

**Table D.1.1
Jonah Infill Drilling Project
Early Project Development Stage Modeling Emissions
(Tons Per Year)**

	Early Project Development Stage Cases	
	Direct Project	Non-Project Regional Emissions
<u>Production Emissions</u>		
Wells¹		
NO _x	31.7	--
SO ₂	0.0	--
PM ₁₀	6.1	--
PM _{2.5}	6.1	--
Traffic²		
NO _x	5.9	--
SO ₂	0.2	--
PM ₁₀	160.1	--
PM _{2.5}	24.3	--
Compression³		
NO _x	503.4	189.0
SO ₂	0.0	0.0
PM ₁₀	0.0	0.0
PM _{2.5}	0.0	0.0
<u>Construction Emissions</u>		
Well Drilling⁴		
NO _x	1,728.9	6,105.0
SO ₂	116.1	365.0
PM ₁₀	415.7	509.6
PM _{2.5}	415.7	509.6
Traffic⁵		
NO _x	9.6	--
SO ₂	0.3	--
PM ₁₀	160.4	--
PM _{2.5}	24.6	--
Flaring⁶		
NO _x	45.2	332.0
SO ₂	0.0	0.0
PM ₁₀	0.0	21.9
PM _{2.5}	0.0	21.9
<u>Other Inventory Emissions</u>		
MSI⁷		
NO _x	--	4,059.7
SO ₂	--	(48.0)
PM ₁₀	--	700.8
PM _{2.5}	--	605.3
RFFA⁸		
NO _x	--	810.7
SO ₂	--	(1,347.1)
PM ₁₀	--	(1,196.6)
PM _{2.5}	--	(500.4)
RFD⁹		
NO _x	--	3,166.5
SO ₂	--	56.1
PM ₁₀	--	84.0
PM _{2.5}	--	81.9
Total		
NO _x	2,324.7	14,662.8
SO ₂	116.5	(973.9)
PM ₁₀	742.3	119.7
PM _{2.5}	470.7	718.2
¹ Includes emissions from indirect heater, separator heater, and dehydrator heater (scaled from DEIS). ² Includes emissions from all traffic associated with full field production(scaled from DEIS). ³ Includes compression estimates from DEIS and expanded compression estimates post DEIS. ⁴ Includes emissions from drilling rigs operating continuously during the year. 80% Tier 0/20% Tier 1 - Emissions breakdowns can be found in the following tables. ⁵ Includes emissions from all traffic for well construction from DEIS scaled by a factor of 14.25/20 to account for the difference between 2006 and 2002 construction estimates. ⁶ Includes emissions from flares operating continuously throughout the year. Emissions breakdowns can be found in the following tables. ⁷ Includes sources from DEIS as well as post DEIS up to 3-31-04. ⁸ Includes sources from DEIS as well as post DEIS up to 3-31-04. ⁹ Includes sources from DEIS.		

Table D.1.2
Jonah Field - Drilling Emissions - AP-42 - Straight Drilling

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Jonah Infill Drilling Project Scenario: Straight Drilling Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA AP-42 Date: 6/30/2005				
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.00668	2,100	0.42	19	24	2,702.63	5.93	25.96
NOx	0.031	2,100	0.42	19	24	12,542.17	27.50	120.47
SO ₂	0.00205	2,100	0.42	19	24	829.40	1.82	7.97
VOC	0.0025	2,100	0.42	19	24	1,011.47	2.22	9.72
PM ₁₀ ⁴	0.0022	2,100	0.42	19	24	890.09	1.95	8.55
¹ AP-42 (EPA, 1996), Section 3.3, Gasoline and Diesel Industrial Engines. Table 3.3-1, "Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines." ² Drilling engine horsepower based on three engines, two at 800hp and one at 500hp. ³ The overall load factor is calculated based on average throttle setting of 65% and a load factor of 65%. Therefore, the overall load factor = 0.65 * 0.65 = 0.42. ⁴ PM _{2.5} assumed equivalent to PM ₁₀ for drilling engines.								

Table D.1.3
Jonah Field - Drilling Emissions Tier 1 - Straight Drilling

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Jonah Infill Drilling Project Scenario: Straight Drilling Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA Tier 1 Date: 6/30/2005				
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions Per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.0187	2,100	0.42	19	24	7,581.69	16.63	72.82
NOx	0.015	2,100	0.42	19	24	6,154.55	13.50	59.12
SO ₂ ⁴	0.00035	2,100	0.42	19	24	139.77	0.31	1.34
VOC	0.0022	2,100	0.42	19	24	891.96	1.96	8.57
PM ₁₀ ⁵	0.00088	2,100	0.42	19	24	356.79	0.78	3.43
¹ Emission factor for Tier 1 engine taken from Diesel Net, Emissions Standards: USA: Nonroad Diesel Engines, Table 1, "EPA Tier 1-3 Nonroad Diesel Engine Emission Standards, g/kWh (g/bhp-hr)." Available on-line at http://www.dieselnets.com/standards/us/offroad.html . ² Drilling engine horsepower based on three engines, two at 800hp and one at 500hp. ³ The overall load factor is calculated based on average throttle setting of 65% and a load factor of 65%. Therefore, the overall load factor = 0.65 * 0.65 = 0.42. ⁴ The SO ₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets. ⁵ PM2.5 assumed equivalent to PM10 for drilling engines.								

Table D.1.4
Jonah Field - Drilling Emissions Tier 2 - Straight Drilling

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317			Project: Jonah Infill Drilling Project Scenario: Straight Drilling Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA Tier 2 Date: 6/30/2005					
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.0057	2,100	0.42	19	24	2,319.11	5.09	22.28
NO _x	0.0090	2,100	0.42	19	24	3,657.05	8.02	35.13
SO ₂ ⁴	0.00035	2,100	0.42	19	24	139.77	0.31	1.34
VOC	0.0004	2,100	0.42	19	24	148.87	0.33	1.43
PM ₁₀ ⁵	0.00033	2,100	0.42	19	24	133.79	0.29	1.29
¹ Emission factor for Tier 2 engine taken from Diesel Net, Emissions Standards: USA: Nonroad Diesel Engines, Table 1, "EPA Tier 1-3 Nonroad Diesel Engine Emission Standards, g/kWh (g/bhp-hr)." Available on-line at http://www.dieselnet.com/standards/us/offroad.html . NO _x and HC Emission Factors estimated based on Tables 3 and 5 of "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-- Compression-Ignition," NR-009c, EPA, April 2004. ² Drilling engine horsepower based on three engines, two at 800hp and one at 500hp. ³ The overall load factor is calculated based on average throttle setting of 65% and a load factor of 65%. Therefore, the overall load factor = 0.65 * 0.65 = 0.42. ⁴ The SO ₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets. ⁵ PM _{2.5} assumed equivalent to PM ₁₀ for drilling engines.								

