0.6	11.68	0.73	15.37	326
CT-2931	RFD	13	419000	4952500	1243.9	38.4				9.05	0.76	12.50	510
CT-2932	RFD	12	658704	4914014	1769.5			1.3	1.3	11.68	0.73	15.37	326
CT-2954	RFD	13	372101	4923147	1395.7	15.4				9.05	0.76	12.50	510
CT-2955	RFD	13	371952	4921138	1393.3	11.5				9.05	0.76	12.50	510
CT-2984	RFD	13	355838	4978886	1109.3	144.4				60.21	2.74	16.68	432
CT-2985	RFD	13	352024	4976964	1108.8	144.4				60.21	2.74	16.68	432
CT-2986	RFD	13	349170	4978443	1097.0	144.4				60.21	2.74	16.68	432
CT-2987	RFD	13	351168	4973648	1141.6	79				60.21	2.74	16.68	432
CT-3009	RFD	13	355271	4932845	1429.4	39.3	12.3	21.8	21.8	14.12	0.91	10.03	350
CT-3010	RFD	13	407200	4886000	1252.0	108.2				9.05	0.76	12.50	510
CT-3027	RFD	13	359200	4965800	1220.4	58.7				9.05	0.76	12.50	510
CT-3028	RFD	13	362200	4964900	1280.0	58.7				9.05	0.76	12.50	510
CT-3031	RFD	13	371200	4950600	1314.8	19.5				9.05	0.76	12.50	510
CT-3032	RFD	13	367500	4951500	1394.0	19.5				9.05	0.76	12.50	510
CT-3034	RFD	13	369582	4931138	1339.1	22.4				9.05	0.76	12.50	510
CT-3036	RFD	13	244850	4844261	1314.6			2.5	2.5	11.68	0.73	15.37	326
CT-3038	RFD	13	368400	4949200	1381.5	19.5				9.05	0.76	12.50	510
CT-3039	RFD	13	368700	4950300	1334.2	97.5				9.05	0.76	12.50	510
CT-3040	RFD	13	371000	4948500	1361.1	109.2				9.05	0.76	12.50	510
CT-3065	RFD	13	390600	4941300	1219.2	44.9				9.05	0.76	12.50	510
CT-3102	RFD	13	378609	4932250	1287.5	116.3				9.05	0.76	12.50	510
CT-3114	RFD	12	605322	4714137	2226.2	2.4				9.05	0.76	12.50	510
CT-3130	RFD	13	378579	4932697	1280.4	30.7				9.05	0.76	12.50	510

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CT-3148	RFD	13	380900	4851200	1463.0	30.9				9.05	0.76	12.50	510
CT-3151	RFD	13	366823	4937642	1305.9	30.5				9.05	0.76	12.50	510
CT-3152	RFD	13	379500	4958100	1401.9	30.9				9.05	0.76	12.50	510
CT-3153	RFD	13	377800	4955600	1419.3	186.2				9.05	0.76	12.50	510
CT-3154	RFD	13	380200	4954700	1402.0	23.2				9.05	0.76	12.50	510
CT-3157	RFD	13	366479	4939545	1401.1	4.1				9.05	0.76	12.50	510
CT-3158	RFD	13	366274	4939528	1402.0	4.1				9.05	0.76	12.50	510
CT-3159	RFD	13	364150	4939250	1402.0	6.1				9.05	0.76	12.50	510
CT-3182	RFD	13	348657	4968700	1200.8	11.6				9.05	0.76	12.50	510
CT-3183	RFD	13	362963	4927972	1463.0	11.6				9.05	0.76	12.50	510
CT-3184	RFD	13	360366	4929686	1416.3	11.6				9.05	0.76	12.50	510
CT-3206	RFD	13	383818	4935523	1274.0	30.7				9.05	0.76	12.50	510
CT-3207	RFD	13	415750	4881960	1328.4	22.3				9.05	0.76	12.50	510
CT-3208	RFD	13	417300	4943669	1142.2	19.4				9.05	0.76	12.50	510
CT-3261	RFD	13	355180	4977247	1117.6	11.6				9.05	0.76	12.50	510
CT-3266	RFD	13	399735	4882640	1293.1	85.5				9.05	0.76	12.50	510
CT-3269	RFD	12	612264	4708237	2224.1	3.2				11.77	0.82	9.51	451
CT-3274	RFD	12	593522	4717169	2097.4			4.8	4.8	11.68	0.73	15.37	326
CT-3279	RFD	13	413643	4888477	1348.6	24.6				9.05	0.76	12.50	510
CT-3298	RFD	13	415550	4888144	1402.0	24.6				9.05	0.76	12.50	510
CT-3300	RFD	12	552100	4707800	2269.2	12.6				7.32	0.20	33.90	403
CT-3301	RFD	12	519085	4793989	1801.1	33.8	5.7	12.9	12.9	7.09	0.10	30.05	422
CT-3302	RFD	13	258753	4934797	1219.9	9.1	0.9	1.4	1.4	11.68	0.73	15.37	326
CT-3321	RFD	12	591365	4738529	2266.0	3.6				11.77	0.82	9.51	451
CT-3327	RFD	13	414477	4887726	1375.4	91.3				9.05	0.76	12.50	510
CT-3340	RFD	13	414182	4931430	1172.5	10.3				9.05	0.76	12.50	510
CT-771A	RFD	12	574367	4700209	2073.0		29.6			14.12	0.91	10.03	350
MD-647	RFD	12	518389	4813133	1907.6	9.2	0.4	0.2	0.2	11.68	0.73	15.37	326
MD-651	RFD	12	660349	4873817	2085.0	5.4				9.05	0.76	12.50	510
MD-668	RFD	13	320360	4777714	1878.6	11.6				11.77	0.82	9.51	451
MD-696	RFD	12	560119	4677976	2121.7	1.7				9.05	0.76	12.50	510
MD-745	RFD	13	363702	4911623	1440.1	25.4	4	24.7	24.7	11.68	0.73	15.37	326
MD-760	RFD	13	380556	4750248	1627.0	0.7	0.2	22.6	22.6	11.62	0.76	9.45	358
MD-808	RFD	12	545994	4708775	2560.0	20.6				7.32	0.30	45.20	797
MD-809	RFD	12	499773	4754656	1820.7		2.3	5.7	5.7	9.10	0.98	8.20	422
MD-813	RFD	12	520036	4812179	2302.0	6.9	7.3	3.7	3.7	14.12	0.91	10.03	350
MD-827	RFD	13	418832	4942637	1155.6	15.3				9.05	0.76	12.50	510
MD-874	RFD	13	320500	4776500	1890.0	40.2				14.40	0.30	41.15	735
MD-886	RFD	13	282418	4881927	1442.5		60.8			9.05	0.76	12.50	510
TOTAL	**Total Sources**	**119**				**4620.6**	**124.4**	**109**	**109**				

Company	Facility	Facility_Class
Wyoming Department of Transportation	crushing, hot mix plant, stockpiling site	Crushing and Screening
TOTAL Rowdy Pipeline, LLC	Pumpkin Creek Central Compressor Station	Compressor Station
Rowdy Pipeline, LLC	Pumpkin Creek Pod 1 Station	Compressor Station
Rowdy Pipeline, LLC	Pumpkin Creek Pod 2 Station	Compressor Station
Jonah Gas Gathering Company	Paradise Compressor Station	Compressor Station
TOTAL Jonah Gas Gathering Company	Falcon Compressor Station	Compressor Station
TOTAL Jonah Gas Gathering Company	Bird Canyon/County Line Compressor Station	Compressor Station
CMS Field Services	Hey Joe Creek Prospect A Compressor Station	Compressor Station
CMS Field Services	Hey Joe Creek Prospect D Compressor Station	Compressor Station
Mountain Gas Resources	Jonah Compressor Station	Compressor Station
Federated Oil and Gas	Box Elder Creek Main Compressor Station	Compressor Station
Federated Oil and Gas	Box Elder Creek Pod 2 Compressor Station	Compressor Station
Wyoming Department of Transportation	Portable Hot Mix Plant	Asphalt Plant
Bear Paw Energy Incorporated	Prairie Dog Pod F	Compressor Station
Bitter Creek Pipelines LLC	Beatty Gulch Central Compressor Station	Compressor Station
Bitter Creek Pipelines LLC	State #26 Battery	Compressor Station
Bitter Creek Pipelines LLC	State #36 Battery	Compressor Station
Bitter Creek Pipelines LLC	Wrench Ranch #2 Battery	Compressor Station
Bitter Creek Pipelines LLC	Wrench Ranch 49 Battery	Compressor Station
Bitter Creek Pipelines LLC	Wrench Ranch #11 Battery	Compressor Station
Wyoming Department of Transportation	Clark Pit	Crushing and Screening
TOTAL Anadarko Petroleum Company	County Line Central Compressor Station	Compressor Station
Western Gas Resources	Juniper/Aspen Compressor Station	Compressor Station
Western Gas Resources	Deer Gulch Compressor Station	Compressor Station
Western Gas Resources	Flying Creek/Bridge Draw Compressor Station	Compressor Station
Carl D. Underwood Oil & Gas	Burnt Wagon Gas Processing Plant	Sweet Gas Plant
Thunder Creek Gas Services	SC-2956	Compressor Station
TOTAL Lee Excavation , Inc.&Rissler and McMurry Company	Crushing and Screening Plant	Crushing and Screening
CMS Field Services	Cottonwood Creek Prospect F	Compressor Station
TOTAL Western Gas Resources	Bullwacker/Pine Ridge Compressor Station	Compressor Station
Quaneco LLC	Walker Draw Low Pressure Compressor Station	Compressor Station
Quaneco LLC	Wallows Creek Low Pressure Compressor Station	Compressor Station
Quaneco LLC	Walker Draw Main Compressor Station	Compressor Station

CMS Field Services	OK Creek 25 Compressor Station	Compressor Station
Questar Gas Management Company	Mesa 1 Compressor Station	Compressor Station
Questar Gas Management Company	Mesa 2 Compressor Station	Compressor Station
Questar Gas Management Company	Pinedale Compressor Station	Compressor Station
Bill Barrett Corporation	Cooper Reservoir Unit	Compressor Station
Western Gas Resources	Pumpkin/Bruno	Compressor Station
CMS Field Services	Ivy Creek Gibbs - 18	Compressor Station
Thunder Creek Gas Services	Juniper Draw Compressor Station	Compressor Station
Bitter Creek Pipelines LLC	Dunning 32 Battery	Compressor Station
Bitter Creek Pipelines LLC	Dewey 28 Battery	Compressor Station
Bitter Creek Pipelines LLC	Dewey 21 Battery	Compressor Station
Bitter Creek Pipelines LLC	Dewey 27 Battery	Compressor Station
Bitter Creek Pipelines LLC	Trembath 25 Battery	Compressor Station
Bitter Creek Pipelines LLC	Mischke 24 Battery	Compressor Station
Bitter Creek Pipelines LLC	DeLapp 27 Compressor Station	Compressor Station
Marathon Oil Company	South Chugwater Booster	Compressor Station
Anadarko Petroleum Company	Jeff Pod Compressor Station	Compressor Station
Anadarko Petroleum Company	Neil Pod Compressor Station	Compressor Station
Anadarko Petroleum Company	Tim Pod Compressor Station	Compressor Station
CMS Field Services	Badger Creek A Compressor Station	Compressor Station
CMS Field Services	Badger Creek B Compressor Station	Compressor Station
CMS Field Services	Badger Creek C Compessor Station	Compressor Station
CMS Field Services	Badger Creek D Compressor Station	Compressor Station
CMS Field Services	Badger Creek E Compressor Station	Compressor Station
CMS Field Services	Prairie Dog A Compressor Station	Compressor Station
CMS Field Services	Prairie Dog B Compressor Station	Compressor Station
CMS Field Services	Prairie Dog C Compressor Station	Compressor Station
CMS Field Services	Prairie Dog E Compressor Station	Compressor Station
CMS Field Services	Prairie Dog F Compressor Station	Compressor Station
CMS Field Services	Prairie Dog G Compressor Station	Compressor Station
Western Gas Resources	Wild Ho/Middle Prong Compressor Station	Compressor Station
Devon Energy Production Company, L.P.	Worland Field Compressor Station	Compressor Station
CMS Field Services	Kuhn #2 Compressor Station	Compressor Station
Woodrow Barstad	Barstad Pit	Crushing and Screening
EnRe LP	Skull Creek Pipeline	Compressor Station
Burlington Resources Oil and Gas Co	MBE Compressor	Compressor Station
TOTAL 71 Construction	71 Pitt	Crushing and Screening

71 Construction	487 Pit	Crushing and Screening
Wyoming Department of Transportation	Piney Creek #2	Crushing and Screening
Northwest Energy, LLC	North Piney C1	Compressor Station
Northwest Energy, LLC	North Piney C2	Compressor Station
Northwest Energy, LLC	North Piney C3	Compressor Station
Bear Paw Energy Incorporated	Prairie Dog Pod N	Compressor Station
Bear Paw Energy Incorporated	Prairie Dog Pod P	Compressor Station
Northwest Energy, LLC	Box Elder Quinn Booster 2	Compressor Station
Northwest Energy, LLC	Box Elder Quinn Booster 1	Compressor Station
Northwest Energy, LLC	North Piney B6	Compressor Station
Northwest Energy, LLC	North Piney B7	Compressor Station
Northwest Energy, LLC	Clear Creek Esponda Booster 1	Compressor Station
Northwest Energy, LLC	Clear Creek Esponda Booster 3	Compressor Station
Northwest Energy, LLC	Clear Creek Quinn CPF	Compressor Station
Northwest Energy, LLC	Box Elder Quinn CPF	Compressor Station
Northwest Energy, LLC	Clear Creek Borgelli Booster 1	Compressor Station
Northwest Energy, LLC	Clear Creek Esponda Booster 2	Compressor Station
Northwest Energy, LLC	North Piney B13	Compressor Station
Northwest Energy, LLC	North Piney B14	Compressor Station
Northwest Energy, LLC	North Piney C4	Compressor Station
Northwest Energy, LLC	North Piney B10	Compressor Station
Northwest Energy, LLC	North Piney B12	Compressor Station
Northwest Energy, LLC	North Piney B1	Compressor Station
Northwest Energy, LLC	North Piney B4-2	Compressor Station
Northwest Energy, LLC	North Piney B2	Compressor Station
Northwest Energy, LLC	North Piney B8	Compressor Station
Northwest Energy, LLC	Clear Creek Watt Booster 1	Compressor Station
Northwest Energy, LLC	Wild Horse	Compressor Station
Bitter Creek Pipelines LLC	Koltiska 31 Battery	Compressor Station
Bitter Creek Pipelines LLC	Koltiska 32 Battery	Compressor Station
Comet Energy, LLC	Belus #28 CPF	Compressor Station
Northwest Energy, LLC	North Piney B5	Compressor Station
Northwest Energy, LLC	North Piney B11	Compressor Station
Northwest Energy, LLC	North Piney B9-2	Compressor Station
Northwest Energy, LLC	Clear Creek Texaco Booster 1	Compressor Station
71 Construction	Henrie Pit	Crushing and Screening
Western Gas Resources	Joe Compressor Station	Compressor Station

Wyoming Department of Transportation	Windy Flat Pit	Crushing and Screening
Comet Energy, LLC	Lawrence 28 Compressor Station	Compressor Station
Comet Energy, LLC	Lawrence 33 CPF Compressor Station	Compressor Station
MegaEnergy Generating, LLC	Prairie Dog Gen Site 1	Generation
MegaEnergy Generating, LLC	Prairie Dog Gen Site 2	Generation
MegaEnergy Generating, LLC	Prairie Dog Gen Site 3	Generation
MegaEnergy Generating, LLC	Prairie Dog Gen Site 4	Generation
JTL Group Incorporated	Portable Asphalt Hot Mix Plant	Asphalt Plant
Kern River Gas Transmission	Coyote Creek	Compressor Station
Riverside Contracting, Inc.	Portable Hot Mix Plant CT-3009	Asphalt Plant
Western Gas Resources	SG Palo/Big Mike	Compressor Station
JM Huber	Wyarno Compressor Station	Compressor Station
JM Huber	Jones Draw Compressor Station	Compressor Station
JM Huber	Middle Creek Compressor Station	Compressor Station
JM Huber	Roode Compressor Station	Compressor Station
Comet Energy, LLC	Belus #32	Compressor Station
Wyoming Department of Transportation	Rabbit Pit	Crushing and Screening
JM Huber	Upper Spring Creek Compressor Station	Compressor Station
JM Huber	Beaver Creek Compressor Station	Compressor Station
JM Huber	Dutch Creek Compressor Station	Compressor Station
CMS Field Services	Rhoades Ranch Compressor Station	Compressor Station
Recycled Materials Company, Inc.	portable crushing and screening plant	Crushing and Screening
Northwest Energy, LLC	Box Elder Quinn CPF #2	Compressor Station
Yates Petroleum Corporation	Blue Rim State #1	Compressor Station
Northwest Energy, LLC	Box Elder Quinn Booster 3	Compressor Station
JM Huber	Town Draw Compressor Station	Compressor Station
SRW, Inc.	Ellenwood, Krezelok, & Ruzila CPF Compressor Station	Compressor Station
JM Huber	Buffalo Creek Compressor Station	Compressor Station
JM Huber	Twin Buttes Compressor Station	Compressor Station
JM Huber	Whitmeyer Compressor Station	Compressor Station
SRW, Inc.	Ellenwood, Krezelok, & Ruzila Pod 1 Compressor Station	Compressor Station
SRW, Inc.	Ellenwood, Krezelok, & Ruzila Pod 2 Compressor Station	Compressor Station
SRW, Inc.	Ellenwood, Krezelok, & Ruzila Pod 3	Compressor Station
Bitter Creek Pipelines LLC	Seven Brothers 1 Battery	Compressor Station
Bitter Creek Pipelines LLC	Texaco 922 Battery	Compressor Station
Bitter Creek Pipelines LLC	Texaco 522 Battery	Compressor Station
Northwest Energy, LLC	Box Elder Quinn Booster 4	Compressor Station

Western Gas Resources	Hollywood Compressor Station	Compressor Station
Federated Oil and Gas	Wild Horse Creek Compressor Station	Compressor Station
Bear Paw Energy Incorporated	Prairie Dog Pod EE Compressor Station	Compressor Station
Western Gas Resources	Whiskey Draw/Jack Daniels Compressor Station	Compressor Station
Shell Rocky Mountain Production Company LLC	Rainbow 11-32-30-107D, 12-32-30-107D & 13-32-30-107	Production Site
NERD Gas Company, LLC	Mesa Road Mine	Crushing and Screening
Rowdy Pipeline, LLC	Burger Draw Satellite 2	Compressor Station
Rowdy Pipeline, LLC	Burger Draw Satellite 1	Compressor Station
Infinity Oil & Gas of Wyoming	Thompson Compressor Station	Compressor Station
Kiewit Western Company	Portable Hot Mix Asphalt Plant	Asphalt Plant
Mountain Construction Company	CT-3302	Crushing and Screening
Questar Exploration Production Co.	Stewart Pt Wells 9-29 &16-29 Pad	Production Well
Rowdy Pipeline, LLC	Burger Draw Central Compressor Station	Compressor Station
CMS Field Service	KHUN 35 Compressor Station	Compressor Station
LeGrand Johnson	Asphalt Plant CT-771	Asphalt Plant
Chevron USA, Inc.	Bullfrog Compressor Station	Compressor Station
TOTAL KLT Gas Incorporated	Jepsen Compressor Station	Compressor Station
TOTAL CMS Field Services	Hank Williams-Malli Compressor Station	Compressor Station
Questar Pipeline Company	Eakin Compressor Station	Compressor Station
Merit Energy Company	SRMGU 27-32	Production Site
Umetco Minerals	Rattlesnake Quarry	Crushing and Screening
Questar Gas Management Company	Blacks Fork Gas Plant	Sweet Gas Plant
RST Excavation	Temporary Jackson Gravel Operation	Crushing and Screening
Saga Petroleum LLC	YU Bench Compressor Station	Compressor Station
Bitter Creek Pipelines LLC	Piney Creek Central Station	Compressor Station
M-I Drilling Fluids Company	Greybull Plant	Bentonite Plant
Chevron USA, Inc.	Waltman 44 Compression Facility	Compressor Station
Chevron USA, Inc.	Waltman #23	Production Site
Bitter Creek Pipelines LLC	Gladewater Central Station	Compressor Station
TOTAL Frontier Oil and Refining Company	Frontier Refinery	Petroleum Refinery
Williams Field Services	LaBarge Compressor Station	Compressor Station
Williams Field Services	Saddle Ridge Compressor Station	Compressor Station
Williams Field Services	Big Piney Compressor Station	Compressor Station
EOG Resources	North LaBarge Shallow Unit Tract 16	Compressor Station
Meridian Granite Company	Granite Canyon Quarry	Crushing and Screening
Evans Construction	Jackson Yard	Crushing and Screening
Natrona County International Airport	Airport	Miscellaneous

Infinity Oil & Gas of Wyoming	Riley Ridge Compressor Facility #1 and Pod Compressor Stations	Compressor Station
Lincoln County Wyoming	Municipal Solid Waste Combustor	Incineration
Evans Construction	Asphalt Plant	Asphalt Plant
CMS Field Services	Wild Horse Compressor Station	Compressor Station
Bill Barrett Corporation	Cave Gulch Gas Conditioning Plant	
BP America Production Company	Anschutz Ranch East	Sweet Gas Plant
Hiland Partners, L.L.C.	Cottonwood Compressor Station	Compressor Station

Permit_Number	Permit_Date	Start_Date	Operating_Status	UTM Zone	UTM_E_Meters	UTM_N_Meters	Elevation_m	Latitude
CT-2225	23-Jan-01		assume operational	13	364974	4937421	1332.179592	
CT-2242&MD-751				13	415103	4872475	1325.833172	
CT-2243	30-Jan-01	30-Jan-03	operational	13	414725	4872510	1334.99376	
CT-2244	30-Jan-01	30-Jan-03	operational	13	415689	4872930	1339.170919	
CT-2250	23-Feb-01	23-Feb-03	operational	12	598265	4726644	2134	42.41.12
CT-2251&MD-815				12	609636	4709062	2240.083019	
CT-2252&MD-856				12	579930	4681316	2225	
CT-2254	27-Feb-01	14-May-02	operational	13	417097.6	4956112.2	1216.935689	
CT-2257	27-Feb-01	14-May-02	operational	13	414326.9	4958931.7	1097	
CT-2280	03-Apr-01	03-Apr-03	operational	12	606220	4698500	2187.272883	
CT-2289	10-Apr-01		RFD	13	370935	4936984	1280	
CT-2291	10-Apr-01	10-Apr-03	operational	13	372642	4937258	1276.020139	
CT-2303	30-Apr-01	22-May-01	operational	13	486250	4549245	2195	
CT-2322	07-May-01	07-May-03	operational	13	355800	4978900	1107.249211	
CT-2325	04-May-01	04-Mar-02	operational	13	347116	4970108	1190.205736	
CT-2326	04-May-01	04-Mar-02	operational	13	345792	4972600	1158	
CT-2327	04-May-01	04-Mar-02	operational	13	346439	4971047	1188.556078	
CT-2328	04-May-01	17-Jul-02	operational	13	346251	4968878	1188.64518	
CT-2329	04-May-01		assume operational	13	343171	4967788	1157.699381	
CT-2330	04-May-01	04-May-03	operational	13	346480	4967251	1158	
CT-2331	07-May-01		assume operational	12	669161	4953686	1397.375683	
CT-2357&CT-2357&MD-833				13	410466	4887576	1273.672332	
CT-2367	22-May-01	22-May-03	operational	13	411800	4896800	1221.46794	
CT-2368	22-May-01	22-May-03	operational	13	406900	4910200	1211.230417	
CT-2369	22-May-01	22-May-03	operational	13	408000	4903800	1207.992218	
CT-2370	25-May-01	10-Oct-01	operational	13	340775	4732435	2029.138253	
CT-2392	05-Jun-01	05-Jun-03	operational	13	417821	4951612	1228.594249	
CT-2407&CT-2407&CT-3225				13	391556	4742315	1626.258795	
CT-2446	25-Jul-01	17-Jan-03	operational	13	414392	4938039	1136.619461	44deg35'33.2
CT-2448&MD-801				13	409700	4830800	1516.414257	
CT-2449	31-Jul-01		RFD	13	383457	4884309	1402.070975	
CT-2450	31-Jul-01		RFD	13	379515	4886333	1342.276682	
CT-2451	31-Jul-01		RFD	13	383356	4884511	1403.050233	

CT-2463	14-Aug-01	15-May-02	operational	13	414356	4941998	1147.136247	44 deg 37' 41.5
CT-2464	21-Aug-01		RFD	12	592320	4735120	2256	
CT-2465	21-Aug-01		RFD	12	594892	4733300	2256	
CT-2466	21-Aug-01	09-Aug-02	operational	12	597260	4727158	2157.338452	
CT-2467	24-Aug-01		RFD	13	316494	4766898	1848.726006	
CT-2472	28-Aug-01		RFD	13	410500	4874800	1296.514021	
CT-2502	11-Sep-01		RFD	13	415985	4963529	1097	44deg49'19.8
CT-2507	18-Sep-01	21-Apr-03	operational	13	402596	4895608	1356.033224	
CT-2508	18-Sep-01	06-Jun-02	operational	13	349927	4980782	1077.20843	
CT-2509	18-Sep-01	12-Sep-02	operational	13	351880	4980919	1121.377411	
CT-2510	18-Sep-01	20-Sep-02	operational	13	352562	4983358	1092.545093	
CT-2511	18-Sep-01	11-Oct-02	operational	13	353239	4981693	1108.161152	
CT-2512	18-Sep-01	31-Dec-02	operational	13	356997	4981510	1131.755038	
CT-2513	18-Sep-01	13-Dec-02	operational	13	356384	4982931	1073.275458	
CT-2514	18-Sep-01		RFD	13	343402	4981227	1161.771527	
CT-2517	27-Sep-01	15-Jan-02	operational	12	666443	4913268	1737.503406	
CT-2575	06-Nov-01	10-Apr-02	operational	13	410043	4888859	1279.241431	44deg 08' 50.64"
CT-2576	06-Nov-01	27-Aug-02	operational	13	412377	4887506	1282.618413	44deg 08' 07.8"
CT-2577	06-Nov-01	24-Jan-03	operational	13	409496	4886322	1280	44deg 07' 28.2"
CT-2609	27-Nov-01		RFD	13	362224	4969907	1282.999698	44deg 52' 16.4"
CT-2610	27-Nov-01		RFD	13	366478	4969570	1362.441174	44deg 52' 8.4"
CT-2611	27-Nov-01		RFD	13	361585	4967426	1337.408942	44deg 50' 55.6"
CT-2612	27-Nov-01		RFD	13	364400	4968185	1338.843779	44deg 51' 22.1"
CT-2613	27-Nov-01		RFD	13	366568	4967519	1369.133675	44deg 51' 2.0"
CT-2629	29-Nov-01		RFD	13	353004	4972834	1118.797063	44deg 53' 44.6"
CT-2630	29-Nov-01		RFD	13	351968	4971695	1158	44deg 53' 6.9"
CT-2631	29-Nov-01		RFD	13	352809	4969229	1134.801678	44deg 51' 47.7"
CT-2633	29-Nov-01		RFD	13	353136	4966841	1146.874447	44deg 50' 30.6"
CT-2634	29-Nov-01		RFD	13	352012	4966082	1158	44deg 50' 5.1"
CT-2635	29-Nov-01		RFD	13	353136	4965365	1158	44deg 49' 42.8"
CT-2656	14-Dec-01		RFD	13	419600	4944500	1210.697066	
CT-2677	11-Jan-02	17-Sep-02	operational	12	740584	4895137	1280	44 deg 10' 18.3
CT-2683	29-May-02	08-Aug-02	operational	13	413281	4939081	1149.531957	44 deg 36' 6.5
CT-2711	07-Feb-02		RFD	13	365391	4914845	1408.750284	
CT-2723	21-Feb-02	18-Jan-02	operational	12	642610	4950983	1644.319117	44.7 deg
CT-2735	01-Mar-02	29-Jun-02	operational	13	288344	4796047	1678.154461	
CT-2738&CT-3094				13	388408	4745571	1581.362289	

CT-2756	14-Mar-02		RFD	13	372944	4726570	1656.609835	
CT-2766	26-Mar-02		RFD	13	353678	4934497	1455.14068	
CT-2771	09-Apr-02		RFD	13	382756	4940097	1281.2253	
CT-2772	09-Apr-02		RFD	13	376604	4942879	1401.114022	
CT-2780	04-Jun-02		RFD	13	371318	4943138	1402	
CT-2793	23-Apr-02		RFD	13	347500	4980100	1096.539918	
CT-2794	04-Oct-02		RFD	13	349260	4974840	1123.335037	
CT-2828	21-May-02		RFD	13	375900	4932500	1290.686305	
CT-2829	21-May-02		RFD	13	374700	4932400	1341	
CT-2831	04-Jun-02		RFD	13	377900	4942500	1402	
CT-2832	04-Jun-02		RFD	13	376300	4942800	1402	
CT-2840	04-Jun-02		RFD	13	377100	4923800	1335.115014	
CT-2841	04-Jun-02		RFD	13	378500	4927800	1333.398141	
CT-2842	04-Jun-02		RFD	13	374556	4930000	1341	
CT-2846	04-Jun-02		RFD	13	374954	4932218	1343.130627	
CT-2847	04-Jun-02		RFD	13	374200	4923500	1350.945156	
CT-2848	04-Jun-02		RFD	13	377300	4925700	1339.892271	
CT-2849	04-Jun-02		RFD	13	369580	4944948	1341.1086	
CT-2850	04-Jun-02		RFD	13	378500	4942700	1360.298704	
CT-2851	04-Jun-02		RFD	13	378571	4943211	1341.177977	
CT-2852	04-Jun-02		RFD	13	373548	4942519	1393.121458	
CT-2853	04-Jun-02		RFD	13	371456	4941098	1401.377318	
CT-2854	04-Jun-02		RFD	13	385900	4943200	1219	
CT-2855	04-Jun-02		RFD	13	383500	4939100	1280	
CT-2856	04-Jun-02		RFD	13	383100	4941700	1299.2979	
CT-2857	03-Jun-02		RFD	13	376100	4940000	1348.873437	
CT-2859	24-Jun-02		RFD	13	371800	4926900	1411.174672	
CT-2863	18-Jun-02	15-Aug-02	operational	13	417100	4942800	1164.451481	
CT-2864	17-Jun-02		RFD	13	348866	4970732	1205.82429	
CT-2865	17-Jun-02	13-May-03	operational	13	350222	4970540	1161.934861	
CT-2869	25-Jul-02		RFD	13	371087	4932315	1385.560582	
CT-2892	05-Jul-02		RFD	13	380000	4945500	1302.658759	
CT-2893	05-Jul-02		RFD	13	373100	4944200	1402	
CT-2894	09-Jul-02		RFD	13	374200	4933200	1402	
CT-2895	09-Jul-02		RFD	13	374600	4929300	1395.624915	
CT-2896	11-Jul-02		RFD	13	409171	4747066	1574.953014	
CT-2931	30-Jul-02		RFD	13	419000	4952500	1243.858385	

CT-2932	26-Jul-02		RFD	12	658704	4914014	1769.538889	
CT-2954	14-Aug-02		RFD	13	372101	4923147	1395.658841	
CT-2955	12-Aug-02		RFD	13	371952	4921138	1393.338826	
CT-2984	19-Aug-02		RFD	13	355838	4978886	1109.31143	
CT-2985	19-Aug-02		RFD	13	352024	4976964	1108.825197	
CT-2986	19-Aug-02		RFD	13	349170	4978443	1097	
CT-2987	19-Aug-02		RFD	13	351168	4973648	1141.598551	
CT-2989	19-Aug-02	01-Oct-02	operational	13	391082	4780976	1632.799027	
CT-3003	18-Sep-02	03-Apr-03	operational	12	499012	4545244	2230.543697	
CT-3009	17-Sep-02		RFD	13	355271	4932845	1429.414982	
CT-3010	17-Sep-02		RFD	13	407200	4886000	1252.041614	
CT-3027	24-Sep-02		RFD	13	359200	4965800	1220.425501	
CT-3028	24-Sep-02		RFD	13	362200	4964900	1280	
CT-3031	27-Sep-02		RFD	13	371200	4950600	1314.753355	
CT-3032	27-Sep-02		RFD	13	367500	4951500	1393.952117	
CT-3034	01-Oct-02		RFD	13	369582	4931138	1339.116525	
CT-3036	01-Oct-02		RFD	13	244850	4844261	1314.580593	
CT-3038	07-Oct-02		RFD	13	368400	4949200	1381.54126	
CT-3039	07-Oct-02		RFD	13	368700	4950300	1334.174045	
CT-3040	07-Oct-02		RFD	13	371000	4948500	1361.087621	
CT-3065	25-Oct-02		RFD	13	390600	4941300	1219.174441	
CT-3093	07-Nov-02		RFD	13	513955	4553979	1875.057299	
CT-3102	12-Nov-02		RFD	13	378609	4932250	1287.519311	
CT-3114	19-Nov-02		RFD	12	605322	4714137	2226.157059	42.57444
CT-3130	26-Nov-02		RFD	13	378579	4932697	1280.374009	
CT-3148	10-Dec-02		RFD	13	380900	4851200	1462.988738	
CT-3151	10-Dec-02		RFD	13	366823	4937642	1305.913575	
CT-3152	10-Dec-02		RFD	13	379500	4958100	1401.923039	
CT-3153	10-Dec-02		RFD	13	377800	4955600	1419.288183	
CT-3154	10-Dec-02		RFD	13	380200	4954700	1402	
CT-3157	10-Dec-02		RFD	13	366479	4939545	1401.081945	
CT-3158	10-Dec-02		RFD	13	366274	4939528	1402	
CT-3159	10-Dec-02		RFD	13	364150	4939250	1402	
CT-3182	03-Jan-03		RFD	13	348657	4968700	1200.825559	
CT-3183	15-Jan-03		RFD	13	362963	4927972	1463	
CT-3184	15-Jan-03		RFD	13	360366	4929686	1416.317879	
CT-3206	21-Jan-03		RFD	13	383818	4935523	1273.961068	