Table D.1.5
Jonah Field - Drilling Emissions AP-42 - Directional Drilling

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Jonah Infill Drilling Project Scenario: Directional Drilling Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA AP-42 Date: 6/30/2005				
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions Per Well	Emissions Per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.00668	2,600	0.42	23	24	4,050.56	7.34	32.14
NO _x	0.031	2,600	0.42	23	24	18,797.53	34.05	149.15
SO ₂	0.00205	2,600	0.42	23	24	1,243.06	2.25	9.86
VOC	0.0025	2,600	0.42	23	24	1,515.93	2.75	12.03
PM ₁₀ ⁴	0.0022	2,600	0.42	23	24	1,334.02	2.42	10.59
¹ AP-42 (EPA, 1996), Section 3.3, Gasoline and Diesel Industrial Engines. Table 3.3-1, "Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines." ² Drilling engine horsepower based on three engines, two at 800hp and one at 500hp. ³ The overall load factor is calculated based on average throttle setting of 65% and a load factor of 65%. Therefore, the overall load factor = 0.65 * 0.65 = 0.42. ⁴ PM _{2.5} assumed equivalent to PM ₁₀ for drilling engines.								

Table D.1.6
Jonah Field - Drilling Emissions Tier 1 - Directional Drilling

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Jonah Infill Drilling Project Scenario: Directional Drilling Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA Tier 1 Date: 6/30/2005				
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.0187	2,600	0.42	23	24	11,363.04	20.59	90.16
NOx	0.015	2,600	0.42	23	24	9,224.12	16.71	73.19
SO ₂ ⁴	0.00035	2,600	0.42	23	24	209.48	0.38	1.66
VOC	0.0022	2,600	0.42	23	24	1,336.83	2.42	10.61
PM ₁₀ ⁵	0.00088	2,600	0.42	23	24	534.73	0.97	4.24
¹ Emission factor for Tier 1 engine taken from Diesel Net, Emissions Standards: USA: Nonroad Diesel Engines, Table 1, "EPA Tier 1-3 Nonroad Diesel Engine Emission Standards, g/kWh (g/bhp-hr)." Available on-line at http://www.dieselnet.com/standards/us/offroad.html . ² Drilling engine horsepower based on four engines, two at 800hp and two at 500hp. ³ The overall load factor is calculated based on average throttle setting of 65% and a load factor of 65%. Therefore, the overall load factor = 0.65 * 0.65 = 0.42. ⁴ The SO ₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets. ⁵ PM2.5 assumed equivalent to PM10 for drilling engines.								

Table D.1.7
Jonah Field - Drilling Emissions Tier 2 - Directional Drilling

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Jonah Infill Drilling Project Scenario: Directional Drilling Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA Tier 2 Date: 6/30/2005				
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.0057	2,600	0.42	23	24	3,475.75	6.30	27.58
NO _x	0.0090	2,600	0.42	23	24	5,481.00	9.93	43.49
SO ₂ ⁴	0.00035	2,600	0.42	23	24	209.48	0.38	1.66
VOC	0.0004	2,600	0.42	23	24	223.12	0.40	1.77
PM ₁₀ ⁵	0.00033	2,600	0.42	23	24	200.52	0.36	1.59
<p>¹ Emission factor for Tier 2 engine taken from Diesel Net, Emissions Standards: USA: Nonroad Diesel Engines, Table 1, "EPA Tier 1-3 Nonroad Diesel Engine Emission Standards, g/kWh (g/bhp-hr)." Available on-line at http://www.dieselnet.com/standards/us/offroad.html. NO_x and HC Emission Factors estimated based on Tables 3 and 5 of "Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling-- Compression-Ignition," NR-009c, EPA, April 2004.</p> <p>² Drilling engine horsepower based on four engines, two at 800hp and two at 500hp.</p> <p>³ The overall load factor is calculated based on average throttle setting of 65% and a load factor of 65%. Therefore, the overall load factor = 0.65 * 0.65 = 0.42.</p> <p>⁴ The SO₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets.</p> <p>⁵ PM2.5 assumed equivalent to PM10 for drilling engines.</p>								

Table D.1.8
Jonah Field - Completion Flaring Emissions

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317			Project: Jonah Infill Drilling Project Scenario: All Scenarios Activity: Completion/Testing Flaring Emissions: Gas Flaring without High Pressure Flowback Separator Units Date: 6/30/2005						
Flaring Specifications:									
Total Volume of Gas Emitted	35000	mcf							
Total Volume of Condensate Emitted	250	bbls							
Average Heat Content	1092.9	BTU/scf							
Flaring/Flowback Activity Duration	120	hrs/well							
Flaring Duration	80	hr/well							
Pre-ignition Flow-back Duration	40	hr/well							
Pre-ignition Flow-back Time Involving a Gas Stream	10	%							
Actual Hours Gas is Vented	4	hrs							
Total Hours in which Gas is Vented or Flared ¹	84	hrs							
Average Flowrate of Gas ²	416.67	mcf/hr							
Total Volume of Gas Vented ³	1,666.67	mcf							
Total Volume of Flared Gas ⁴	33,333.33	mcf							
Average Flowrate of Condensate	2.98	bbls/hr							
Pre-flare Volume of Condensate	11.90	bbls							
Volume of Condensate Flared	238.10	bbls							
Activity	Volume	Volume Units	Pollutant	Emission Factor	Emission Factor Units	Emission Factor Source ⁶	Total Emissions (tons)	Duration (hours)	Hourly Emissions (lb/hr)
Venting - Natural Gas ⁵	1,666.67	mcf	VOC	4.70	lb / 1000 scf	Gas Constituent Analysis	3.91	4	1,956.87
			HAP (total)	0.17	lb / 1000 scf	Gas Constituent Analysis	0.14	4	71.37
			n-Hexane	0.08	lb / 1000 scf	Gas Constituent Analysis	0.070	4	35.13
			Benzene	0.026	lb / 1000 scf	Gas Constituent Analysis	0.022	4	10.75
			Toluene	0.041	lb / 1000 scf	Gas Constituent Analysis	0.034	4	17.02
			Ethylbenzene	0.0019	lb / 1000 scf	Gas Constituent Analysis	0.0016	4	0.80
			Xylenes	0.018	lb / 1000 scf	Gas Constituent Analysis	0.015	4	7.67
Flaring - Natural Gas	33,333.33	mcf	NOx	0.068	lb / 10 ⁶ BTU	AP-42 Section 13.5	1.24	80	30.97
			CO	0.37	lb / 10 ⁶ BTU	AP-42 Section 13.5	6.74	80	168.49
			VOC	2.35	lb / 1000 scf	Gas Constituent Analysis	39.14	80	978.43
			HAP (total)	0.09	lb / 1000 scf	Gas Constituent Analysis	1.43	80	35.69
			n-Hexane	0.042	lb / 1000 scf	Gas Constituent Analysis	0.70	80	17.57
			Benzene	0.013	lb / 1000 scf	Gas Constituent Analysis	0.22	80	5.38
			Toluene	0.020	lb / 1000 scf	Gas Constituent Analysis	0.34	80	8.51
			Ethylbenzene	0.001	lb / 1000 scf	Gas Constituent Analysis	0.016	80	0.40
			Xylenes	0.009	lb / 1000 scf	Gas Constituent Analysis	0.15	80	3.83
			Flaring - Condensate	238.10	bbls	VOC	121.98	lb/bbl	ndensate Constituent Analy
HAP (total)	25.85	lb/bbl				ndensate Constituent Analy	3.08	80	76.93
n-hexane	4.59	lb/bbl				ndensate Constituent Analy	0.55	80	13.67
Benzene	1.42	lb/bbl				ndensate Constituent Analy	0.17	80	4.22
Toluene	6.11	lb/bbl				ndensate Constituent Analy	0.73	80	18.19
Ethylbenzene	0.74	lb/bbl				ndensate Constituent Analy	0.09	80	2.19
Xylenes	12.99	lb/bbl				ndensate Constituent Analy	1.55	80	38.66
¹ Calculated as 10% * 40 hrs of pre-ignition flowback + 80 hrs of flaring. ² Calculated as 3500 mcf / 84 hrs. ³ Calculated as 416.67 mcf/hr * 4 hrs. ⁴ Calculated as 416.67 mcf/hr * 80 hrs. ⁵ An estimated 11.9 bbl of condensate are captured prior to flare ignition. Flashing from this condensate is not analyzed. ⁶ For all emission factors that used the constituent analysis, a 50% destruction rate was assumed.									