CT-3207	21-Jan-03		RFD	13	415750	4881960	1328.447906	
CT-3208	21-Jan-03		RFD	13	417300	4943669	1142.247509	
CT-3261	20-Mar-03		RFD	13	355180	4977247	1117.632185	
CT-3266	25-Mar-03		RFD	13	399735	4882640	1293.115502	
CT-3269	25-Mar-03		RFD	12	612264	4708237	2224.144081	42.5203
CT-3274	08-Apr-03		RFD	12	593522	4717169	2097.409955	
CT-3279	15-Apr-03		RFD	13	413643	4888477	1348.60448	
CT-3298	13-May-03		RFD	13	415550	4888144	1402	
CT-3300	13-May-03		RFD	12	552100	4707800	2269.215233	
CT-3301	13-May-03		RFD	12	519085	4793989	1801.083057	
CT-3302	13-May-03		RFD	13	258753	4934797	1219.934488	
CT-3321	10-Jun-03		RFD	12	591365	4738529	2265.982101	
CT-3327	10-Jun-03		RFD	13	414477	4887726	1375.363033	
CT-3340	24-Jun-03		RFD	13	414182	4931430	1172.479957	
CT-771A	06-Nov-02		RFD	12	574367	4700209	2073	
MD-351A	04-Apr-01	18-Dec-01	operational	13	319855	4776286	1912.333413	
MD-565&MD-565&MD-755				13	411295	4847201	1462.827318	
MD-600&MD-600A				13	417781	4949201	1165.414549	
MD-615	01-May-01		assume operational	12	563243	4587905	1992.950635	41 deg 26' 25
MD-620	08-May-01	13-Jul-01	operational	13	324662	4741524	2007.837527	42.48.30
MD-625	10-May-01	01-Jul-00	operational	13	301440	4749660	2109.309639	
MD-638	29-May-01	13-Jun-03	operational	12	579279	4600540	1920	
MD-647	10-Jul-01		RFD	12	518389	4813133	1907.636052	
MD-651	30-Jul-01		RFD	12	660349	4873817	2084.988953	44.00000
MD-654	31-Jul-01	03-Sep-02	operational	13	357396	4929766	1441.277242	
MD-658	21-Aug-01		RFD	13	256560	4933932	1154.96867	
MD-659	21-Aug-01	14-Sep-01	operational	13	318630	4777816	1900.65059	
MD-668	11-Sep-01		RFD	13	320360	4777714	1878.564657	43deg 07' 58.15
MD-670	18-Sep-01	13-Jan-03	operational	13	351607	4979611	1149.279192	44.95638
MD-674&MD-798				13	517500	4551000	1829	
MD-675	23-Oct-01	26-Mar-02	operational	12	563058	4676100	2058.190085	
MD-676	23-Oct-01	04-Feb-02	operational	12	558400	4690300	2256	
MD-677	23-Oct-01	01-Apr-02	operational	12	558500	4694600	2256	
MD-696	11-Dec-01		RFD	12	560119	4677976	2121.74606	42deg 19' 51"
MD-737	05-Mar-02	22-Feb-02	operational	13	485099	4550364	2255	
MD-745	18-Mar-02		RFD	13	363702	4911623	1440.131216	
MD-760	14-May-02		RFD	13	380556	4750248	1627	

MD-808	10-Sep-02		RFD	12	545994	4708775	2560	
MD-809	23-Oct-02		RFD	12	499773	4754656	1820.743243	
MD-813	01-Oct-02		RFD	12	520036	4812179	2302.032214	
MD-827	26-Nov-02		RFD	13	418832	4942637	1155.617887	44deg 38' 4.0
MD-874	13-May-03		RFD	13	320500	4776500	1890	
MD-878	28-May-03		RFD	12	497044	4545291	2248.236047	
MD-886	24-Jun-03		RFD	13	282418	4881927	1442.531729	

Longitude	Facility_Permit_Delta_NOx_TPY	Facility_Permit_Delta_SO2_TPY	Facility_Permit_Delta_PM10_TPY	Facility_Actual_Delta_NOx_TPY	Facility_Actual_Delta_SO2_TPY	Facility_Actual_Delta_PM10_TPY	Stack_Ht_m	Stack_Temp_K	Stack_Diam_m
			2.9				11.6768	326.2056	0.7317
	48						9.0549	509.8167	0.7622
	5.1						9.0549	509.8167	0.7622
	5.1						9.0549	509.8167	0.7622
109.41.33	83.7						7.9248	422	0.710184
	96.1						7.9248	422	0.710184
	66.3						7.9248	422	0.70104
	44.4						9.0549	509.8167	0.7622
	44.4						9.0549	509.8167	0.7622
	54.9						7.62	904	0.406
	28.7						9.0549	509.8167	0.7622
	3.9						9.0549	509.8167	0.7622
	11.5	3.6	32.7				14.1159	350.0389	0.9146
	38.6						9.0549	509.8167	0.7622
	81.6						9.0549	509.8167	0.7622
	11.6						9.0549	509.8167	0.7622
	11.6						9.0549	509.8167	0.7622
	15.5						9.0549	509.8167	0.7622
	11.7						9.0549	509.8167	0.7622
	11.7						9.0549	509.8167	0.7622
			3.8				11.6768	326.2056	0.7317
	86.5						9.0549	509.8167	0.7622
	57.6						9.0549	509.8167	0.7622
	25.2						9.0549	509.8167	0.7622
	57.6						9.0549	509.8167	0.7622
	2.5						3.6576	422	0.1524
	11.4						9.0549	509.8167	0.7622
	39.9	5.8	11				11.6768	326.2056	0.7317
106deg4'42.7	15.4						9.0549	509.8167	0.7622
	101.2						8	899.82	0.3
	30.6						9.0549	509.8167	0.7622
	11.7						9.0549	509.8167	0.7622
	65.6						9.0549	509.8167	0.7622

106 deg 4' 46.7	20.5						9.0549	509.8167	0.7622
	62.9						15.24	711	0.457
	31.5						15.24	711	0.457
	88						15.24	714	0.457
	11.8						9.0549	509.8167	0.7622
	68.8						9.0549	509.8167	0.7622
106deg03'45.6	53.8						9.0549	509.8167	0.7622
	158.6						9.0549	509.8167	0.7622
	11.7						9.0549	509.8167	0.7622
	11.7						9.0549	509.8167	0.7622
	11.7						9.0549	509.8167	0.7622
	11.7						9.0549	509.8167	0.7622
	11.7						9.0549	509.8167	0.7622
	11.7						9.0549	509.8167	0.7622
	11.7						9.0549	509.8167	0.7622
	7.6						9.0549	509.8167	0.7622
106deg 07' 29.28"	11						9.0549	509.8167	0.7622
106deg 05' 43.44"	11						9.0549	509.8167	0.7622
106deg 07' 52.32"	11						9.0549	509.8167	0.7622
106deg 44' 38.9"	44.9						9.0549	509.8167	0.7622
106deg 41' 24.8"	44.9						9.0549	509.8167	0.7622
106deg 45' 5.5"	44.9						9.0549	509.8167	0.7622
106deg 42' 58.1"	44.9						9.0549	509.8167	0.7622
106deg 41' 18.7"	44.9						9.0549	509.8167	0.7622
106deg 51' 41.9"	44.9						9.0549	509.8167	0.7622
106deg 52' 27.9"	44.9						9.0549	509.8167	0.7622
106deg 51' 47.0"	44.9						9.0549	509.8167	0.7622
106deg 51' 29.6"	44.9						9.0549	509.8167	0.7622
106deg 52' 20"	44.9						9.0549	509.8167	0.7622
106deg 51' 28.1"	44.9						9.0549	509.8167	0.7622
	70.8						9.0549	509.8167	0.7622
107 deg 59' 26.4	16						9.0549	509.8167	0.7622
106 deg 5' 33.8	15.4						9.0549	509.8167	0.7622
	5.4	0.9	2.6				11.6768	326.2056	0.7317
109.2 deg	7.5						9.0549	509.8167	0.7622
	25.6						9.0549	509.8167	0.7622
	1.3		1.2				11.6768	326.2056	0.7317

			2.4				11.6768	326.2056	0.7317
			1.8				11.6768	326.2056	0.7317
	116.5						9.0549	509.8167	0.7622
	116.5						9.0549	509.8167	0.7622
	116.5						9.0549	509.8167	0.7622
	43.8						9.0549	509.8167	0.7622
	43.8						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	49.2						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	116.4						9.0549	509.8167	0.7622
	116.4						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	116.4						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	3.9						9.0549	509.8167	0.7622
	11.7						9.0549	509.8167	0.7622
	11.7						9.0549	509.8167	0.7622
	19.5						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
	30.6						9.0549	509.8167	0.7622
			0.6				11.6768	326.2056	0.7317
	38.4						9.0549	509.8167	0.7622

			1.3				11.6768	326.2056	0.7317
	15.4						9.0549	509.8167	0.7622
	11.5						9.0549	509.8167	0.7622
	144.4						60.2134	431.5944	2.7439
	144.4						60.2134	431.5944	2.7439
	144.4						60.2134	431.5944	2.7439
	79						60.2134	431.5944	2.7439
	86.8						14.1159	350.0389	0.9146
	44						5.39496	422	0.405384
	39.3	12.3	21.8				14.1159	350.0389	0.9146
	108.2						9.0549	509.8167	0.7622
	58.7						9.0549	509.8167	0.7622
	58.7						9.0549	509.8167	0.7622
	19.5						9.0549	509.8167	0.7622
	19.5						9.0549	509.8167	0.7622
	22.4						9.0549	509.8167	0.7622
			2.5				11.6768	326.2056	0.7317
	19.5						9.0549	509.8167	0.7622
	97.5						9.0549	509.8167	0.7622
	109.2						9.0549	509.8167	0.7622
	44.9						9.0549	509.8167	0.7622
	17.3	1.1	3.7				11.6768	326.2056	0.7317
	116.3						9.0549	509.8167	0.7622
109.716660	2.4						9.0549	509.8167	0.7622
	30.7						9.0549	509.8167	0.7622
	30.9						9.0549	509.8167	0.7622
	30.5						9.0549	509.8167	0.7622
	30.9						9.0549	509.8167	0.7622
	186.2						9.0549	509.8167	0.7622
	23.2						9.0549	509.8167	0.7622
	4.1						9.0549	509.8167	0.7622
	4.1						9.0549	509.8167	0.7622
	6.1						9.0549	509.8167	0.7622
	11.6						9.0549	509.8167	0.7622
	11.6						9.0549	509.8167	0.7622
	11.6						9.0549	509.8167	0.7622
	30.7						9.0549	509.8167	0.7622

	22.3						9.0549	509.8167	0.7622
	19.4						9.0549	509.8167	0.7622
	11.6						9.0549	509.8167	0.7622
	85.5						9.0549	509.8167	0.7622
109.6333	3.2						11.7683	450.5389	0.8232
			4.8				11.6768	326.2056	0.7317
	24.6						9.0549	509.8167	0.7622
	24.6						9.0549	509.8167	0.7622
	12.6						7.32	403	0.204
	33.8	5.7	12.9				7.0866	422	0.103632
	9.1	0.9	1.4				11.6768	326.2056	0.7317
	3.6						11.7683	450.5389	0.8232
	91.3						9.0549	509.8167	0.7622
	10.3						9.0549	509.8167	0.7622
	0	29.6	0				14.1159	350.0389	0.9146
	2.3						9.0549	509.8167	0.7622
	25.5						6.86	729.8	0.31
	61						9.0549	509.8167	0.7622
110 deg 14' 35	-122						10.52	700	0.61
107.08.40	17.8						11.7683	450.5389	0.8232
			9.3				11.6768	326.2056	0.7317
	32.4						9.14	869	0.46
	9.2	0.4	0.2				11.6768	326.2056	0.7317
109.0000	5.4						9.0549	509.8167	0.7622
	11.4						9.0549	509.8167	0.7622
	0		-1496.5	-1		10	15	422	0.31
	11.6						5.94	649	0.3
107deg 12' 31.47	11.6						11.7683	450.5389	0.8232
106.88134	64.8						9.0549	509.8167	0.7622
	-212.7	-1024	-173.8	-5.6	-227.5	-6.7	17.7744	389.3722	1.8293
	2.7			-44			9.0549	509.8167	0.7622
	2.2			-62			9.0549	509.8167	0.7622
	3.1			-116			9.0549	509.8167	0.7622
110deg 16' 16.5"	1.7						9.0549	509.8167	0.7622
	148.35		60.9			29	11.6768	326.2056	0.7317
	25.4	4	24.7	59	435		11.6768	326.2056	0.7317
	0.7	0.2	22.6				11.6159	357.9278	0.7622

	20.6						7.32	797.2	0.3
	-3.8	2.3	5.7				9.1	422	0.975
	6.9	7.3	3.7				14.1159	350.0389	0.9146
106deg 1' 24	15.3						9.0549	509.8167	0.7622
	40.2						14.4	734.8	0.3
	-300.7			-167			15	422	0.31
	-0.2	60.8					9.0549	509.8167	0.7622

Stack_Vel_mps	Facility_Permit_Delta_PM25_TPY	Facility_Actual_Delta_PM25_TPY
15.3659	2.9	
12.5		
12.5		
12.5		
142.0368		
142.0368		
142.0368		
12.5		
12.5		
28.66		
12.5		
12.5		
10.0305	32.7	
12.5		
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12.5		
15.3659	3.8	
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12.5		
15.3659	5.8	
12.5		
54.86		
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12.5		
15.3659	2.6	
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12.5		
15.3659	1.2	

15.3659	2.4	
15.3659	1.8	
12.5		
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15.3659	0.6	
12.5		

15.3659	1.3	
12.5		
12.5		
16.6768		
16.6768		
16.6768		
16.6768		
10.0305		
12.5		
10.0305	21.8	
12.5		
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12.5		
15.3659	2.5	
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12.5		
15.3659	3.7	
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12.5		
9.5122		
15.3659	4.8	
12.5		
12.5		
33.9		
30.05328	12.9	
15.3659	1.4	
9.5122		
12.5		
12.5		
10.0305	0	
12.5		
47.71		
12.5		
28.01		
9.5122		
15.3659	9.3	
69.17		
15.3659	0.2	
12.5		
12.5		
10	-1496.5	10
52.7		
9.5122		
12.5		
5.2439	-173.8	-6.7
12.5		
12.5		
12.5		
12.5		
15.3659	60.9	29
15.3659	24.7	
9.4512	22.6	

45.2		
8.19912	5.7	
10.0305	3.7	
12.5		
41.15		
10		
12.5		

Permit_Number	Operating_Status	UTM Zone	UTM_E_Meters	UTM_N_Meters	Lambert X	Lambert Y
51	OPERATING	12	462499	4802381	-228.129	92.795
65	OPERATING	12	462322	4814099	-227.950	104.124
2653		12	570667	5040457	-116.603	319.570
2459a		12	588013	5025995	-100.280	305.093
2459b		12	588013	5025995	-100.280	305.093
CT-2250	operational	12	598265	4726644	-99.107	15.592
CT-2251&MD-815		12	609636	4709062	-88.617	-1.736
CT-2252&MD-856		12	579930	4681316	-118.147	-27.716
CT-2280	operational	12	606220	4698500	-92.224	-11.852
CT-2331	assume operational	12	669161	4953686	-24.047	232.894
CT-2464	RFD	12	592320	4735120	-104.610	23.959
CT-2465	RFD	12	594892	4733300	-102.176	22.125
CT-2466	operational	12	597260	4727158	-100.064	16.118
CT-2517	operational	12	666443	4913268	-27.846	193.946
CT-2677	operational	12	740584	4895137	43.217	174.305
CT-2723	operational	12	642610	4950983	-49.762	231.058
CT-2932	RFD	12	658704	4914014	-35.297	194.891
CT-3003	operational	12	499012	4545244	-200.458	-157.071
CT-3114	RFD	12	605322	4714137	-92.643	3.296
CT-3269	RFD	12	612264	4708237	-86.099	-2.609
CT-3274	RFD	12	593522	4717169	-103.966	6.567
CT-3300	RFD	12	552100	4707800	-144.296	-1.291
CT-3301	RFD	12	519085	4793989	-173.687	83.006
CT-3321	RFD	12	591365	4738529	-105.435	27.283
CT-771A	RFD	12	574367	4700209	-122.981	-9.280
MD-615	assume operational	12	563243	4587905	-136.998	-117.634
MD-638	operational	12	579279	4600540	-121.108	-105.864
MD-647	RFD	12	518389	4813133	-173.796	101.529
MD-651	RFD	12	660349	4873817	-34.872	156.023

MD-675	operational	12	563058	4676100	-134.620	-32.272
MD-676	operational	12	558400	4690300	-138.713	-18.401
MD-677	operational	12	558500	4694600	-138.491	-14.245
MD-696	RFD	12	560119	4677976	-137.408	-30.372
MD-808	RFD	12	545994	4708775	-150.173	-0.170
MD-809	RFD	12	499773	4754656	-193.517	45.555
MD-813	RFD	12	520036	4812179	-172.232	100.559
MD-878	RFD	12	497044	4545291	-202.363	-156.967

Permit_Number	Operating_Status	UTM Zone	UTM_E_Meters	UTM_N_Meters	lambert x
3036		13	350880	4987732	-330.404
3037		13	350070	4986300	-331.229
3038		13	351921	4986863	-329.425
3070		13	351379	4984558	-330.017
3140		13	355020	4984420	-326.506
3141		13	348490	4989160	-332.669
3250		13	357575	4984300	-324.043
CT-2225	assume operational	13	364974	4937421	-318.299
CT-2242&MD-751		13	415103	4872475	-271.829
CT-2243	operational	13	414725	4872510	-272.193
CT-2244	operational	13	415689	4872930	-271.249
CT-2254	operational	13	417098	4956112	-267.405
CT-2257	operational	13	414327	4958932	-269.997
CT-2289	RFD	13	370935	4936984	-312.556
CT-2291	operational	13	372642	4937258	-310.899
CT-2303	operational	13	486250	4549245	-212.702
CT-2322	operational	13	355800	4978900	-325.918
CT-2325	operational	13	347116	4970108	-334.565
CT-2326	operational	13	345792	4972600	-335.768
CT-2327	operational	13	346439	4971047	-335.190
CT-2328	operational	13	346251	4968878	-335.437
CT-2329	assume operational	13	343171	4967788	-338.443
CT-2330	operational	13	346480	4967251	-335.264
CT-2357&CT-2357&MD-833		13	410466	4887576	-275.856
CT-2367	operational	13	411800	4896800	-274.292
CT-2368	operational	13	406900	4910200	-278.624
CT-2369	operational	13	408000	4903800	-277.753
CT-2370	operational	13	340775	4732435	-347.900