Table D.1.9
Jonah Field - Summary - 2002

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317			Project: Jonah Infill Drilling Project Scenario: Estimated 2002 Drilling and Completion Emissions 2,100 hp, 100 % Tier 0 100% Straight Drilling Date: 6/30/2005					
Month	Pollutant	# of Operating Drilling Rigs	# of Operating Flares	Rig Emissions (Tier 0) (lb/hr)	Tier 0 Fraction	Average Drilling Emissions per Rig ¹ (lb/hr)	Total Emissions from all Rigs ¹ (lb/hr)	Flaring Emissions ² (lb/hr)
January	NO _x	6	3	27.50	1.0	27.50	165.03	92.90
	SO ₂			1.82	1.0	1.82	10.91	-
	PM ₁₀			1.95	1.0	1.95	11.71	-
February	NO _x	6	3	27.50	1.0	27.50	165.03	92.90
	SO ₂			1.82	1.0	1.82	10.91	-
	PM ₁₀			1.95	1.0	1.95	11.71	-
March	NO _x	6	3	27.50	1.0	27.50	165.03	92.90
	SO ₂			1.82	1.0	1.82	10.91	-
	PM ₁₀			1.95	1.0	1.95	11.71	-
April	NO _x	8	4	27.50	1.0	27.50	220.04	123.86
	SO ₂			1.82	1.0	1.82	14.55	-
	PM ₁₀			1.95	1.0	1.95	15.62	-
May	NO _x	5	2	27.50	1.0	27.50	137.52	61.93
	SO ₂			1.82	1.0	1.82	9.09	-
	PM ₁₀			1.95	1.0	1.95	9.76	-
June	NO _x	7	3	27.50	1.0	27.50	192.53	92.90
	SO ₂			1.82	1.0	1.82	12.73	-
	PM ₁₀			1.95	1.0	1.95	13.66	-
July	NO _x	4	2	27.50	1.0	27.50	110.02	61.93
	SO ₂			1.82	1.0	1.82	7.28	-
	PM ₁₀			1.95	1.0	1.95	7.81	-
August	NO _x	5	2	27.50	1.0	27.50	137.52	61.93
	SO ₂			1.82	1.0	1.82	9.09	-
	PM ₁₀			1.95	1.0	1.95	9.76	-
September	NO _x	8	4	27.50	1.0	27.50	220.04	123.86
	SO ₂			1.82	1.0	1.82	14.55	-
	PM ₁₀			1.95	1.0	1.95	15.62	-
October	NO _x	5	2	27.50	1.0	27.50	137.52	61.93
	SO ₂			1.82	1.0	1.82	9.09	-
	PM ₁₀			1.95	1.0	1.95	9.76	-
November	NO _x	4	2	27.50	1.0	27.50	110.02	61.93
	SO ₂			1.82	1.0	1.82	7.28	-
	PM ₁₀			1.95	1.0	1.95	7.81	-
December	NO _x	5	2	27.50	1.0	27.50	137.52	61.93
	SO ₂			1.82	1.0	1.82	9.09	-
	PM ₁₀			1.95	1.0	1.95	9.76	-

¹ Emissions are calculated based on 2,100 hp 100 % Tier 0 engines.
² Flaring emissions taken from the "Draft Air Quality Technical Support Document for the Jonah Infill Drilling Project Environmental Impact Statement November, 2004.

Table D.1.10
Jonah Field - Summary - 2006

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Jonah Infill Drilling Project Scenario: Estimated 2006 Drilling and Completion Emissions 50% Straight, 50% Directional 80% Tier 0, 20% Tier 1 Date: 6/30/2005										
Month ¹	Pollutant	# of Operating Drilling Rigs	# of Operating Flares	Tier 0 Drilling Emissions - Straight (lb/hr)	Tier 1 Drilling Emissions - Straight (lb/hr)	Tier 0 Drilling Emissions - Directional (lb/hr)	Tier 1 Drilling Emissions - Directional (lb/hr)	Tier 0 Fraction	Tier 1 Fraction	Average Drilling Emissions per Rig ² (lb/hr)	Total Emissions from all Rigs ² (lb/hr)	Flaring Emissions ³ (lb/hr)
All	NO _x	20	3	27.50	13.50	34.05	16.71	0.8	0.2	27.64	552.88	92.90
	SO ₂			1.82	1.82	2.25	0.38	0.8	0.2	1.85	36.96	-
	PM ₁₀			1.95	1.95	10.59	0.97	0.8	0.2	5.31	106.14	-

¹ All months have equal numbers of 20 drilling rigs and 3 flares.
² Emissions based on 50% directional drilling and 50% straight drilling, as well as 80% Tier 0 engines and 20% Tier 1 compliant engines.
³ Flaring emissions taken from the "Draft Air Quality Technical Support Document for the Jonah Infill Drilling Project Environmental Impact Statement", November, 2004.