CT-2392	operational	13	417821	4951612	-266.841
CT-2407&CT-2407&CT-3225		13	391556	4742315	-298.509
CT-2446	operational	13	414392	4938039	-270.557
CT-2448&MD-801		13	409700	4830800	-278.299
CT-2449	RFD	13	383457	4884309	-302.043
CT-2450	RFD	13	379515	4886333	-305.789
CT-2451	RFD	13	383356	4884511	-302.134
CT-2463	operational	13	414356	4941998	-270.474
CT-2467	RFD	13	316494	4766898	-370.304
CT-2472	RFD	13	410500	4874800	-276.206
CT-2502	RFD	13	415985	4963529	-268.259
CT-2507	operational	13	402596	4895608	-283.217
CT-2508	operational	13	349927	4980782	-331.532
CT-2509	operational	13	351880	4980919	-329.642
CT-2510	operational	13	352562	4983358	-328.911
CT-2511	operational	13	353239	4981693	-328.307
CT-2512	operational	13	356997	4981510	-324.684
CT-2513	operational	13	356384	4982931	-325.233
CT-2514	RFD	13	343402	4981227	-337.818
CT-2575	operational	13	410043	4888859	-276.226
CT-2576	operational	13	412377	4887506	-274.012
CT-2577	operational	13	409496	4886322	-276.831
CT-2609	RFD	13	362224	4969907	-319.983
CT-2610	RFD	13	366478	4969570	-315.886
CT-2611	RFD	13	361585	4967426	-320.674
CT-2612	RFD	13	364400	4968185	-317.934
CT-2613	RFD	13	366568	4967519	-315.860
CT-2629	RFD	13	353004	4972834	-328.798
CT-2630	RFD	13	351968	4971695	-329.833
CT-2631	RFD	13	352809	4969229	-329.094
CT-2633	RFD	13	353136	4966841	-328.850

CT-2634	RFD	13	352012	4966082	-329.958
CT-2635	RFD	13	353136	4965365	-328.894
CT-2656	RFD	13	419600	4944500	-265.334
CT-2683	operational	13	413281	4939081	-271.599
CT-2711	RFD	13	365391	4914845	-318.574
CT-2735	operational	13	288344	4796047	-396.601
CT-2738&CT-3094		13	388408	4745571	-301.453
CT-2756	RFD	13	372944	4726570	-316.982
CT-2766	RFD	13	353678	4934497	-329.295
CT-2771	RFD	13	382756	4940097	-301.048
CT-2772	RFD	13	376604	4942879	-306.905
CT-2780	RFD	13	371318	4943138	-312.002
CT-2793	RFD	13	347500	4980100	-333.895
CT-2794	RFD	13	349260	4974840	-332.353
CT-2828	RFD	13	375900	4932500	-307.896
CT-2829	RFD	13	374700	4932400	-309.058
CT-2831	RFD	13	377900	4942500	-305.665
CT-2832	RFD	13	376300	4942800	-307.201
CT-2840	RFD	13	377100	4923800	-306.997
CT-2841	RFD	13	378500	4927800	-305.526
CT-2842	RFD	13	374556	4930000	-309.268
CT-2846	RFD	13	374954	4932218	-308.818
CT-2847	RFD	13	374200	4923500	-309.807
CT-2848	RFD	13	377300	4925700	-306.747
CT-2849	RFD	13	369580	4944948	-313.626
CT-2850	RFD	13	378500	4942700	-305.080
CT-2851	RFD	13	378571	4943211	-304.996
CT-2852	RFD	13	373548	4942519	-309.867
CT-2853	RFD	13	371456	4941098	-311.930
CT-2854	RFD	13	385900	4943200	-297.919
CT-2855	RFD	13	383500	4939100	-300.359

CT-2856	RFD	13	383100	4941700	-300.667
CT-2857	RFD	13	376100	4940000	-307.478
CT-2859	RFD	13	371800	4926900	-312.023
CT-2863	operational	13	417100	4942800	-267.800
CT-2864	RFD	13	348866	4970732	-332.856
CT-2865	operational	13	350222	4970540	-331.553
CT-2869	RFD	13	371087	4932315	-312.549
CT-2892	RFD	13	380000	4945500	-303.548
CT-2893	RFD	13	373100	4944200	-310.249
CT-2894	RFD	13	374200	4933200	-309.516
CT-2895	RFD	13	374600	4929300	-309.247
CT-2896	RFD	13	409171	4747066	-281.336
CT-2931	RFD	13	419000	4952500	-265.676
CT-2954	RFD	13	372101	4923147	-311.845
CT-2955	RFD	13	371952	4921138	-312.049
CT-2984	RFD	13	355838	4978886	-325.881
CT-2985	RFD	13	352024	4976964	-329.621
CT-2986	RFD	13	349170	4978443	-332.333
CT-2987	RFD	13	351168	4973648	-330.547
CT-2989	operational	13	391082	4780976	-297.794
CT-3009	RFD	13	355271	4932845	-327.806
CT-3010	RFD	13	407200	4886000	-279.058
CT-3027	RFD	13	359200	4965800	-323.026
CT-3028	RFD	13	362200	4964900	-320.156
CT-3031	RFD	13	371200	4950600	-311.893
CT-3032	RFD	13	367500	4951500	-315.439
CT-3034	RFD	13	369582	4931138	-314.038
CT-3036	RFD	13	244850	4844261	-437.115
CT-3038	RFD	13	368400	4949200	-314.638
CT-3039	RFD	13	368700	4950300	-314.316
CT-3040	RFD	13	371000	4948500	-312.149

CT-3065	RFD	13	390600	4941300	-293.437
CT-3093	RFD	13	513955	4553979	-185.724
CT-3102	RFD	13	378609	4932250	-305.287
CT-3130	RFD	13	378579	4932697	-305.303
CT-3148	RFD	13	380900	4851200	-305.509
CT-3151	RFD	13	366823	4937642	-316.507
CT-3152	RFD	13	379500	4958100	-303.654
CT-3153	RFD	13	377800	4955600	-305.370
CT-3154	RFD	13	380200	4954700	-303.080
CT-3157	RFD	13	366479	4939545	-316.782
CT-3158	RFD	13	366274	4939528	-316.981
CT-3159	RFD	13	364150	4939250	-319.040
CT-3182	RFD	13	348657	4968700	-333.119
CT-3183	RFD	13	362963	4927972	-320.524
CT-3184	RFD	13	360366	4929686	-322.981
CT-3206	RFD	13	383818	4935523	-300.159
CT-3207	RFD	13	415750	4881960	-270.920
CT-3208	RFD	13	417300	4943669	-267.581
CT-3261	RFD	13	355180	4977247	-326.565
CT-3266	RFD	13	399735	4882640	-286.370
CT-3279	RFD	13	413643	4888477	-272.760
CT-3298	RFD	13	415550	4888144	-270.928
CT-3302	RFD	13	258753	4934797	-420.928
CT-3327	RFD	13	414477	4887726	-271.977
CT-3340	RFD	13	414182	4931430	-270.957
MD-351A	operational	13	319855	4776286	-366.768
MD-565&MD-565&MD-755		13	411295	4847201	-276.266
MD-600&MD-600A		13	417781	4949201	-266.951
MD-620	operational	13	324662	4741524	-363.194
MD-625	operational	13	301440	4749660	-385.384
MD-654	operational	13	357396	4929766	-325.846

MD-658	RFD	13	256560	4933932	-423.071
MD-659	operational	13	318630	4777816	-367.904
MD-668	RFD	13	320360	4777714	-366.236
MD-670	operational	13	351607	4979611	-329.945
MD-674&MD-798		13	517500	4551000	-182.378
MD-737	operational	13	485099	4550364	-213.784
MD-745	RFD	13	363702	4911623	-320.302
MD-760	RFD	13	380556	4750248	-308.901
MD-827	RFD	13	418832	4942637	-266.132
MD-874	RFD	13	320500	4776500	-366.138
MD-886	RFD	13	282418	4881927	-399.690

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Table F-3
Excluded Permitted Source Summary

Permit Number	Company	Facility	Location	Comments
CT-1320A	KCS Mountain Resources Incorporated	Manderson Gas Plant / Oil Battery	Washakie County, WY	Reduction, not a PSD major source.
CT-1552A	EOG Resources	B Tank Battery	Sublette County, WY	Production well with emissions < 3TPY.
CT-1942A	Federated Oil and Gas	Wild Horse Creek Compressor Station	Sheridan County, WY	No change in emissions.
CT-1946A	Burlington Resources Oil and Gas Co	Lost Cabin Gas Plant	Fremont County, WY	No change in emissions.
CT-2051A	Bitter Creek Pipelines LLC	Chevron 20 Battery	Sheridan County, WY	Administrative change.
CT-2052A	Bitter Creek Pipelines LLC	Chevron 30 Battery	Sheridan County, WY	Administrative change.
CT-2054A	Bitter Creek Pipelines LLC	Chevron 19 Battery	Sheridan County, WY	Administrative change.
CT-2058A	Tom Brown Incorporated	Frenchie Draw Satellite Station	Fremont County, WY	No longer a permit.
CT-2117	Joe's Concrete & Lumber Incorporated	Portable Concrete Batch Plant & Screening Plant	Sublette County, WY	Increase < 1 TPY.
CT-2150A	Bear Paw Energy Incorporated	Prairie Dog Gathering System - Pod A	Sheridan County, WY	No change in emissions.
CT-2151A	Bear Paw Energy Incorporated	Prairie Dog Gathering System - Pod B	Sheridan County, WY	No change in emissions.
CT-2152A	Bear Paw Energy Incorporated	Prairie Dog Gathering System - Pod C	Sheridan County, WY	No change in emissions.
CT-2153A	Bear Paw Energy Incorporated	Prairie Dog Gathering System - Pod D	Sheridan County, WY	No change in emissions.
CT-2154A	Bear Paw Energy Incorporated	Prairie Dog Gathering System - Pod E	Sheridan County, WY	No change in emissions.
CT-2178A	Bear Paw Energy Incorporated	Prairie Dog Pod K (Formerly Station 28)	Sheridan County, WY	No change in emissions.
CT-2186A	Bear Paw Energy Incorporated	Prairie Dog Pod J (Formerly Station 21)	Sheridan County, WY	Reduction, not a PSD major source.
CT-2189A	CMS Field Services	Kuhn 27 Compressor Station	Johnson County, WY	No change in emissions.
CT-2194A	CMS Field Services	Cottonwood Creek Prospect C Station	Sheridan County, WY	No change in emissions.
CT-2252A	Jonah Gas Gathering Company	Bird Canyon/County Line Compressor Station	Sublette County, WY	Location change.
CT-2289A	Federated Oil and Gas	Box Elder Creek Main Compressor Station	Sheridan County, WY	Reduction, not a PDS major source.
CT-2329A	Bitter Creek Pipelines LLC	Wrench Ranch 49 Battery	Sheridan County, WY	No change in emissions.
CT-2329A2	Bitter Creek Pipelines LLC	Wrench Ranch 49 Battery	Sheridan County, WY	No change in emissions.
CT-2392A	Thunder Creek Gas Services	SC-2956	Sheridan County, WY	No change in emissions.
CT-2413	Mountain Gas Resources	Stud Horse Butte 14-24	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database.
CT-2414	Mountain Gas Resources	Stud Horse Butte 10-23A	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database.
CT-2425	Mountain Gas Resources	Stud Horse Butte 2-23	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database.
CT-2472A	Western Gas Resources	Pumpkin/Bruno	Johnson County, WY	Reduction, not a PSD major source.
CT-2507A	Thunder Creek Gas Services	Juniper Draw Compressor Station	Johnson County, WY	Reduction, not a PSD major source.
CT-2531	Amoco Production Company	Corona 8-19	Sublette County, WY	Production well with emissions < 3TPY.
CT-2532	Amoco Production Company	Cabrito 10-30	Sublette County, WY	Production well with emissions < 3TPY.
CT-2547	Forest Oil Corporation	Elm Federal No. 23-22	Sublette County, WY	Production well with emissions < 3TPY.
CT-2586	Mountain Gas Resources	Stud Horse Butte 10-21	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database.
CT-2587	Mountain Gas Resources	Stud Horse Butte 6-24	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database.
CT-2588	Mountain Gas Resources	Stud Horse Butte 16-21	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database.
CT-2614	Mountain Gas Resources	Stud Horse Butte 14-21	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database.
CT-2615	BP America Production Company	Cabrito 6-31 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
CT-2616	Mountain Gas Resources	Stud Horse Butte 2-24	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database.
CT-2643	Devon Energy Production Company, L.P.	Yellow Point No. 04-01-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2644	CMS Field Services	Meriwether Lewis A Compressor Station	Sheridan County, WY	Permit withdrawn.
CT-2645	CMS Field Services	Meriwether Lewis B Compressor Station	Sheridan County, WY	Permit withdrawn.
CT-2646	CMS Field Services	Meriwether Lewis C Compressor Station	Sheridan County, WY	Permit withdrawn.
CT-2647	CMS Field Services	Meriwether Lewis D Compressor Station	Sheridan County, WY	Permit withdrawn.
CT-2648	CMS Field Services	Meriwether Lewis E Compressor Station	Sheridan County, WY	Permit withdrawn.
CT-2649	CMS Field Services	Meriwether Lewis F Compressor Station	Sheridan County, WY	Permit withdrawn.
CT-2650	CMS Field Services	Meriwether Lewis G Compressor Station	Sheridan County, WY	Permit withdrawn.
CT-2652	Amoco Production Company	Cabrito 6-25	Sublette County, WY	Production well with emissions < 3TPY.
CT-2667	Mountain Gas Resources	War Bonnett 15-23	Sublette County, WY	Increase <1 TPY.
CT-2677A	Devon Energy Production Company, L.P.	Worland Field Compressor Station	Big Horn County, WY	Increase <1 TPY.
CT-2683A	CMS Field Services	Kuhn #2 Compressor Station	Sheridan County, WY	No change in emissions.
CT-2686	Amoco Production Company	Stud Horse Butte 4-20	Sublette County, WY	Production well with emissions < 3TPY.
CT-2687	Amoco Production Company	Corona 11-30 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
CT-2688	Amoco Production Company	Cabrito 13-18 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
CT-2698	Ultra Resources Incorporated	Stud Horse Butte 12-23	Sublette County, WY	Production well with emissions < 3TPY.
CT-2699	Woodrow Barstad	Barstad Pit	Johnson County, WY	Permit Expired.
CT-2702	Devon Energy Production Company, L.P.	Yellow Point No. 14-14-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2719	Ultra Resources Incorporated	Stud Horse Butte 16-21	Sublette County, WY	Production well with emissions < 3TPY.
CT-2720	Ultra Resources Incorporated	Stud Horse Butte 10-21	Sublette County, WY	Production well with emissions < 3TPY.
CT-2721	Ultra Resources Incorporated	Stud Horse Butte 6-24	Sublette County, WY	Production well with emissions < 3TPY.
CT-2773	Bitter Creek Pipelines LLC	Clearmont Central/2949 Battery	Sheridan County, WY	Permit withdrawn.

Table F-3
Excluded Permitted Source Summary

Permit Number	Company	Facility	Location	Comments
CT-2774	Bitter Creek Pipelines LLC	3149 Battery	Sheridan County, WY	Permit withdrawn.
CT-2775	Bitter Creek Pipelines LLC	3349 East Battery	Sheridan County, WY	Permit withdrawn.
CT-2776	Bitter Creek Pipelines LLC	3349 West Battery	Sheridan County, WY	Permit withdrawn.
CT-2777	Bitter Creek Pipelines LLC	3449 Battery	Sheridan County, WY	Permit withdrawn.
CT-2803	McMurry Oil Company	Stud Horse Butte No. 8-34-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2807	McMurry Oil Company	Stud Horse Butte 10-33-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2808	McMurry Oil Company	Yellow Point 16-11-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2819	McMurry Oil Company	Jonah Federal 7-6-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2820	McMurry Oil Company	Stud Horse Butte 7-33-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2835	BP America Production Company	Cabrito 03-30 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
CT-2836	BP America Production Company	Cabrito 06-30 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
CT-2866	McMurry Oil Company	Stud Horse Butte 4-35-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2867	Forest Oil Corporation	Elm Federal No. 23-12	Sublette County, WY	Production well with emissions < 3TPY.
CT-2874	Rissler and McMurry Company	Eagle Creek Ranch Quarry	Natrona County, WY	Increase < 1 TPY.
CT-2880	McMurry Oil Company	Yellow Point 8-2-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2881	McMurry Oil Company	Jonah Federal 2-7-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2882	McMurry Oil Company	Stud Horse Butte 10-35-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2887	McMurry Oil Company	Stud Horse Butte 12-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2888	McMurry Oil Company	Cabrito 12-25-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2889	McMurry Oil Company	Jonah Federal 1-7X-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2890	McMurry Oil Company	Yellow Point No. 10-12-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2891	McMurry Oil Company	Jonah Federal 6-5-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2897	Chevron USA, Inc.	Waltman # 57	Natrona County, WY	Production well with emissions < 3TPY.
CT-2900	Tom Brown Incorporated	West Cave Gulch 4-36	Natrona County, WY	Increase <1 TPY.
CT-2901	Wexpro Company	Mesa Well 11-16	Sublette County, WY	Production well with emissions < 3TPY.
CT-2902	McMurry Oil Company	Jonah Federal 8-7-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2903	McMurry Oil Company	Yellow Point No. 12-12-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2904	McMurry Oil Company	Stud Horse Butte 12-34-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2905	McMurry Oil Company	Stud Horse Butte 9-19-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2906	McMurry Oil Company	Stud Horse Butte 10-34-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2907	McMurry Oil Company	Jonah Federal No. 4-7-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2908	McMurry Oil Company	Stud Horse Butte 13-20-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2909	McMurry Oil Company	Stud Horse Butte 13-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2910	McMurry Oil Company	Stud Horse Butte 6-34-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2911	McMurry Oil Company	Jonah Federal 4-18-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2912	McMurry Oil Company	Jonah Federal 4-4-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2913	McMurry Oil Company	Jonah Federal 6-7-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2914	McMurry Oil Company	Jonah Federal 12-7-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2915	McMurry Oil Company	Stud Horse Butte No. 4-34-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2928	Amoco Production Company	Corona 02-11	Sublette County, WY	Production well with emissions < 3TPY.
CT-2929	McMurry Oil Company	Stud Horse Butte 5-36-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2937	McMurry Oil Company	Jonah Federal 1-6X-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2938	McMurry Oil Company	Cabrito 14-25-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2939	McMurry Oil Company	Stud Horse Butte 1-36-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2941	BP America Production Company	Cabrito 16-30	Sublette County, WY	Production well with emissions < 3TPY.
CT-2942	BP America Production Company	Cabrito 11-18	Sublette County, WY	Production well with emissions < 3TPY.
CT-2943	Amoco Production Company	Stud Horse Butte 10-22	Sublette County, WY	Production well with emissions < 3TPY.
CT-2944	McMurry Oil Company	Jonah Federal 1-5x-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2945	McMurry Oil Company	Yellow Point 4-12-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2948	McMurry Oil Company	Stud Horse Butte 8-35-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2949	McMurry Oil Company	Stud Horse Butte 14-35-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2950	McMurry Oil Company	Stud Horse Butte 8-36-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2951	McMurry Oil Company	Stud Horse Butte 14-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2952	McMurry Oil Company	Yellow Point 6-12-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2953	McMurry Oil Company	Stud Horse Butte 2-34-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2954A	Comet Energy, LLC	Lawrence 28 Compressor Station	Johnson County, WY	Reduction, not a PSD major source.
CT-2956	McMurry Oil Company	Jonah Federal 5-8-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2957	McMurry Oil Company	Jonah Federal 3-8x-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2958	McMurry Oil Company	Stud Horse Butte 2-35-29-108	Sublette County, WY	Production well with emissions < 3TPY.

Table F-3
Excluded Permitted Source Summary

Permit Number	Company	Facility	Location	Comments
CT-2959	McMurry Oil Company	Jonah Federal 7-5-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2960	McMurry Oil Company	Stud Horse Butte 4-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2961	McMurry Oil Company	Stud Horse Butte 2-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2962	Amoco Production Company	Stud Horse Butte 16-22	Sublette County, WY	Production well with emissions < 3TPY.
CT-2963	Amoco Production Company	Stud Horse Butte 16-15	Sublette County, WY	Production well with emissions < 3TPY.
CT-2964	Amoco Production Company	Stud Horse Butte 16-14 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
CT-2965	Amoco Production Company	Corona 02-19 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
CT-2980	Shell Rocky Mountain Production Company LLC	Antelope #11-4	Sublette County, WY	Production well with emissions < 3TPY.
CT-2981	BP America Production Company	Cabrito 15-13	Sublette County, WY	Production well with emissions < 3TPY.
CT-2990	EOG Resources	GRBU 301-7d	Sublette County, WY	Production well with emissions < 3TPY.
CT-2997	Chevron USA, Inc.	Birch Creek 186	Sublette County, WY	Production well with emissions < 3TPY.
CT-2997	Chevron USA, Inc.	Birch Creek 134	Sublette County, WY	Production well with emissions < 3TPY.
CT-3000	Amoco Production Company	Stud Horse Butte 06-22	Sublette County, WY	Production well with emissions < 3TPY.
CT-3004	Amoco Production Company	Stud Horse Butte 04-22	Sublette County, WY	Production well with emissions < 3TPY.
CT-3016	McMurry Oil Company	Stud Horse Butte 1-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3017	McMurry Oil Company	Stud Horse Butte 11-22-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3019	McMurry Oil Company	Yellow Point 2-12-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3022	McMurry Oil Company	Jonah Federal 6-6-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3025	McMurry Oil Company	Stud Horse Butte 15-19-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3026	McMurry Oil Company	Jonah Federal 4-6-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3035	El Paso Field Services	Fee 1-8	Fremont County, WY	Production well with emissions < 3TPY.
CT-3044	McMurry Oil Company	Stud Horse Butte 3-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3046	Ultra Resources Incorporated	Riverside 2-2	Sublette County, WY	Production well with emissions < 3TPY.
CT-3050	McMurry Oil Company	Stud Horse Butte 7-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3051	McMurry Oil Company	Stud Horse Butte 9-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3052	McMurry Oil Company	Yellow Point 12-13-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3053	McMurry Oil Company	Stud Horse Butte 10-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3055	Anschutz Exploration Corporation	Mesa 9-21D	Sublette County, WY	Production well with emissions < 3TPY.
CT-3056	Anschutz Exploration Corporation	Mesa 6-27D CPF	Sublette County, WY	Production well with emissions < 3TPY.
CT-3057	McMurry Oil Company	Stud Horse Butte 3-36-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3061	Yates Petroleum Corporation	Highway Federal 4-Y Production Facility	Sublette County, WY	Production well with emissions < 3TPY.
CT-3063	BP America Production Company	Cabrito 4-19	Sublette County, WY	Production well with emissions < 3TPY.
CT-3064	Ultra Resources Incorporated	Riverside 1-4	Sublette County, WY	Production well with emissions < 3TPY.
CT-3071	McMurry Oil Company	Stud Horse Butte 8-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3072	McMurry Oil Company	Cabrito 7-30-29-107	Sublette County, WY	Production well with emissions < 3TPY.
CT-3073	McMurry Oil Company	Stud Horse Butte 6-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3075	McMurry Oil Company	Yellow Point 8-12-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3078	McMurry Oil Company	Jonah Federal 8-6-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3085	BP America Production Company	Antelope 3-9	Sublette County, WY	Production well with emissions < 3TPY.
CT-3089	McMurry Oil Company	Stud Horse Butte 6-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3090	McMurry Oil Company	Stud Horse Butte 2-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3091	McMurry Oil Company	Stud Horse Butte 4-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3092	McMurry Oil Company	Stud Horse Butte 10-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3113	McMurry Oil Company	Stud Horse Butte 6-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3114A	Yates Petroleum Corporation	Blue Rim State #1	Sublette County, WY	Reduction, not a PSD major source.
CT-3116	EOG Resources	GRBU 216-12	Lincoln County, WY	Production well with emissions < 3TPY.
CT-3119	McMurry Oil Company	Yellow Point 8-13-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3120	McMurry Oil Company	Stud Horse Butte 14-34-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3123	Shell Rocky Mountain Production Company LLC	Jensen 1A	Sublette County, WY	Production well with emissions < 3TPY.
CT-3124	Shell Rocky Mountain Production Company LLC	Rainbow 7-31	Sublette County, WY	Production well with emissions < 3TPY.
CT-3132	Shell Rocky Mountain Production Company LLC	Mesa 7-27-32-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3134	Shell Rocky Mountain Production Company LLC	Mesa 6-28D-32-109 & Mesa 11-28-32-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3136	BP America Production Company	Stud Horse Butte 09-15	Sublette County, WY	Production well with emissions < 3TPY.
CT-3139	Forest Oil Corporation	Wild Rose 1-26	Sublette County, WY	Production well with emissions < 3TPY.
CT-3139 (Corrected)	Forest Oil Corporation	Wild Rose 1-26	Sublette County, WY	Production well with emissions < 3TPY.
CT-3141	Shell Rocky Mountain Production Company LLC	New Fork 7-3-31-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3141 (Corrected)	Shell Rocky Mountain Production Company LLC	New Fork 7-3-31-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3144	McMurry Oil Company	Stud Horse Butte 11-33X-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3146	Burlington Resources Oil and Gas Co	FEO 1-35 SWD	Fremont County, WY	Production well with emissions < 3TPY.

Table F-3
Excluded Permitted Source Summary

Permit Number	Company	Facility	Location	Comments
CT-3155	McMurry Oil Company	Stud Horse Butte 4-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3156	McMurry Oil Company	Stud Horse Butte 16-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3162	Ultra Resources Incorporated	War Bonnet 6-23	Sublette County, WY	Production well with emissions < 3TPY.
CT-3167	McMurry Oil Company	Jonah Federal 5-4-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3169	Ultra Resources Incorporated	Warbonnet 4-26	Sublette County, WY	Production well with emissions < 3TPY.
CT-3173	Ultra Resources Incorporated	Stud Horse Butte 8-24	Sublette County, WY	Production well with emissions < 3TPY.
CT-3174	Ultra Resources Incorporated	Warbonnet 7-4	Sublette County, WY	Production well with emissions < 3TPY.
CT-3175	Ultra Resources Incorporated	Boulder 5-19	Sublette County, WY	Production well with emissions < 3TPY.
CT-3176	Ultra Resources Incorporated	Stud Horse Butte 2-24	Sublette County, WY	Production well with emissions < 3TPY.
CT-3178	Ultra Resources Incorporated	Warbonnet 5-23	Sublette County, WY	Production well with emissions < 3TPY.
CT-3179	McMurry Oil Company	Stud Horse Butte 1-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3180	McMurry Oil Company	Yellow Point 14-13-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3181	Ultra Resources Incorporated	Warbonnet 4-25	Sublette County, WY	Production well with emissions < 3TPY.
CT-3192	Questar Exploration & Production Company	Mesa Well 7-7 & Mesa 3-7	Sublette County, WY	Production well with emissions < 3TPY.
CT-3192 (Corrected)	Questar Exploration & Production Company	Mesa Well 7-7 & Mesa 3-7	Sublette County, WY	Production well with emissions < 3TPY.
CT-3193	McMurry Oil Company	Yellow Point 10-11-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3194	McMurry Oil Company	Jonah Federal 11-7-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3195	McMurry Oil Company	Stud Horse Butte 12-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3196	Shell Rocky Mountain Production Company LLC	Jensen 10-11D	Sublette County, WY	Increase < 1 TPY.
CT-3197	McMurry Oil Company	Yellow Point 10-14-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3198	McMurry Oil Company	Stud Horse Butte 16-35R-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3200	McMurry Oil Company	Stud Horse Butte 2-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3202	McMurry Oil Company	Yellow Point 11-14-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3203	McMurry Oil Company	Yellow Point 10-13-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3204	McMurry Oil Company	Stud Horse Butte 2-27-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3205	McMurry Oil Company	Stud Horse Butte 6-33-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3213	McMurry Oil Company	Stud Horse Butte 14-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3214	McMurry Oil Company	Stud Horse Butte 2-33-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3215	McMurry Oil Company	Stud Horse Butte 14-27-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3217	McMurry Oil Company	Stud Horse Butte 16-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3218	First Energy Services Company, Inc.	Road Runner Screen Plant with Truss Stacker/Conveyor	Portable County, WY	Increase < 1 TPY.
CT-3219	Questar Exploration & Production Company	Mesa Well 16-16	Sublette County, WY	Production well with emissions < 3TPY.
CT-3220	Wexpro Company	Mesa 9-16 pad	Sublette County, WY	Production well with emissions < 3TPY.
CT-3222	McMurry Oil Company	Cabrito 12-19-29-107	Sublette County, WY	Production well with emissions < 3TPY.
CT-3223	McMurry Oil Company	Cabrito 14-30-29-107	Sublette County, WY	Production well with emissions < 3TPY.
CT-3230	McMurry Oil Company	Stud Horse Butte 7-36A-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3231	Shell Rocky Mountain Production Company LLC	Rainbow 11-31-30-107	Sublette County, WY	Production well with emissions < 3TPY.
CT-3232	Williams Production Company	Riley Ridge 14-33F	Sublette County, WY	Production well with emissions < 3TPY.
CT-3245	Wexpro Company	Mesa 14-16	Sublette County, WY	Production well with emissions < 3TPY.
CT-3246	McMurry Oil Company	Corona-SHB 16-31-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3247	McMurry Oil Company	Stud Horse Butte 5-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3248	McMurry Oil Company	Stud Horse Butte 8-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3249	McMurry Oil Company	Yellow Point 2-1-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3253	Wexpro Company	Mesa 15-16	Sublette County, WY	Production well with emissions < 3TPY.
CT-3254	Questar Exploration & Production Company	Mesa 5-21	Sublette County, WY	Production well with emissions < 3TPY.
CT-3266A	Western Gas Resources	Whiskey Draw/Jack Daniels Compressor Station	Johnson County, WY	No change in emissions.
CT-3267	McMurry Oil Company	Stud Horse Butte 14-33-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3268	Ultra Resources Incorporated	Riverside 4-10	Sublette County, WY	Production well with emissions < 3TPY.
CT-3272	McMurry Oil Company	Stud Horse Butte 12-27-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3276	McMurry Oil Company	Stud Horse Butte 4-27-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3277	McMurry Oil Company	Corona SHB 10-30-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3280	McMurry Oil Company	Stud Horse Butte 16-33-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3283	Questar Exploration & Production Company	Stewart Point 15-17	Sublette County, WY	Production well with emissions < 3TPY.
CT-3284	Shell Rocky Mountain Production Company LLC	Riverside 2-14-31-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3285	Shell Rocky Mountain Production Company LLC	Mesa 13-26-32-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3288	Ultra Resources Incorporated	Mesa 9-34	Sublette County, WY	Production well with emissions < 3TPY.
CT-3296	McMurry Oil Company	Stud Horse Butte 8-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3297	McMurry Oil Company	Corona-Stud Horse Butte 6-30-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3304	Ultra Resources Incorporated	Boulder 7-19	Sublette County, WY	Production well with emissions < 3TPY.

Table F-3
Excluded Permitted Source Summary

Permit Number	Company	Facility	Location	Comments
CT-3315	McMurry Oil Company	Stud Horse Butte 8-27M-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3337	Mountain Gas Resources	Stud Hourse Butte 12-24	Sublette County, WY	Increase <1 TPY.
MD-273A	Red Butte Pipe Line Company	Byron Station	Big Horn County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database.
MD-275A	Red Butte Pipe Line Company	Chatham Station	Washakie County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database.
MD-289A	American Colloid Mineral Company	Lovell Plant	Big Horn County, WY	No change in emissions.
MD-579	Bill Barrett Corporation	Cave Gulch #7	Natrona County, WY	Production well with emissions < 3TPY.
MD-580	Bill Barrett Corporation	Cave Gulch #24	Natrona County, WY	Reduction, not a PSD major source.
MD-610	Intermountain Construction and Materials	CT-1216	Sheridan County, WY	No change, based on review of MD-610.
MD-626	Bill Barrett Corporation	Cave Gulch Gas Conditioning Plant	Natrona County, WY	Increase <1 TPY.
MD-634	ConocoPhillips Company	Sheridan Terminal	Sheridan County, WY	Change only to enforeable HAP limits.
MD-634A	ConocoPhillips Company	Sheridan Terminal	Sheridan County, WY	No change in emissions.
MD-641	Hiland Partners, L.L.C.	Hiland Gas Plant	Washakie County, WY	No change in emissions.
MD-641A	Hiland Partners, L.L.C.	Hiland Gas Plant	Washakie County, WY	No change in emissions.
MD-645	Wyoming Medical Center	Hospital Waste Incinerator	Natrona County, WY	Permitted in 2001 but began operation in 1992. Exclude because assumed in background.
MD-654A	Bitter Creek Pipelines LLC	Piney Creek Central Station	Johnson County, WY	Reduction, not a PSD major source.
MD-670A	Bitter Creek Pipelines LLC	Gladewater Central Station	Sheridan County, WY	Reduction, not a PSD major source.
MD-672	Kinder Morgan	Cyclone Ridge (39 Mile) Compressor Station	Natrona County, WY	No change in emissions.
MD-673	ConocoPhillips Company	Casper Pump Station	Natrona County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database.
MD-680	Tom Brown Incorporated	West Pavillion Compressor Station	Fremont County, WY	Increase <1 TPY.
MD-697	Sinclair Oil Company	Casper Refinery	Natrona County, WY	No change in emissions.
MD-700	Sinclair Oil Company	Casper Station	Natrona County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database.
MD-714	Jonah Gas Gathering Company	Luman Compressor Station	Sublette County, WY	Increase <1 TPY.
MD-762	Defense Technology Corporation	Casper Facilities	Natrona County, WY	Increase <1 TPY.
MD-769	Kinder Morgan, Inc.	Casper Extraction Plant	Natrona County, WY	No change in emissions.
MD-770A	Chevron USA, Inc.	Birch Creek Compressor Station @ Battery A	Sublette County, WY	Reduction, not a PSD major source.
MD-775	Taylor Quarry	Quarry	Sheridan County, WY	Increase < 1 TPY.
MD-795	BP America Production Company	Cabrito 6-31 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
MD-803	Platte Pipe Line Company	Casper Tank farm	Natrona County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database.
MD-836	Shell Rocky Mountain Production Company LLC	Antelope 1-9 & Antelope 2-9	Sheridan County, WY	Production well with emissions < 3TPY.
MD-849	Bentonite Performance Minerals	Lovell Plant	Big Horn County, WY	Reduction, not a PSD major source.
MD-864	Shell Rocky Mountain Production Company LLC	Falcon 8-36	Sublette County, WY	Production well with emissions < 3TPY.
MD-864	Shell Rocky Mountain Production Company LLC	Falcon 1-36	Sublette County, WY	Production well with emissions < 3TPY.
MD-885	Howell Petroleum Corporation	Big Sand Draw Compressor Station	Fremont County, WY	Reduction, not a PSD major source.
1120	Spring Creek Coal	Spring Creek Coal	Big Horn County, MT	Administrative permit changes only
1435	Decker Coal Company	Decker Coal Company	Big Horn County, MT	Administrative permit changes only
3035	Bitter Creek Pipelines, LLC	School House Battery	Big Horn County, MT	Administrative permit changes only
3118	Bitter Creek Pipelines, LLC	CX19 Battery	Big Horn County, MT	Administrative permit changes only
3119	Bitter Creek Pipelines, LLC	Shell 33 Creek Battery	Big Horn County, MT	Administrative permit changes only
3122	Bitter Creek Pipelines, LLC	CX-35 Battery	Big Horn County, MT	Administrative permit changes only
291	P4 Production LLC	P4 Production LLC	Caribou County, ID	Permit pre-2001. Facility operational. No change in emissions after baseline.
292	Kerr-Mcgee Chemical LLC	Kerr-Mcgee Chemical LLC	Caribou County, ID	Permit pre-2001. Facility operational.
293	Nu-West (Agrium)	Nu-West (Agrium)	Caribou County, ID	Permit pre-2001. Facility operational.
2331	Montana Limestone Company	Montana Limestone Company	Carbon County, MT	Administrative permit changes only
2900	Montana Limestone Company	Quarry	Carbon County, MT	Administrative permit changes only
2928	Chemical Lime Company	Chemical Lime Company	Caribou County, ID	Permit pre-2001. Facility operational.
2932	Alexander Company	Alexander Company	Caribou County, ID	Permit pre-2001. Facility operational.
OP2784	NorthWestern Corporation	Dry Creek, Red Lodge (56)	Carbon County, MT	Administrative permit changes only
777247	Smith Paving & Construction	Smith Paving & Construction	Caribou County, ID	Permit pre-2001. Facility operational.