Table D.1.11
Jonah Field - Summary - 2006-2002

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Jonah Infill Scenario: 2006-2002 Emissions and Modeling Scalars Date: 6/30/2005							
Month	Pollutant	Total Emissions from all Rigs (2006) (lb/hr)	Flaring Emissions (2006) (lb/hr)	Total Emissions from all Rigs (2002) (lb/hr)	Flaring Emissions (2002) (lb/hr)	Emissions Difference - Rigs - (2006 - 2002) (lb/hr)	Emissions Difference - Flares - (2006 - 2002) (lb/hr)	Rig Scalar	Flare Scalar
January	NO _x	552.88	92.90	165.03	92.90	387.85	0.00	0.8758	0.00
	SO ₂	36.96	-	10.91	-	26.05	-	0.8775	-
	PM ₁₀	106.14	-	11.71	-	94.43	-	0.9603	-
February	NO _x	552.88	92.90	165.03	92.90	387.85	0.00	0.8758	0.00
	SO ₂	36.96	-	10.91	-	26.05	-	0.8775	-
	PM ₁₀	106.14	-	11.71	-	94.43	-	0.9603	-
March	NO _x	552.88	92.90	165.03	92.90	387.85	0.00	0.8758	0.00
	SO ₂	36.96	-	10.91	-	26.05	-	0.8775	-
	PM ₁₀	106.14	-	11.71	-	94.43	-	0.9603	-
April	NO _x	552.88	92.90	220.04	123.86	332.84	-30.97	0.7516	-1.00
	SO ₂	36.96	-	14.55	-	22.41	-	0.7549	-
	PM ₁₀	106.14	-	15.62	-	90.52	-	0.9206	-
May	NO _x	552.88	92.90	137.52	61.93	415.36	30.97	0.9379	1.00
	SO ₂	36.96	-	9.09	-	27.87	-	0.9387	-
	PM ₁₀	106.14	-	9.76	-	96.38	-	0.9801	-
June	NO _x	552.88	92.90	192.53	92.90	360.35	0.00	0.8137	0.00
	SO ₂	36.96	-	12.73	-	24.23	-	0.8162	-
	PM ₁₀	106.14	-	13.66	-	92.47	-	0.9404	-
July	NO _x	552.88	92.90	110.02	61.93	442.86	30.97	1.0000	1.00
	SO ₂	36.96	-	7.28	-	29.69	-	1.0000	-
	PM ₁₀	106.14	-	7.81	-	98.33	-	1.0000	-
August	NO _x	552.88	92.90	137.52	61.93	415.36	30.97	0.9379	1.00
	SO ₂	36.96	-	9.09	-	27.87	-	0.9387	-
	PM ₁₀	106.14	-	9.76	-	96.38	-	0.9801	-
September	NO _x	552.88	92.90	220.04	123.86	332.84	-30.97	0.7516	-1.00
	SO ₂	36.96	-	14.55	-	22.41	-	0.7549	-
	PM ₁₀	106.14	-	15.62	-	90.52	-	0.9206	-
October	NO _x	552.88	92.90	137.52	61.93	415.36	30.97	0.9379	1.00
	SO ₂	36.96	-	9.09	-	27.87	-	0.9387	-
	PM ₁₀	106.14	-	9.76	-	96.38	-	0.9801	-
November	NO _x	552.88	92.90	110.02	61.93	442.86	30.97	1.0000	1.00
	SO ₂	36.96	-	7.28	-	29.69	-	1.0000	-
	PM ₁₀	106.14	-	7.81	-	98.33	-	1.0000	-
December	NO _x	552.88	92.90	137.52	61.93	415.36	30.97	0.9379	1.00
	SO ₂	36.96	-	9.09	-	27.87	-	0.9387	-
	PM ₁₀	106.14	-	9.76	-	96.38	-	0.9801	-

Numbers that scalars are based on. These scalars are used in model input files for modeling monthly emissions.

Table D.1.12
Jonah Field - Expanded Field Operators - Summary - 2006

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Jonah Infill Drilling Project - Expanded Field Operators Scenario: Estimated 2006 Drilling and Completion Emissions 2600 hp Rigs 80% Tier 0, 20% Tier 1 Date: 6/30/2005						
Month ¹	Pollutant	# of Operating Drilling Rigs	# of Operating Flares	Tier 0 Drilling Emissions (lb/hr)	Tier 1 Drilling Emissions (lb/hr)	Tier 0 Fraction	Tier 1 Fraction	Average Drilling Emissions per Rig ² (lb/hr)	Total Emissions from all Rigs ² (lb/hr)	Flaring Emissions ³ (lb/hr)
All	NO _x	3	1	34.05	16.71	0.8	0.2	30.58	91.75	30.97
	SO ₂			2.25	0.38	0.8	0.2	1.88	5.63	-
	PM ₁₀			10.59	0.97	0.8	0.2	8.66	25.99	-

¹ All months have equal numbers of 3 drilling rigs.
² Emissions based on 2600 hp Rigs with 80% Tier 0 engines and 20% Tier 1 compliant engines.
³ Flaring emissions taken from the "Draft Air Quality Technical Support Document for the Jonah Infill Drilling Project Environmental Impact Statement", November, 2004.

Table D.1.13
Pinedale Anticline - Drilling Emissions - Manufacturer's/AP-42 - Rig # 232

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Pinedale Anticline Scenario: Rig # 232 Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - Manufacturer's and AP-42 Date: 6/30/2005					
Engine	Pollutant	Pollutant Emission Factor ¹	Horsepower ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
		(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
Cat. 398 TA	CO	0.00668	912	0.56	60	24	4,912.72	3.41	14.94
	NOx	0.0101	912	N/A	60	24	13,299.98	9.24	40.45
	SO ₂	0.00205	912	0.56	60	24	1,507.65	1.05	4.59
	VOC	0.0025	912	0.56	60	24	1,838.59	1.28	5.59
	PM ₁₀ ⁴	0.0022	912	0.56	60	24	1,617.96	1.12	4.92
Cat. 398 TA	CO	0.00668	912	0.56	60	24	4,912.72	3.41	14.94
	NOx	0.0101	912	N/A	60	24	13,299.98	9.24	40.45
	SO ₂	0.00205	912	0.56	60	24	1,507.65	1.05	4.59
	VOC	0.0025	912	0.56	60	24	1,838.59	1.28	5.59
	PM ₁₀ ⁴	0.0022	912	0.56	60	24	1,617.96	1.12	4.92
Cat. 398 TA	CO	0.00668	912	0.56	60	24	4,912.72	3.41	14.94
	NOx	0.0101	912	N/A	60	24	13,299.98	9.24	40.45
	SO ₂	0.00205	912	0.56	60	24	1,507.65	1.05	4.59
	VOC	0.0025	912	0.56	60	24	1,838.59	1.28	5.59
	PM ₁₀ ⁴	0.0022	912	0.56	60	24	1,617.96	1.12	4.92
Cat. 3408 TA	CO	0.00668	480	0.14	60	24	646.41	0.45	1.97
	NOx	0.0024	480	N/A	60	24	1,640.01	1.14	4.99
	SO ₂	0.00205	480	0.14	60	24	198.37	0.14	0.60
	VOC	0.0025	480	0.14	60	24	241.92	0.17	0.74
	PM ₁₀ ⁴	0.0022	480	0.14	60	24	212.89	0.15	0.65
Rig Totals	CO		3,216		60	24	15,384.56	10.68	46.79
	NOx		3,216		60	24	41,539.95	28.85	126.35
	SO₂		3,216		60	24	4,721.31	3.28	14.36
	VOC		3,216		60	24	5,757.70	4.00	17.51
	PM₁₀⁴		3,216		60	24	5,066.77	3.52	15.41

¹ NOx based on data provided by WDEQ/Questar, all other pollutants based on AP-42 (EPA, 1996), Section 3.3, Gasoline and Diesel Industrial Engines. Table 3.3-1, "Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines."
² Drilling engine horsepower based on data provided by WDEQ/Questar.
³ The overall load factor is based on data provided by WDEQ/Questar. Load factor for NOx is accounted for in the emission factor as it is load-weighted.
⁴ PM2.5 assumed equivalent to PM10 for drilling engines.

Table D.1.14
Pinedale Anticline - Drilling Emissions - Tier 1 - Rig # 232

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Pinedale Anticline Scenario: Rig # 232 Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - Tier 1 Date: 6/30/2005					
Engine	Pollutant	Pollutant Emission Factor ¹	Horsepower ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
		(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
Cat. 398 TA	CO	0.0187	912	0.56	60	24	13,781.64	9.57	41.92
	NOx	0.015	912	0.56	60	24	11,187.45	7.77	34.03
	SO ₂ ⁴	0.00035	912	0.56	60	24	254.07	0.18	0.77
	VOC	0.0022	912	0.56	60	24	1,621.37	1.13	4.93
	PM ₁₀ ⁵	0.00088	912	0.56	60	24	648.55	0.45	1.97
Cat. 398 TA	CO	0.0187	912	0.56	60	24	13,781.64	9.57	41.92
	NOx	0.015	912	0.56	60	24	11,187.45	7.77	34.03
	SO ₂ ⁴	0.00035	912	0.56	60	24	254.07	0.18	0.77
	VOC	0.0022	912	0.56	60	24	1,621.37	1.13	4.93
	PM ₁₀ ⁵	0.00088	912	0.56	60	24	648.55	0.45	1.97
Cat. 398 TA	CO	0.0187	912	0.56	60	24	13,781.64	9.57	41.92
	NOx	0.015	912	0.56	60	24	11,187.45	7.77	34.03
	SO ₂ ⁴	0.00035	912	0.56	60	24	254.07	0.18	0.77
	VOC	0.0022	912	0.56	60	24	1,621.37	1.13	4.93
	PM ₁₀ ⁵	0.00088	912	0.56	60	24	648.55	0.45	1.97
Cat. 3408 TA	CO	0.0187	480	0.14	60	24	1,813.37	1.26	5.52
	NOx	0.015	480	0.14	60	24	1,472.03	1.02	4.48
	SO ₂ ⁴	0.00035	480	0.14	60	24	33.43	0.02	0.10
	VOC	0.0022	480	0.14	60	24	213.34	0.15	0.65
	PM ₁₀ ⁵	0.00088	480	0.14	60	24	85.34	0.06	0.26
Rig Totals	CO		3,216		60	24	43,158.28	29.97	131.27
	NOx		3,216		60	24	35,034.37	24.33	106.56
	SO₂⁴		3,216		60	24	795.64	0.55	2.42
	VOC		3,216		60	24	5,077.45	3.53	15.44
	PM₁₀⁵		3,216		60	24	2,030.98	1.41	6.18

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

² Drilling engine horsepower based on data provided by WDEQ/Questar.

³ The overall load factor is based on data provided by WDEQ/Questar.

⁴ The SO₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets.

⁵ PM2.5 assumed equivalent to PM10 for drilling engines.

Table D.1.15
Pinedale Anticline - Drilling Emissions - Manufacturer's/AP-42 - Rig # 235

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317					Project: Pinedale Anticline Scenario: Rig # 235 Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - Manufacturer's and AP-42 Date: 6/30/2005				
Engine	Pollutant	Pollutant Emission Factor ¹	Horsepower ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
		(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
Cat. 398 TA	CO	0.00668	912	0.56	60	24	4,912.72	3.41	14.94
	NOx	0.0101	912	N/A	60	24	13,299.98	9.24	40.45
	SO ₂	0.00205	912	0.56	60	24	1,507.65	1.05	4.59
	VOC	0.0025	912	0.56	60	24	1,838.59	1.28	5.59
	PM ₁₀ ⁴	0.0022	912	0.56	60	24	1,617.96	1.12	4.92
Cat. 398 TA	CO	0.00668	912	0.56	60	24	4,912.72	3.41	14.94
	NOx	0.0101	912	N/A	60	24	13,299.98	9.24	40.45
	SO ₂	0.00205	912	0.56	60	24	1,507.65	1.05	4.59
	VOC	0.0025	912	0.56	60	24	1,838.59	1.28	5.59
	PM ₁₀ ⁴	0.0022	912	0.56	60	24	1,617.96	1.12	4.92
Cat. 398 TA	CO	0.00668	912	0.56	60	24	4,912.72	3.41	14.94
	NOx	0.0101	912	N/A	60	24	13,299.98	9.24	40.45
	SO ₂	0.00205	912	0.56	60	24	1,507.65	1.05	4.59
	VOC	0.0025	912	0.56	60	24	1,838.59	1.28	5.59
	PM ₁₀ ⁴	0.0022	912	0.56	60	24	1,617.96	1.12	4.92
Cat. 3412TA	CO	0.00668	725	0.14	60	24	976.35	0.68	2.97
	NOx	0.0030	725	N/A	60	24	3,140.04	2.18	9.55
	SO ₂	0.00205	725	0.14	60	24	299.63	0.21	0.91
	VOC	0.0025	725	0.14	60	24	365.40	0.25	1.11
	PM ₁₀ ⁴	0.0022	725	0.14	60	24	321.55	0.22	0.98
Rig Totals	CO		3,461		60	24	15,714.50	10.91	47.80
	NOx		3,461		60	24	43,039.98	29.89	130.91
	SO₂		3,461		60	24	4,822.56	3.35	14.67
	VOC		3,461		60	24	5,881.18	4.08	17.89
	PM₁₀⁴		3,461		60	24	5,175.43	3.59	15.74

¹ NOx based on data provided by WDEQ/Questar, all other pollutants based on AP-42 (EPA, 1996), Section 3.3, Gasoline and Diesel Industrial Engines. Table 3.3-1, "Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines."
² Drilling engine horsepower based on data provided by WDEQ/Questar.
³ The overall load factor is based on data provided by WDEQ/Questar. Load factor for NOx is accounted for in the emission factor as it is load-weighted.
⁴ PM2.5 assumed equivalent to PM10 for drilling engines.