		Facility Name	Location	Reason For Exclusion
2932	Alexander Company	Alexander Company	Caribou County, ID	Permit pre-2001. Facility operational.
2928	Chemical Lime Company	Chemical Lime Company	Caribou County, ID	Permit pre-2001. Facility operational.
292	Kerr-Mcgee Chemical LLC	Kerr-Mcgee Chemical LLC	Caribou County, ID	Permit pre-2001. Facility operational.
293	Nu-West (Agrium)	Nu-West (Agrium)	Caribou County, ID	Permit pre-2001. Facility operational.
291	P4 Production LLC	P4 Production LLC	Caribou County, ID	Permit pre-2001. Facility operational. No change in emissions after baseline.
777247	Smith Paving & Construction	Smith Paving & Construction	Caribou County, ID	Permit pre-2001. Facility operational.

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2	**Permit Number**		**Facility Name**	**Location**	**Reason For Exclusion**
3					
4	3118	Bitter Creek Pipelines, LLC	CX19 Battery	Big Horn County, MT	Pre-baseline source (pre-2001). Administrative permit changes only after baseline date.
5	3122	Bitter Creek Pipelines, LLC	CX-35 Battery	Big Horn County, MT	Pre-baseline source (pre-2001). Administrative permit changes only after baseline date.
6	3035	Bitter Creek Pipelines, LLC	School House Battery	Big Horn County, MT	Pre-baseline source (pre-2001). Administrative permit changes only after baseline date.
7	3119	Bitter Creek Pipelines, LLC	Shell 33 Creek Battery	Big Horn County, MT	Pre-baseline source (pre-2001). Administrative permit changes only after baseline date.
8	1435	Decker Coal Company	Decker Coal Company	Big Horn County, MT	Pre-baseline source (pre-2001). Administrative permit changes only after baseline date.
9	1120	Spring Creek Coal	Spring Creek Coal	Big Horn County, MT	Pre-baseline source (pre-2001). Administrative permit changes only after baseline date.
10	2331	Montana Limestone Company	Montana Limestone Company	Carbon County, MT	Pre-baseline source (pre-2001). Administrative permit changes only after baseline date.
11	2900	Montana Limestone Company	Quarry	Carbon County, MT	Pre-baseline source (pre-2001). Administrative permit changes only after baseline date.
12	OP2784	NorthWestern Corporation	Dry Creek, Red Lodge (56)	Carbon County, MT	Pre-baseline source (pre-2001). Administrative permit changes only after baseline date.

Permit Number	Company	Facility	Location	Comments
CT-1320A	KCS Mountain Resources Incorporated	Manderson Gas Plant / Oil Battery	Washakie County, WY	Reduction, not a PSD major source.
CT-1552A	EOG Resources	B Tank Battery	Sublette County, WY	Production well with emissions < 3TPY.
CT-1942A	Federated Oil and Gas	Wild Horse Creek Compressor Station	Sheridan County, WY	No change in emissions.
CT-1946A	Burlington Resources Oil and Gas Co	Lost Cabin Gas Plant	Fremont County, WY	No change in emissions.
CT-2051A	Bitter Creek Pipelines LLC	Chevron 20 Battery	Sheridan County, WY	Administrative change.
CT-2052A	Bitter Creek Pipelines LLC	Chevron 30 Battery	Sheridan County, WY	Administrative change.
CT-2054A	Bitter Creek Pipelines LLC	Chevron 19 Battery	Sheridan County, WY	Administrative change.
CT-2058A	Tom Brown Incorporated	Frenchie Draw Satellite Station	Fremont County, WY	No longer a permit.
CT-2117	Joe's Concrete & Lumber Incorporated	Portable Concrete Batch Plant & Screening Plant	Sublette County, WY	Increase < 1 TPY.
CT-2150A	Bear Paw Energy Incorporated	Prairie Dog Gathering System - Pod A	Sheridan County, WY	No change in emissions.
CT-2151A	Bear Paw Energy Incorporated	Prairie Dog Gathering System - Pod B	Sheridan County, WY	No change in emissions.
CT-2152A	Bear Paw Energy Incorporated	Prairie Dog Gathering System - Pod C	Sheridan County, WY	No change in emissions.
CT-2153A	Bear Paw Energy Incorporated	Prairie Dog Gathering System - Pod D	Sheridan County, WY	No change in emissions.
CT-2154A	Bear Paw Energy Incorporated	Prairie Dog Gathering System - Pod E	Sheridan County, WY	No change in emissions.
CT-2178A	Bear Paw Energy Incorporated	Prairie Dog Pod K (Formerly Station 28)	Sheridan County, WY	No change in emissions.
CT-2186A	Bear Paw Energy Incorporated	Prairie Dog Pod J (Formerly Station 21)	Sheridan County, WY	Reduction, not a PSD major source.
CT-2189A	CMS Field Services	Kuhn 27 Compressor Station	Johnson County, WY	No change in emissions.
CT-2194A	CMS Field Services	Cottonwood Creek Prospect C Station	Sheridan County, WY	No change in emissions.
CT-2252A	Jonah Gas Gathering Company	Bird Canyon/County Line Compressor Station	Sublette County, WY	Location change.
CT-2289A	Federated Oil and Gas	Box Elder Creek Main Compressor Station	Sheridan County, WY	Reduction, not a PDS major source.
CT-2329A	Bitter Creek Pipelines LLC	Wrench Ranch 49 Battery	Sheridan County, WY	No change in emissions.
CT-2329A2	Bitter Creek Pipelines LLC	Wrench Ranch 49 Battery	Sheridan County, WY	No change in emissions.
CT-2392A	Thunder Creek Gas Services	SC-2956	Sheridan County, WY	No change in emissions.
CT-2413	Mountain Gas Resources	Stud Horse Butte 14-24	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database. Assume no NOx, SO2, or PM10.
CT-2414	Mountain Gas Resources	Stud Horse Butte 10-23A	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database. Assume no NOx, SO2, or PM10.
CT-2425	Mountain Gas Resources	Stud Horse Butte 2-23	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database. Assume no NOx, SO2, or PM10.
CT-2472A	Western Gas Resources	Pumpkin/Bruno	Johnson County, WY	Reduction, not a PSD major source.
CT-2507A	Thunder Creek Gas Services	Juniper Draw Compressor Station	Johnson County, WY	Reduction, not a PSD major source.
CT-2531	Amoco Production Company	Corona 8-19	Sublette County, WY	Production well with emissions < 3TPY.
CT-2532	Amoco Production Company	Cabrito 10-30	Sublette County, WY	Production well with emissions < 3TPY.
CT-2547	Forest Oil Corporation	Elm Federal No. 23-22	Sublette County, WY	Production well with emissions < 3TPY.
CT-2586	Mountain Gas Resources	Stud Horse Butte 10-21	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database. Assume no NOx, SO2, or PM10.
CT-2587	Mountain Gas Resources	Stud Horse Butte 6-24	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database. Assume no NOx, SO2, or PM10.
CT-2588	Mountain Gas Resources	Stud Horse Butte 16-21	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database. Assume no NOx, SO2, or PM10.
CT-2614	Mountain Gas Resources	Stud Horse Butte 14-21	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database. Assume no NOx, SO2, or PM10.
CT-2615	BP America Production Company	Cabrito 6-31 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
CT-2616	Mountain Gas Resources	Stud Horse Butte 2-24	Sublette County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database. Assume no NOx, SO2, or PM10.
CT-2643	Devon Energy Production Company, L.P.	Yellow Point No. 04-01-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2644	CMS Field Services	Meriwether Lewis A Compressor Station	Sheridan County, WY	Permit withdrawn.
CT-2645	CMS Field Services	Meriwether Lewis B Compressor Station	Sheridan County, WY	Permit withdrawn.
CT-2646	CMS Field Services	Meriwether Lewis C Compressor Station	Sheridan County, WY	Permit withdrawn.
CT-2647	CMS Field Services	Meriwether Lewis D Compressor Station	Sheridan County, WY	Permit withdrawn.
CT-2648	CMS Field Services	Meriwether Lewis E Compressor Station	Sheridan County, WY	Permit withdrawn.
CT-2649	CMS Field Services	Meriwether Lewis F Compressor Station	Sheridan County, WY	Permit withdrawn.
CT-2650	CMS Field Services	Meriwether Lewis G Compressor Station	Sheridan County, WY	Permit withdrawn.
CT-2652	Amoco Production Company	Cabrito 6-25	Sublette County, WY	Production well with emissions < 3TPY.
CT-2667	Mountain Gas Resources	War Bonnett 15-23	Sublette County, WY	Increase <1 TPY.
CT-2677A	Devon Energy Production Company, L.P.	Worland Field Compressor Station	Big Horn County, WY	Increase <1 TPY.
CT-2683A	CMS Field Services	Kuhn #2 Compressor Station	Sheridan County, WY	No change in emissions.
CT-2686	Amoco Production Company	Stud Horse Butte 4-20	Sublette County, WY	Production well with emissions < 3TPY.
CT-2687	Amoco Production Company	Corona 11-30 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
CT-2688	Amoco Production Company	Cabrito 13-18 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
CT-2698	Ultra Resources Incorporated	Stud Horse Butte 12-23	Sublette County, WY	Production well with emissions < 3TPY.
CT-2699	Woodrow Barstad	Barstad Pit	Johnson County, WY	Permit Expired.
CT-2702	Devon Energy Production Company, L.P.	Yellow Point No. 14-14-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2719	Ultra Resources Incorporated	Stud Horse Butte 16-21	Sublette County, WY	Production well with emissions < 3TPY.
CT-2720	Ultra Resources Incorporated	Stud Horse Butte 10-21	Sublette County, WY	Production well with emissions < 3TPY.
CT-2721	Ultra Resources Incorporated	Stud Horse Butte 6-24	Sublette County, WY	Production well with emissions < 3TPY.
CT-2773	Bitter Creek Pipelines LLC	Clearmont Central/2949 Battery	Sheridan County, WY	Permit withdrawn.
CT-2774	Bitter Creek Pipelines LLC	3149 Battery	Sheridan County, WY	Permit withdrawn.
CT-2775	Bitter Creek Pipelines LLC	3349 East Battery	Sheridan County, WY	Permit withdrawn.
CT-2776	Bitter Creek Pipelines LLC	3349 West Battery	Sheridan County, WY	Permit withdrawn.
CT-2777	Bitter Creek Pipelines LLC	3449 Battery	Sheridan County, WY	Permit withdrawn.
CT-2803	McMurry Oil Company	Stud Horse Butte No. 8-34-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2807	McMurry Oil Company	Stud Horse Butte 10-33-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2808	McMurry Oil Company	Yellow Point 16-11-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2819	McMurry Oil Company	Jonah Federal 7-6-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2820	McMurry Oil Company	Stud Horse Butte 7-33-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2835	BP America Production Company	Cabrito 03-30 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
CT-2836	BP America Production Company	Cabrito 06-30 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
CT-2866	McMurry Oil Company	Stud Horse Butte 4-35-29-108	Sublette County, WY	Production well with emissions < 3TPY.

Permit Number	Company	Facility	Location	Comments
CT-2867	Forest Oil Corporation	Elm Federal No. 23-12	Sublette County, WY	Production well with emissions < 3TPY.
CT-2874	Rissler and McMurry Company	Eagle Creek Ranch Quarry	Natrona County, WY	Increase < 1 TPY.
CT-2880	McMurry Oil Company	Yellow Point 8-2-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2881	McMurry Oil Company	Jonah Federal 2-7-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2882	McMurry Oil Company	Stud Horse Butte 10-35-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2887	McMurry Oil Company	Stud Horse Butte 12-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2888	McMurry Oil Company	Cabrito 12-25-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2889	McMurry Oil Company	Jonah Federal 1-7X-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2890	McMurry Oil Company	Yellow Point No. 10-12-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2891	McMurry Oil Company	Jonah Federal 6-5-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2897	Chevron USA, Inc.	Waltman # 57	Natrona County, WY	Production well with emissions < 3TPY.
CT-2900	Tom Brown Incorporated	West Cave Gulch 4-36	Natrona County, WY	Increase <1 TPY.
CT-2901	Wexpro Company	Mesa Well 11-16	Sublette County, WY	Production well with emissions < 3TPY.
CT-2902	McMurry Oil Company	Jonah Federal 8-7-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2903	McMurry Oil Company	Yellow Point No. 12-12-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2904	McMurry Oil Company	Stud Horse Butte 12-34-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2905	McMurry Oil Company	Stud Horse Butte 9-19-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2906	McMurry Oil Company	Stud Horse Butte 10-34-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2907	McMurry Oil Company	Jonah Federal No. 4-7-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2908	McMurry Oil Company	Stud Horse Butte 13-20-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2909	McMurry Oil Company	Stud Horse Butte 13-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2910	McMurry Oil Company	Stud Horse Butte 6-34-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2911	McMurry Oil Company	Jonah Federal 4-18-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2912	McMurry Oil Company	Jonah Federal 4-4-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2913	McMurry Oil Company	Jonah Federal 6-7-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2914	McMurry Oil Company	Jonah Federal 12-7-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2915	McMurry Oil Company	Stud Horse Butte No. 4-34-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2928	Amoco Production Company	Corona 02-11	Sublette County, WY	Production well with emissions < 3TPY.
CT-2929	McMurry Oil Company	Stud Horse Butte 5-36-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2937	McMurry Oil Company	Jonah Federal 1-6X-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2938	McMurry Oil Company	Cabrito 14-25-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2939	McMurry Oil Company	Stud Horse Butte 1-36-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2941	BP America Production Company	Cabrito 16-30	Sublette County, WY	Production well with emissions < 3TPY.
CT-2942	BP America Production Company	Cabrito 11-18	Sublette County, WY	Production well with emissions < 3TPY.
CT-2943	Amoco Production Company	Stud Horse Butte 10-22	Sublette County, WY	Production well with emissions < 3TPY.
CT-2944	McMurry Oil Company	Jonah Federal 1-5x-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2945	McMurry Oil Company	Yellow Point 4-12-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2948	McMurry Oil Company	Stud Horse Butte 8-35-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2949	McMurry Oil Company	Stud Horse Butte 14-35-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2950	McMurry Oil Company	Stud Horse Butte 8-36-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2951	McMurry Oil Company	Stud Horse Butte 14-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2952	McMurry Oil Company	Yellow Point 6-12-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-2953	McMurry Oil Company	Stud Horse Butte 2-34-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2954A	Comet Energy, LLC	Lawrence 28 Compressor Station	Johnson County, WY	Reduction, not a PSD major source.
CT-2956	McMurry Oil Company	Jonah Federal 5-8-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2957	McMurry Oil Company	Jonah Federal 3-8x-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2958	McMurry Oil Company	Stud Horse Butte 2-35-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2959	McMurry Oil Company	Jonah Federal 7-5-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2960	McMurry Oil Company	Stud Horse Butte 4-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2961	McMurry Oil Company	Stud Horse Butte 2-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-2962	Amoco Production Company	Stud Horse Butte 16-22	Sublette County, WY	Production well with emissions < 3TPY.
CT-2963	Amoco Production Company	Stud Horse Butte 16-15	Sublette County, WY	Production well with emissions < 3TPY.
CT-2964	Amoco Production Company	Stud Horse Butte 16-14 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
CT-2965	Amoco Production Company	Corona 02-19 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
CT-2980	Shell Rocky Mountain Production Company LLC	Antelope #11-4	Sublette County, WY	Production well with emissions < 3TPY.
CT-2981	BP America Production Company	Cabrito 15-13	Sublette County, WY	Production well with emissions < 3TPY.
CT-2990	EOG Resources	GRBU 301-7d	Sublette County, WY	Production well with emissions < 3TPY.
CT-2997	Chevron USA, Inc.	Birch Creek 186	Sublette County, WY	Production well with emissions < 3TPY.
CT-2997	Chevron USA, Inc.	Birch Creek 134	Sublette County, WY	Production well with emissions < 3TPY.
CT-3000	Amoco Production Company	Stud Horse Butte 06-22	Sublette County, WY	Production well with emissions < 3TPY.
CT-3004	Amoco Production Company	Stud Horse Butte 04-22	Sublette County, WY	Production well with emissions < 3TPY.
CT-3016	McMurry Oil Company	Stud Horse Butte 1-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3017	McMurry Oil Company	Stud Horse Butte 11-22-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3019	McMurry Oil Company	Yellow Point 2-12-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3022	McMurry Oil Company	Jonah Federal 6-6-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3025	McMurry Oil Company	Stud Horse Butte 15-19-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3026	McMurry Oil Company	Jonah Federal 4-6-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3035	El Paso Field Services	Fee 1-8	Fremont County, WY	Production well with emissions < 3TPY.
CT-3044	McMurry Oil Company	Stud Horse Butte 3-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3046	Ultra Resources Incorporated	Riverside 2-2	Sublette County, WY	Production well with emissions < 3TPY.
CT-3050	McMurry Oil Company	Stud Horse Butte 7-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.