Table D.1.16
Pinedale Anticline - Drilling Emissions - Tier 1 - Rig # 235

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Pinedale Anticline Scenario: Rig # 235 Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - Tier 1 Date: 6/30/2005					
Engine	Pollutant	Pollutant Emission Factor ¹	Horsepower ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
		(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
Cat. 398 TA	CO	0.0187	912	0.56	60	24	13,781.64	9.57	41.92
	NOx	0.015	912	0.56	60	24	11,187.45	7.77	34.03
	SO ₂ ⁴	0.00035	912	0.56	60	24	254.07	0.18	0.77
	VOC	0.0022	912	0.56	60	24	1,621.37	1.13	4.93
	PM ₁₀ ⁵	0.00088	912	0.56	60	24	648.55	0.45	1.97
Cat. 398 TA	CO	0.0187	912	0.56	60	24	13,781.64	9.57	41.92
	NOx	0.015	912	0.56	60	24	11,187.45	7.77	34.03
	SO ₂ ⁴	0.00035	912	0.56	60	24	254.07	0.18	0.77
	VOC	0.0022	912	0.56	60	24	1,621.37	1.13	4.93
	PM ₁₀ ⁵	0.00088	912	0.56	60	24	648.55	0.45	1.97
Cat. 398 TA	CO	0.0187	912	0.56	60	24	13,781.64	9.57	41.92
	NOx	0.015	912	0.56	60	24	11,187.45	7.77	34.03
	SO ₂ ⁴	0.00035	912	0.56	60	24	254.07	0.18	0.77
	VOC	0.0022	912	0.56	60	24	1,621.37	1.13	4.93
	PM ₁₀ ⁵	0.00088	912	0.56	60	24	648.55	0.45	1.97
Cat. 3412 TA	CO	0.0187	725	0.14	60	24	2,738.95	1.90	8.33
	NOx	0.015	725	0.14	60	24	2,223.38	1.54	6.76
	SO ₂ ⁴	0.00035	725	0.14	60	24	50.49	0.04	0.15
	VOC	0.0022	725	0.14	60	24	322.23	0.22	0.98
	PM ₁₀ ⁵	0.00088	725	0.14	60	24	128.89	0.09	0.39
Rig Totals	CO		3,461		60	24	44,083.86	30.61	134.09
	NOx		3,461		60	24	35,785.72	24.85	108.85
	SO₂⁴		3,461		60	24	812.71	0.56	2.47
	VOC		3,461		60	24	5,186.34	3.60	15.78
	PM₁₀⁵		3,461		60	24	2,074.53	1.44	6.31

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

² Drilling engine horsepower based on data provided by WDEQ/Questar.

³ The overall load factor is based on data provided by WDEQ/Questar.

⁴ The SO₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets.

⁵ PM2.5 assumed equivalent to PM10 for drilling engines.

Table D.1.17
Pinedale Anticline - Drilling Emissions - Manufacturer's/AP-42 - Rig # 236

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Pinedale Anticline Scenario: Rig # 236 Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - Manufacturer's and AP-42 Date: 6/30/2005					
Engine	Pollutant	Pollutant Emission Factor ¹	Horsepower ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
		(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
Cat. 398 TA	CO	0.00668	975	0.52	60	24	4,918.20	3.42	14.96
	NOx	0.0085	975	N/A	60	24	11,900.00	8.26	36.20
	SO ₂	0.00205	975	0.52	60	24	1,509.33	1.05	4.59
	VOC	0.0025	975	0.52	60	24	1,840.64	1.28	5.60
	PM ₁₀ ⁴	0.0022	975	0.52	60	24	1,619.77	1.12	4.93
Cat. 398 TA	CO	0.00668	975	0.52	60	24	4,918.20	3.42	14.96
	NOx	0.0085	975	N/A	60	24	11,900.00	8.26	36.20
	SO ₂	0.00205	975	0.52	60	24	1,509.33	1.05	4.59
	VOC	0.0025	975	0.52	60	24	1,840.64	1.28	5.60
	PM ₁₀ ⁴	0.0022	975	0.52	60	24	1,619.77	1.12	4.93
Cat. 398 TA	CO	0.00668	975	0.52	60	24	4,918.20	3.42	14.96
	NOx	0.0085	975	N/A	60	24	11,900.00	8.26	36.20
	SO ₂	0.00205	975	0.52	60	24	1,509.33	1.05	4.59
	VOC	0.0025	975	0.52	60	24	1,840.64	1.28	5.60
	PM ₁₀ ⁴	0.0022	975	0.52	60	24	1,619.77	1.12	4.93
Cat. 3412TA	CO	0.00668	725	0.14	60	24	976.35	0.68	2.97
	NOx	0.0030	725	N/A	60	24	3,140.04	2.18	9.55
	SO ₂	0.00205	725	0.14	60	24	299.63	0.21	0.91
	VOC	0.0025	725	0.14	60	24	365.40	0.25	1.11
	PM ₁₀ ⁴	0.0022	725	0.14	60	24	321.55	0.22	0.98
Cat. 3412TA	CO	0.00668	725	0.41	60	24	2,880.93	2.00	8.76
	NOx	0.0055	725	N/A	60	24	5,760.00	4.00	17.52
	SO ₂	0.00205	725	0.41	60	24	884.12	0.61	2.69
	VOC	0.0025	725	0.41	60	24	1,078.19	0.75	3.28
	PM ₁₀ ⁴	0.0022	725	0.41	60	24	948.81	0.66	2.89
Rig Totals	CO		4,375		60	24	18,611.88	12.92	56.61
	NOx		4,375		60	24	44,600.02	30.97	135.66
	SO ₂		4,375		60	24	5,711.73	3.97	17.37
	VOC		4,375		60	24	6,965.52	4.84	21.19
	PM ₁₀ ⁴		4,375		60	24	6,129.66	4.26	18.64

¹ NOx based on data provided by WDEQ/Questar, all other pollutants based on AP-42 (EPA, 1996), Section 3.3, Gasoline and Diesel Industrial Engines. Table 3.3-1, "Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines."
² Drilling engine horsepower based on data provided by WDEQ/Questar.
³ The overall load factor is based on data provided by WDEQ/Questar. Load factor for NOx is accounted for in the emission factor as it is load-weighted.
⁴ PM2.5 assumed equivalent to PM10 for drilling engines.

Table D.1.18
Pinedale Anticline - Drilling Emissions - Tier 1 - Rig # 236

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Pinedale Anticline Scenario: Rig # 236 Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - Tier 1 Date: 6/30/2005					
Engine	Pollutant	Pollutant Emission Factor ¹	Horsepower ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
		(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
Cat. 398 TA	CO	0.0187	975	0.52	60	24	13,681.25	9.50	41.61
	NOx	0.015	975	0.52	60	24	11,105.96	7.71	33.78
	SO ₂ ⁴	0.00035	975	0.52	60	24	252.22	0.18	0.77
	VOC	0.0022	975	0.52	60	24	1,609.56	1.12	4.90
	PM ₁₀ ⁵	0.00088	975	0.52	60	24	643.82	0.45	1.96
Cat. 398 TA	CO	0.0187	975	0.52	60	24	13,681.25	9.50	41.61
	NOx	0.015	975	0.52	60	24	11,105.96	7.71	33.78
	SO ₂ ⁴	0.00035	975	0.52	60	24	252.22	0.18	0.77
	VOC	0.0022	975	0.52	60	24	1,609.56	1.12	4.90
	PM ₁₀ ⁵	0.00088	975	0.52	60	24	643.82	0.45	1.96
Cat. 398 TA	CO	0.0187	975	0.52	60	24	13,681.25	9.50	41.61
	NOx	0.015	975	0.52	60	24	11,105.96	7.71	33.78
	SO ₂ ⁴	0.00035	975	0.52	60	24	252.22	0.18	0.77
	VOC	0.0022	975	0.52	60	24	1,609.56	1.12	4.90
	PM ₁₀ ⁵	0.00088	975	0.52	60	24	643.82	0.45	1.96
Cat. 3412 TA	CO	0.0187	725	0.14	60	24	2,738.95	1.90	8.33
	NOx	0.015	725	0.14	60	24	2,223.38	1.54	6.76
	SO ₂ ⁴	0.00035	725	0.14	60	24	50.49	0.04	0.15
	VOC	0.0022	725	0.14	60	24	322.23	0.22	0.98
	PM ₁₀ ⁵	0.00088	725	0.14	60	24	128.89	0.09	0.39
Cat. 3412 TA	CO	0.0187	725	0.41	60	24	8,021.21	5.57	24.40
	NOx	0.015	725	0.41	60	24	6,511.33	4.52	19.81
	SO ₂ ⁴	0.00035	725	0.41	60	24	147.87	0.10	0.45
	VOC	0.0022	725	0.41	60	24	943.67	0.66	2.87
	PM ₁₀ ⁵	0.00088	725	0.41	60	24	377.47	0.26	1.15
Rig Totals	CO		4,375		60	24	51,803.92	35.97	157.57
	NOx		4,375		60	24	42,052.59	29.20	127.91
	SO₂⁴		4,375		60	24	955.03	0.66	2.90
	VOC		4,375		60	24	6,094.58	4.23	18.54
	PM₁₀⁵		4,375		60	24	2,437.83	1.69	7.42

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

² Drilling engine horsepower based on data provided by WDEQ/Questar.

³ The overall load factor is based on data provided by WDEQ/Questar.

⁴ The SO₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets.

⁵ PM2.5 assumed equivalent to PM10 for drilling engines.

Table D.1.19
Pinedale Anticline - Drilling Emissions - Tier 1 - Caza Rig 85

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Pinedale Anticline Scenario: Caza Rig 85 Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - Tier 1 - Engines reported to be Tier 1 compliant Date: 6/30/2005					
Engine	Pollutant	Pollutant Emission Factor ¹	Horsepower ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
		(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
Cat. 3512 TA	CO	0.0187	1,321	0.58	60	24	20,670.88	14.35	62.87
	NOx	0.015	1,321	0.58	60	24	16,779.89	11.65	51.04
	SO ₂ ⁴	0.00035	1,321	0.58	60	24	381.08	0.26	1.16
	VOC	0.0022	1,321	0.58	60	24	2,431.87	1.69	7.40
	PM ₁₀ ⁵	0.00088	1,321	0.58	60	24	972.75	0.68	2.96
Cat. 3512 TA	CO	0.0187	1,321	0.58	60	24	20,670.88	14.35	62.87
	NOx	0.015	1,321	0.58	60	24	16,779.89	11.65	51.04
	SO ₂ ⁴	0.00035	1,321	0.58	60	24	381.08	0.26	1.16
	VOC	0.0022	1,321	0.58	60	24	2,431.87	1.69	7.40
	PM ₁₀ ⁵	0.00088	1,321	0.58	60	24	972.75	0.68	2.96
Cat. 3512 TA	CO	0.0187	1,321	0.58	60	24	20,670.88	14.35	62.87
	NOx	0.015	1,321	0.58	60	24	16,779.89	11.65	51.04
	SO ₂ ⁴	0.00035	1,321	0.58	60	24	381.08	0.26	1.16
	VOC	0.0022	1,321	0.58	60	24	2,431.87	1.69	7.40
	PM ₁₀ ⁵	0.00088	1,321	0.58	60	24	972.75	0.68	2.96
Rig Totals	CO		3,963		60	24	62,012.63	43.06	188.62
	NOx		3,963		60	24	50,339.66	34.96	153.12
	SO₂⁴		3,963		60	24	1,143.23	0.79	3.48
	VOC		3,963		60	24	7,295.60	5.07	22.19
	PM₁₀⁵		3,963		60	24	2,918.24	2.03	8.88

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

² Drilling engine horsepower based on data provided by WDEQ/Questar.

³ The overall load factor is based on data provided by WDEQ/Questar.

⁴ The SO₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets.

⁵ PM2.5 assumed equivalent to PM10 for drilling engines.

Table D.1.20
Pinedale Anticline - Drilling Emissions - Tier 1 - Caza Rig 86

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317					Project: Pinedale Anticline Scenario: Caza Rig 86 Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - Tier 1 - Engines reported to be Tier 1 compliant Date: 6/30/2005				
Engine	Pollutant	Pollutant Emission Factor ¹	Horsepower ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
		(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
Cat. 3512 TA	CO	0.0187	1,321	0.58	60	24	20,670.88	14.35	62.87
	NOx	0.015	1,321	0.58	60	24	16,779.89	11.65	51.04
	SO ₂ ⁴	0.00035	1,321	0.58	60	24	381.08	0.26	1.16
	VOC	0.0022	1,321	0.58	60	24	2,431.87	1.69	7.40
	PM ₁₀ ⁵	0.00088	1,321	0.58	60	24	972.75	0.68	2.96
Cat. 3512 TA	CO	0.0187	1,321	0.58	60	24	20,670.88	14.35	62.87
	NOx	0.015	1,321	0.58	60	24	16,779.89	11.65	51.04
	SO ₂ ⁴	0.00035	1,321	0.58	60	24	381.08	0.26	1.16
	VOC	0.0022	1,321	0.58	60	24	2,431.87	1.69	7.40
	PM ₁₀ ⁵	0.00088	1,321	0.58	60	24	972.75	0.68	2.96
Cat. 3512 TA	CO	0.0187	1,321	0.58	60	24	20,670.88	14.35	62.87
	NOx	0.015	1,321	0.58	60	24	16,779.89	11.65	51.04
	SO ₂ ⁴	0.00035	1,321	0.58	60	24	381.08	0.26	1.16
	VOC	0.0022	1,321	0.58	60	24	2,431.87	1.69	7.40
	PM ₁₀ ⁵	0.00088	1,321	0.58	60	24	972.75	0.68	2.96
Rig Totals	CO		3,963		60	24	62,012.63	43.06	188.62
	NOx		3,963		60	24	50,339.66	34.96	153.12
	SO₂⁴		3,963		60	24	1,143.23	0.79	3.48
	VOC		3,963		60	24	7,295.60	5.07	22.19
	PM₁₀⁵		3,963		60	24	2,918.24	2.03	8.88

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

² Drilling engine horsepower based on data provided by WDEQ/Questar.

³ The overall load factor is based on data provided by WDEQ/Questar.

⁴ The SO₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets.

⁵ PM2.5 assumed equivalent to PM10 for drilling engines.