Permit Number	Company	Facility	Location	Comments
CT-3051	McMurry Oil Company	Stud Horse Butte 9-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3052	McMurry Oil Company	Yellow Point 12-13-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3053	McMurry Oil Company	Stud Horse Butte 10-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3055	Anschutz Exploration Corporation	Mesa 9-21D	Sublette County, WY	Production well with emissions < 3TPY.
CT-3056	Anschutz Exploration Corporation	Mesa 6-27D CPF	Sublette County, WY	Production well with emissions < 3TPY.
CT-3057	McMurry Oil Company	Stud Horse Butte 3-36-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3061	Yates Petroleum Corporation	Highway Federal 4-Y Production Facility	Sublette County, WY	Production well with emissions < 3TPY.
CT-3063	BP America Production Company	Cabrito 4-19	Sublette County, WY	Production well with emissions < 3TPY.
CT-3064	Ultra Resources Incorporated	Riverside 1-4	Sublette County, WY	Production well with emissions < 3TPY.
CT-3071	McMurry Oil Company	Stud Horse Butte 8-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3072	McMurry Oil Company	Cabrito 7-30-29-107	Sublette County, WY	Production well with emissions < 3TPY.
CT-3073	McMurry Oil Company	Stud Horse Butte 6-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3075	McMurry Oil Company	Yellow Point 8-12-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3078	McMurry Oil Company	Jonah Federal 8-6-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3085	BP America Production Company	Antelope 3-9	Sublette County, WY	Production well with emissions < 3TPY.
CT-3089	McMurry Oil Company	Stud Horse Butte 6-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3090	McMurry Oil Company	Stud Horse Butte 2-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3091	McMurry Oil Company	Stud Horse Butte 4-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3092	McMurry Oil Company	Stud Horse Butte 10-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3113	McMurry Oil Company	Stud Horse Butte 6-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3114A	Yates Petroleum Corporation	Blue Rim State #1	Sublette County, WY	Reduction, not a PSD major source.
CT-3116	EOG Resources	GRBU 216-12	Lincoln County, WY	Production well with emissions < 3TPY.
CT-3119	McMurry Oil Company	Yellow Point 8-13-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3120	McMurry Oil Company	Stud Horse Butte 14-34-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3123	Shell Rocky Mountain Production Company LLC	Jensen 1A	Sublette County, WY	Production well with emissions < 3TPY.
CT-3124	Shell Rocky Mountain Production Company LLC	Rainbow 7-31	Sublette County, WY	Production well with emissions < 3TPY.
CT-3132	Shell Rocky Mountain Production Company LLC	Mesa 7-27-32-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3134	Shell Rocky Mountain Production Company LLC	Mesa 6-28D-32-109 & Mesa 11-28-32-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3136	BP America Production Company	Stud Horse Butte 09-15	Sublette County, WY	Production well with emissions < 3TPY.
CT-3139	Forest Oil Corporation	Wild Rose 1-26	Sublette County, WY	Production well with emissions < 3TPY.
CT-3139 (Corrected)	Forest Oil Corporation	Wild Rose 1-26	Sublette County, WY	Production well with emissions < 3TPY.
CT-3141	Shell Rocky Mountain Production Company LLC	New Fork 7-3-31-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3141 (Corrected)	Shell Rocky Mountain Production Company LLC	New Fork 7-3-31-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3144	McMurry Oil Company	Stud Horse Butte 11-33X-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3146	Burlington Resources Oil and Gas Co	FEO 1-35 SWD	Fremont County, WY	Production well with emissions < 3TPY.
CT-3155	McMurry Oil Company	Stud Horse Butte 4-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3156	McMurry Oil Company	Stud Horse Butte 16-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3162	Ultra Resources Incorporated	War Bonnet 6-23	Sublette County, WY	Production well with emissions < 3TPY.
CT-3167	McMurry Oil Company	Jonah Federal 5-4-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3169	Ultra Resources Incorporated	Warbonnet 4-26	Sublette County, WY	Production well with emissions < 3TPY.
CT-3173	Ultra Resources Incorporated	Stud Horse Butte 8-24	Sublette County, WY	Production well with emissions < 3TPY.
CT-3174	Ultra Resources Incorporated	Warbonnet 7-4	Sublette County, WY	Production well with emissions < 3TPY.
CT-3175	Ultra Resources Incorporated	Boulder 5-19	Sublette County, WY	Production well with emissions < 3TPY.
CT-3176	Ultra Resources Incorporated	Stud Horse Butte 2-24	Sublette County, WY	Production well with emissions < 3TPY.
CT-3178	Ultra Resources Incorporated	Warbonnet 5-23	Sublette County, WY	Production well with emissions < 3TPY.
CT-3179	McMurry Oil Company	Stud Horse Butte 1-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3180	McMurry Oil Company	Yellow Point 14-13-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3181	Ultra Resources Incorporated	Warbonnet 4-25	Sublette County, WY	Production well with emissions < 3TPY.
CT-3192	Questar Exploration & Production Company	Mesa Well 7-7 & Mesa 3-7	Sublette County, WY	Production well with emissions < 3TPY.
CT-3192 (Corrected)	Questar Exploration & Production Company	Mesa Well 7-7 & Mesa 3-7	Sublette County, WY	Production well with emissions < 3TPY.
CT-3193	McMurry Oil Company	Yellow Point 10-11-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3194	McMurry Oil Company	Jonah Federal 11-7-28-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3195	McMurry Oil Company	Stud Horse Butte 12-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3196	Shell Rocky Mountain Production Company LLC	Jensen 10-11D	Sublette County, WY	Increase < 1 TPY.
CT-3197	McMurry Oil Company	Yellow Point 10-14-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3198	McMurry Oil Company	Stud Horse Butte 16-35R-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3200	McMurry Oil Company	Stud Horse Butte 2-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3202	McMurry Oil Company	Yellow Point 11-14-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3203	McMurry Oil Company	Yellow Point 10-13-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3204	McMurry Oil Company	Stud Horse Butte 2-27-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3205	McMurry Oil Company	Stud Horse Butte 6-33-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3213	McMurry Oil Company	Stud Horse Butte 14-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3214	McMurry Oil Company	Stud Horse Butte 2-33-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3215	McMurry Oil Company	Stud Horse Butte 14-27-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3217	McMurry Oil Company	Stud Horse Butte 16-26-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3218	First Energy Services Company, Inc.	Road Runner Screen Plant with Truss Stacker/Conveyor	Portable County, WY	Increase < 1 TPY.
CT-3219	Questar Exploration & Production Company	Mesa Well 16-16	Sublette County, WY	Production well with emissions < 3TPY.
CT-3220	Wexpro Company	Mesa 9-16 pad	Sublette County, WY	Production well with emissions < 3TPY.
CT-3222	McMurry Oil Company	Cabrito 12-19-29-107	Sublette County, WY	Production well with emissions < 3TPY.
CT-3223	McMurry Oil Company	Cabrito 14-30-29-107	Sublette County, WY	Production well with emissions < 3TPY.
CT-3230	McMurry Oil Company	Stud Horse Butte 7-36A-29-108	Sublette County, WY	Production well with emissions < 3TPY.

Permit Number	Company	Facility	Location	Comments
CT-3231	Shell Rocky Mountain Production Company LLC	Rainbow 11-31-30-107	Sublette County, WY	Production well with emissions < 3TPY.
CT-3232	Williams Production Company	Riley Ridge 14-33F	Sublette County, WY	Production well with emissions < 3TPY.
CT-3245	Wexpro Company	Mesa 14-16	Sublette County, WY	Production well with emissions < 3TPY.
CT-3246	McMurry Oil Company	Corona-SHB 16-31-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3247	McMurry Oil Company	Stud Horse Butte 5-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3248	McMurry Oil Company	Stud Horse Butte 8-29-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3249	McMurry Oil Company	Yellow Point 2-1-28-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3253	Wexpro Company	Mesa 15-16	Sublette County, WY	Production well with emissions < 3TPY.
CT-3254	Questar Exploration & Production Company	Mesa 5-21	Sublette County, WY	Production well with emissions < 3TPY.
CT-3266A	Western Gas Resources	Whiskey Draw/Jack Daniels Compressor Station	Johnson County, WY	No change in emissions.
CT-3267	McMurry Oil Company	Stud Horse Butte 14-33-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3268	Ultra Resources Incorporated	Riverside 4-10	Sublette County, WY	Production well with emissions < 3TPY.
CT-3272	McMurry Oil Company	Stud Horse Butte 12-27-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3276	McMurry Oil Company	Stud Horse Butte 4-27-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3277	McMurry Oil Company	Corona SHB 10-30-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3280	McMurry Oil Company	Stud Horse Butte 16-33-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3283	Questar Exploration & Production Company	Stewart Point 15-17	Sublette County, WY	Production well with emissions < 3TPY.
CT-3284	Shell Rocky Mountain Production Company LLC	Riverside 2-14-31-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3285	Shell Rocky Mountain Production Company LLC	Mesa 13-26-32-109	Sublette County, WY	Production well with emissions < 3TPY.
CT-3288	Ultra Resources Incorporated	Mesa 9-34	Sublette County, WY	Production well with emissions < 3TPY.
CT-3296	McMurry Oil Company	Stud Horse Butte 8-28-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3297	McMurry Oil Company	Corona-Stud Horse Butte 6-30-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3304	Ultra Resources Incorporated	Boulder 7-19	Sublette County, WY	Production well with emissions < 3TPY.
CT-3315	McMurry Oil Company	Stud Horse Butte 8-27M-29-108	Sublette County, WY	Production well with emissions < 3TPY.
CT-3337	Mountain Gas Resources	Stud Hourse Butte 12-24	Sublette County, WY	Increase <1 TPY.
MD-273A	Red Butte Pipe Line Company	Byron Station	Big Horn County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database. Assume no NOx, SO2, or PM10.
MD-275A	Red Butte Pipe Line Company	Chatham Station	Washakie County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database. Assume no NOx, SO2, or PM10.
MD-289A	American Colloid Mineral Company	Lovell Plant	Big Horn County, WY	No change in emissions.
MD-579	Bill Barrett Corporation	Cave Gulch #7	Natrona County, WY	Production well with emissions < 3TPY.
MD-580	Bill Barrett Corporation	Cave Gulch #24	Natrona County, WY	Reduction, not a PSD major source.
MD-610	Intermountain Construction and Materials	CT-1216	Sheridan County, WY	No change, based on review of MD-610.
MD-626	Bill Barrett Corporation	Cave Gulch Gas Conditioning Plant	Natrona County, WY	Increase <1 TPY.
MD-634	ConocoPhillips Company	Sheridan Terminal	Sheridan County, WY	Change only to enforeable HAP limits.
MD-634A	ConocoPhillips Company	Sheridan Terminal	Sheridan County, WY	No change in emissions.
MD-641	Hiland Partners, L.L.C.	Hiland Gas Plant	Washakie County, WY	No change in emissions.
MD-641A	Hiland Partners, L.L.C.	Hiland Gas Plant	Washakie County, WY	No change in emissions.
MD-645	Wyoming Medical Center	Hospital Waste Incinerator	Natrona County, WY	Permitted in 2001 but began operation in 1992. Exclude because assumed in background.
MD-654A	Bitter Creek Pipelines LLC	Piney Creek Central Station	Johnson County, WY	Reduction, not a PSD major source.
MD-670A	Bitter Creek Pipelines LLC	Gladewater Central Station	Sheridan County, WY	Reduction, not a PSD major source.
MD-672	Kinder Morgan	Cyclone Ridge (39 Mile) Compressor Station	Natrona County, WY	No change in emissions.
MD-673	ConocoPhillips Company	Casper Pump Station	Natrona County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database. Assume no NOx, SO2, or PM10.
MD-680	Tom Brown Incorporated	West Pavillion Compressor Station	Fremont County, WY	Increase <1 TPY.
MD-697	Sinclair Oil Company	Casper Refinery	Natrona County, WY	No change in emissions.
MD-700	Sinclair Oil Company	Casper Station	Natrona County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database. Assume no NOx, SO2, or PM10.
MD-714	Jonah Gas Gathering Company	Luman Compressor Station	Sublette County, WY	Increase <1 TPY.
MD-762	Defense Technology Corporation	Casper Facilities	Natrona County, WY	Increase <1 TPY.
MD-769	Kinder Morgan, Inc.	Casper Extraction Plant	Natrona County, WY	No change in emissions.
MD-770A	Chevron USA, Inc.	Birch Creek Compressor Station @ Battery A	Sublette County, WY	Reduction, not a PSD major source.
MD-775	Taylor Quarry	Quarry	Sheridan County, WY	Increase < 1 TPY.
MD-795	BP America Production Company	Cabrito 6-31 Well Site	Sublette County, WY	Production well with emissions < 3TPY.
MD-803	Platte Pipe Line Company	Casper Tank farm	Natrona County, WY	Emissions of pollutants other than NOx, SO2, and PM10 reported in WDEQ database. Assume no NOx, SO2, or PM10.
MD-836	Shell Rocky Mountain Production Company LLC	Antelope 1-9 & Antelope 2-9	Sheridan County, WY	Production well with emissions < 3TPY.
MD-849	Bentonite Performance Minerals	Lovell Plant	Big Horn County, WY	Reduction, not a PSD major source.
MD-864	Shell Rocky Mountain Production Company LLC	Falcon 8-36	Sublette County, WY	Production well with emissions < 3TPY.
MD-864	Shell Rocky Mountain Production Company LLC	Falcon 1-36	Sublette County, WY	Production well with emissions < 3TPY.
MD-885	Howell Petroleum Corporation	Big Sand Draw Compressor Station	Fremont County, WY	Reduction, not a PSD major source.

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														NOx	SOx	PM10	PM2.5	
Bridger-Teton National Forest																		
Cliff Creek - MA 22	Include.	30-Jul-87	10	oil or gas		0	10	0.045	0.45									0.4
Cottonwood Creek - MA 25	Include.	30-Jul-87	10	gas with oil or condensate		0	10	0.045	0.45									0.4
Horse Creek - MA 24	Include.	30-Jul-87	10	gas with oil or condensate		0	10	0.045	0.45									0.4
LaBarge Creek - MA 12	Include.	30-Jul-87	10	oil or gas		0	10	0.045	0.45									0.4
Little Greys River - MA 31	Include.	30-Jul-87	10	gas with oil or condensate		0	10	0.045	0.45									0.4
Lower Greys River - MA32	Include.	30-Jul-87	10	gas with oil or condensate		0	10	0.045	0.45									0.4
Piney Creeks - 26	Include.	30-Jul-87	10	gas with oil or condensate		0	10	0.045	0.45									0.4
Upper Hoback - MA 23	Include.	30-Jul-87	10	gas with oil or condensate		0	10	0.045	0.45									0.4
Willow Creek - MA 49	Include.	30-Jul-87	10	gas with oil or condensate		0	10	0.045	0.45									0.4
Buffalo Field Office																		
Drainage POD-Torch E&P Corp.	Included as part of PRB.																	
Other POD projects - many listed	Included as part of PRB.																	
Powder River Basin	Include.	Jan-02	39,367	CBM	862,700	3355	36,012	0.045	1,633.19	22,247	840,453	12,173.23						13,806.
Burnt Hollow Management Plan EA	Exclude - RMP Revision.																	
Casper Field Office																		
Cave Gulch	Include.	Feb-97	160	natural gas	15,000	78	82	0.045	3.72	Proponent Reports that no additional compression will be required								3.7
Cooper Reservoir (1998)	Include.	May-98	85	natural gas	5,000	40	45	0.045	2.04	4,978	22	27						28.
Cody Field Office																		
See Worland Office.																		
Kemmerer Field Office																		
Cutthrouat Gas Processing Plant	Exclude - Outside of Study Area	Jul-93																
Eighth Granger Gas Plant Expansion	Exclude - Outside of Study Area	Apr-86											85 hp Ford LSG875 engine	1.6				1.6
Ham's Fork Pipeline	Exclude - Outside of Study Area	Apr-86			2,100					0	2,100	20.28						20.
Hicky-Mountain-Table Mountain	Exclude - Outside of Study Area	May-87	56	oil		9	47	0.30	14.10									14.
Horse Trap	Exclude - Outside of Study Area		24	natural gas	1,200	1	23	0.045	1	0	1,200	20.90						21.
Moxa Arch	Exclude - Outside of Study Area	May-96	1,325	natural gas	28,000	243	1,325	0.045	60.09	11,142	28,000	270.37						330.
Pioneer Gas Plant	Exclude - Outside of Study Area												Gas Plant	19.60		0.03		19.6
Riley Ridge[3]	Include	May-83	238	natural gas		223	15	0.045	0.68	2,579	none proposed							0.
Road Hollow	Exclude - Outside of Study Area	Mar-83											Gas Processing Plant	167.8	109.6	3.18		167.

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														NOx	SOx	PM10	PM2.5	
Lander Field Office																		
Wind River (BIA lead agency)	Exclude - Analyzed Separately	In Progress	325	natural gas	18,175	0	325		199.57	0	18,175	633.438	Heater and Dehy	3.176		0.236	0.236	836.
Newcastle Field Office																		
No projects or project areas within FO district.																		
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.		300	oil and gas wells		248	52	0.045	2.36	30,267								2.
Compresor Station, Pipeline- Williams	Include.				1,000					0	1,000	19.1						19.
Pinedale Anticline Project	Include.	Nov-99	700	natural gas	26,000	347	353	0.045	15.99	52,361								15.
Soda Unit	Include.	Jun-88	13	natural gas		1	12	0.045	0.54									0.
South Piney- Infinity & Williams[2]	Include.	In Progress	210	natural gas	20,000	0	210		280.45	0	20,000	160.775	Central Processing Facility and fire tubes	295.45	0.57	47.092	47.092	736.
Burley	Include	Feb-94	32	oil		15	17	0.30	5									5.
Jonah Infill EIS	Include	In Progress	3,100	natural gas		0	3,100	0.05	140									140.
Castle Creek	Exclude - Not given by FO as project area to include in RFD analysis.																	
Merna Pipeline	Exclude - developed.																	
Jonah II EIS	Exclude - developed.	Feb-98																
Fogarty Creek Unit 2524 Pipeline Production Facilities- Exxon	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.																	

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														NOx	SOx	PM10	PM2.5	
Rawlins Field Office																		
Continental Divide/Wamsutter II EIS	Exclude - Outside of Wind River Study Area	Apr-99	3,000	natural gas	90,000	722	2278	0.045	103.31	67,788	22,212	643		0	0	0	0	746.6
Creston-Blue Gap	Exclude - Outside of Wind River Study Area	1994	330	natural gas		231	99	0.045	4.49	1,954	None Proposed in EIS							4.4
Desolation Flats	Exclude - Outside of Wind River Study Area	Apr-03	385	natural gas	32,000	0	385	0.045	17.46	0	32,000	309						326.4
Mulligan Draw	Exclude - Outside of Wind River Study Area		45	natural gas		22	23	0.045	1.043									1.0
Sierra Madre	Exclude - Outside of Wind River Study Area	1987	46	oil		23	23	0.3	6.90									6.9
South Baggs	Exclude - Outside of Wind River Study Area	Apr-00	90	natural gas	3,000	3	87	0.045	3.95	0	3,000	57.9						61.8
Atlantic Rim EIS	Exclude - no emissions quantified.	In Progress																
Seminoe Road	Exclude - no emissions quantified.	In Progress																
Dripping Rock/Cedar Breaks	Exclude - John Spehar Rawlins FO.																	
Hay Reservoir	Exclude - developed.																	

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														NOx	SOx	PM10	PM2.5	
Rock Springs Field Office																		
Bird Canyon	Included in Bird Opal Loop Pipeline.																	
BTA Bravo	Exclude - Outside of Wind River Study Area	May-95	10	natural gas	1,200	6	4	0.045	0.18		1,200	25	Processing equipment	25				50.
Burlington Little Monument	Exclude - Outside of Wind River Study Area		31	natural gas	2,000	0	31	0.045	1.41	0	2,000	13.52						14.
Copper Ridge Shallow Gas Proj.	Exclude - Outside of Wind River Study Area	In Progress	89	shallow gas wells	4,800	0	89		104.30	1,206	3,594	157						261.
Fontenelle Natural Gas Infill Drilling	Include.	May-96	1,317	natural gas		176	1,141	0.045	51.75	19,040	268.35	3.11						54.
Jack Morrow Hills	Include.	Jan-03	110		3,480	0	110	0.045	4.99	3,480	3,480	40.32						45.
Lower Bush Creek CBM (Kennedy Oil)	Exclude - Outside of Wind River Study Area	Aug-03	20	exploratory CBM wells		10	10	0.045	0.45									0.4
Stage Coach	Exclude - Outside of Wind River Study Area	Mar-95	72	natural gas	6,000	22	50	0.045	2.27	1,375	4,625	89.32						91.
Vermillion Basin	Exclude - Outside of Wind River Study Area	Aug-00	56	natural gas		8	48	0.045	2.18	745	none proposed							2.
Bitter Creek Shallow Gas Development Project	Exclude- no emissions quantified.	In Progress	61	natural gas														
Pacific Rim Shallow Gas Project	Exclude- no emissions quantified.	In Progress	120	natural gas														
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.	Feb-99			12,000					23,673								
Opal-Loop Pipeline	Exclude - developed.																	
Worland Field Office																		
No projects or project areas within FO district.																		

[1] Projects for which well emission rates were greater than recent Jonah Field well stack test data utilized the Jonah. For projects in progress, well emission rates provided by air quality contractors were used regardless of magnitude. Jonah Field tested natural gas/CBM well emissions - 0.045 tpy of NOx per producting gas well. Oil well emissions - 0.3 TPY NOx per producing oil well, obtained from Denise Kohtala, WDEQ-AQD 2003.

[2] Emissions from South Piney taken from Emissions Inventory, Table 2.6 pg 14.

[3] Four sour gas plants proposed as part of original proposed action in 1983. As the field is nearly developed and these ancillary facilities have not yet been constructed, it is assumed they will not be developed and therefore were excluded from the inventory.

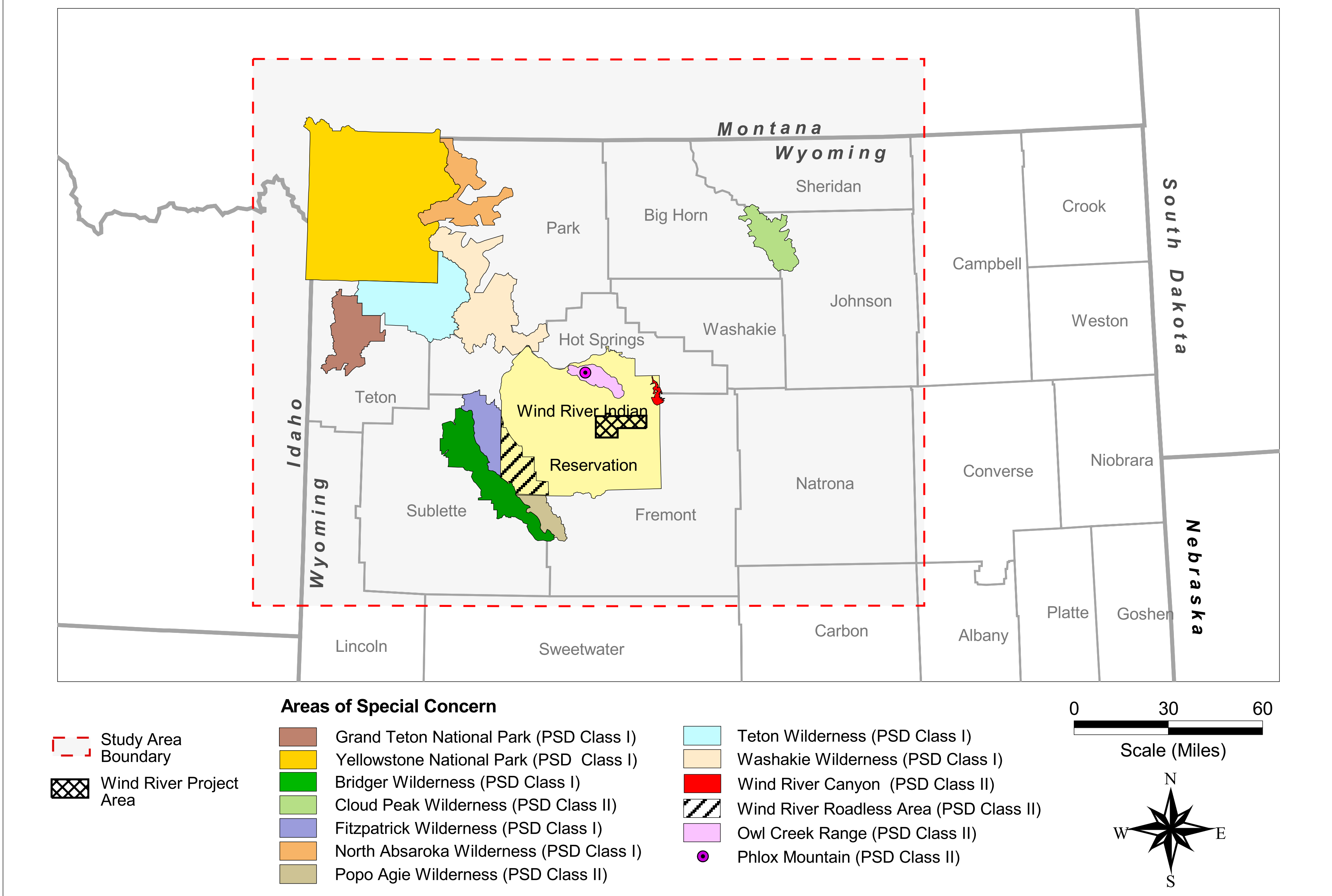

Figure 1-1. Wind River Project Area and Study Domain Boundaries.

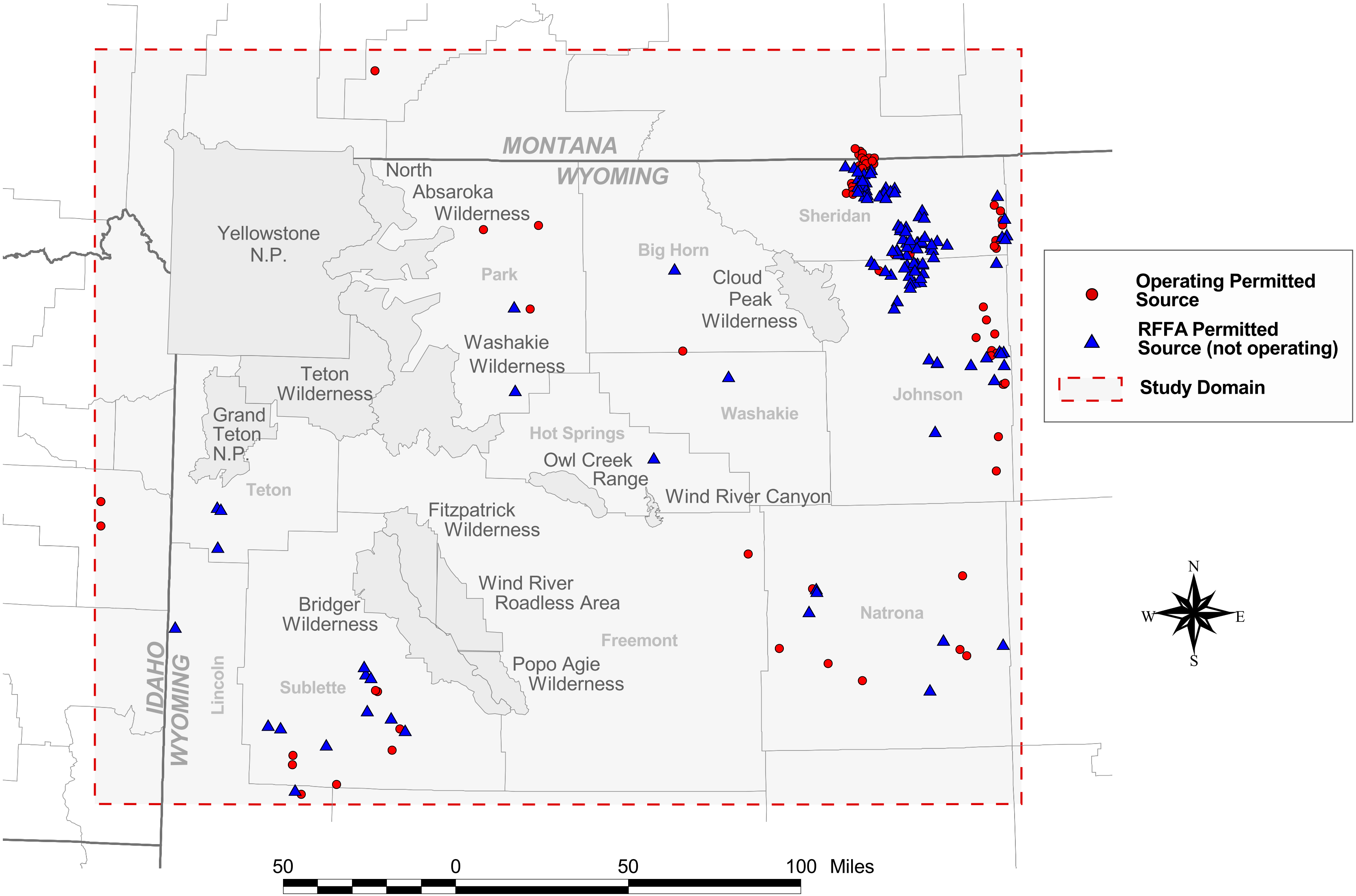

Figure 3-1. Permitted Source Locations.

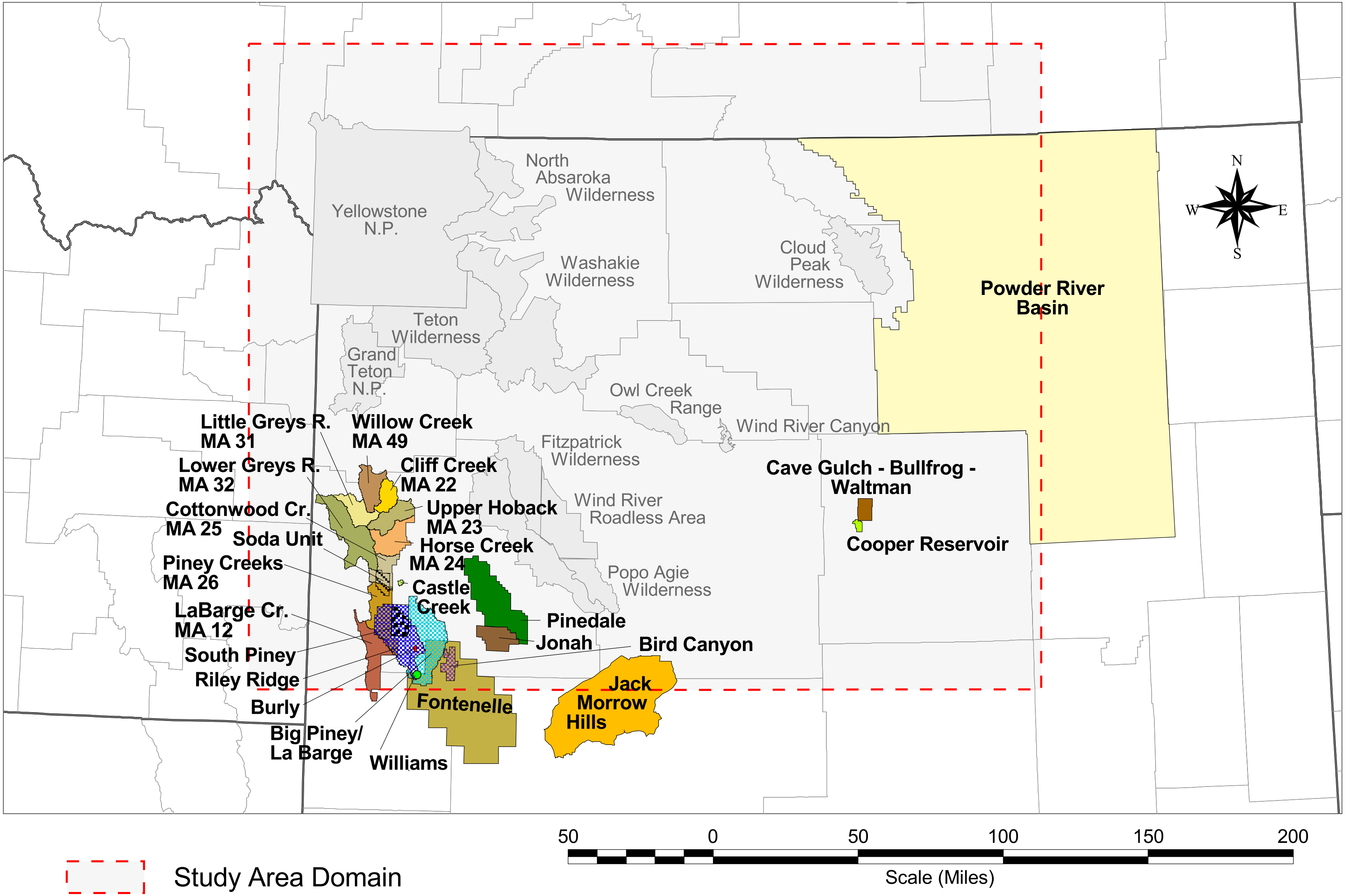

Figure 5-1. Reasonably Foreseeable Development Projects.