Table D.1.21
Pinedale Anticline - Drilling Emissions - Tier1/AP-42 - Caza Rig 24

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Pinedale Anticline Scenario: Caza Rig 24 Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - Cat 3508s at Tier 1, 3412s at AP-42 Date: 6/30/2005					
Engine	Pollutant	Pollutant Emission Factor ¹	Horsepower ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
		(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
Cat 3508 TA	CO	0.0187	650	0.60	60	24	10,545.09	7.32	32.07
	NOx	0.015	650	0.60	60	24	8,560.13	5.94	26.04
	SO ₂ ⁴	0.00035	650	0.60	60	24	194.40	0.14	0.59
	VOC	0.0022	650	0.60	60	24	1,240.60	0.86	3.77
	PM ₁₀ ⁵	0.00088	650	0.60	60	24	496.24	0.34	1.51
Cat. 3508 TA	CO	0.0187	650	0.60	60	24	10,545.09	7.32	32.07
	NOx	0.015	650	0.60	60	24	8,560.13	5.94	26.04
	SO ₂ ⁴	0.00035	650	0.60	60	24	194.40	0.14	0.59
	VOC	0.0022	650	0.60	60	24	1,240.60	0.86	3.77
	PM ₁₀ ⁵	0.00088	650	0.60	60	24	496.24	0.34	1.51
Cat. 3508 TA	CO	0.0187	650	0.60	60	24	10,545.09	7.32	32.07
	NOx	0.015	650	0.60	60	24	8,560.13	5.94	26.04
	SO ₂ ⁴	0.00035	650	0.60	60	24	194.40	0.14	0.59
	VOC	0.0022	650	0.60	60	24	1,240.60	0.86	3.77
	PM ₁₀ ⁵	0.00088	650	0.60	60	24	496.24	0.34	1.51
Cat. 3412 TA	CO	0.00668	725	0.41	60	24	2,880.65	2.00	8.76
	NOx	0.0062	725	N/A	60	24	6,424.62	4.46	19.54
	SO ₂ ⁴	0.00205	725	0.41	60	24	884.03	0.61	2.69
	VOC	0.0025	725	0.41	60	24	1,078.09	0.75	3.28
	PM ₁₀ ⁵	0.0022	725	0.41	60	24	948.72	0.66	2.89
Cat. 3412 TA	CO	0.00668	725	0.41	60	24	2,880.65	2.00	8.76
	NOx	0.0062	725	N/A	60	24	6,424.62	4.46	19.54
	SO ₂ ⁴	0.00205	725	0.41	60	24	884.03	0.61	2.69
	VOC	0.0025	725	0.41	60	24	1,078.09	0.75	3.28
	PM ₁₀ ⁵	0.0022	725	0.41	60	24	948.72	0.66	2.89
Rig Totals	CO		3,400		60	24	37,396.56	25.97	113.75
	NOx		3,400		60	24	38,529.63	26.76	117.19
	SO₂⁴		3,400		60	24	2,351.27	1.63	7.15
	VOC		3,400		60	24	5,877.97	4.08	17.88
	PM₁₀⁵		3,400		60	24	3,386.15	2.35	10.30

¹ Emission factor for Tier 1 engine taken from Diesel Net, Emissions Standards: USA: Nonroad Diesel Engines, Table 1, "EPA Tier 1-3 Nonroad Diesel Engine Emission Standards, g/kWh (g/bhp-hr)." Available on-line at <http://www.dieselnet.com/standards/us/offroad.html>.
For Caterpillar 3412TAs NOx based on data provided by WDEQ/Questar, all other pollutants based on AP-42 (EPA, 1996), Section 3.3, Gasoline and Diesel Industrial Engines. Table 3.3-1, "Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines."
² Drilling engine horsepower based on data provided by WDEQ/Questar.
³ The overall load factor is based on data provided by WDEQ/Questar.
⁴ The SO2 emission factor for the Cat. 3508TAs is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets. Cat 3412TAs are based on AP-42.
⁵ PM2.5 assumed equivalent to PM10 for drilling engines.

Table D.1.22
Pinedale Anticline - Drilling Emissions - Tier 1 - Caza Rig 24

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Pinedale Anticline Scenario: Caza Rig 24 Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - Tier 1 Date: 6/30/2005					
Engine	Pollutant	Pollutant Emission Factor ¹	Horsepower ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
		(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
Cat. 3508 TA	CO	0.0187	650	0.60	60	24	10,545.09	7.32	32.07
	NOx	0.015	650	0.60	60	24	8,560.13	5.94	26.04
	SO ₂ ⁴	0.00035	650	0.60	60	24	194.40	0.14	0.59
	VOC	0.0022	650	0.60	60	24	1,240.60	0.86	3.77
	PM ₁₀ ⁵	0.00088	650	0.60	60	24	496.24	0.34	1.51
Cat. 3508 TA	CO	0.0187	650	0.60	60	24	10,545.09	7.32	32.07
	NOx	0.015	650	0.60	60	24	8,560.13	5.94	26.04
	SO ₂ ⁴	0.00035	650	0.60	60	24	194.40	0.14	0.59
	VOC	0.0022	650	0.60	60	24	1,240.60	0.86	3.77
	PM ₁₀ ⁵	0.00088	650	0.60	60	24	496.24	0.34	1.51
Cat. 3508 TA	CO	0.0187	650	0.60	60	24	10,545.09	7.32	32.07
	NOx	0.015	650	0.60	60	24	8,560.13	5.94	26.04
	SO ₂ ⁴	0.00035	650	0.60	60	24	194.40	0.14	0.59
	VOC	0.0022	650	0.60	60	24	1,240.60	0.86	3.77
	PM ₁₀ ⁵	0.00088	650	0.60	60	24	496.24	0.34	1.51
Cat. 3412 TA	CO	0.0187	725	0.41	60	24	8,081.07	5.61	24.58
	NOx	0.015	725	0.41	60	24	6,559.93	4.56	19.95
	SO ₂ ⁴	0.00035	725	0.41	60	24	148.98	0.10	0.45
	VOC	0.0022	725	0.41	60	24	950.71	0.66	2.89
	PM ₁₀ ⁵	0.00088	725	0.41	60	24	380.29	0.26	1.16
Cat. 3412 TA	CO	0.0187	725	0.41	60	24	8,081.07	5.61	24.58
	NOx	0.015	725	0.41	60	24	6,559.93	4.56	19.95
	SO ₂ ⁴	0.00035	725	0.41	60	24	148.98	0.10	0.45
	VOC	0.0022	725	0.41	60	24	950.71	0.66	2.89
	PM ₁₀ ⁵	0.00088	725	0.41	60	24	380.29	0.26	1.16
Rig Totals	CO		3,400		60	24	47,797.42	33.19	145.38
	NOx		3,400		60	24	38,800.26	26.94	118.02
	SO₂⁴		3,400		60	24	881.17	0.61	2.68
	VOC		3,400		60	24	5,623.23	3.91	17.10
	PM₁₀⁵		3,400		60	24	2,249.29	1.56	6.84

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

² Drilling engine horsepower based on data provided by WDEQ/Questar.

³ The overall load factor is based on data provided by WDEQ/Questar.

⁴ The SO₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets.

⁵ PM2.5 assumed equivalent to PM10 for drilling engines.

Table D.1.23
Pinedale Anticline - Drilling Emissions - AP-42 - Summer Rigs

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317			Project: Pinedale Anticline Scenario: Summer Rigs Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - AP-42 Date: 6/30/2005					
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.00668	3,216	0.50	60	24	15,384.15	10.68	46.79
NO _x	0.031	3,216	0.50	60	24	71,393.50	49.58	217.16
SO ₂	0.00205	3,216	0.50	60	24	4,721.18	3.28	14.36
VOC	0.0025	3,216	0.50	60	24	5,757.54	4.00	17.51
PM ₁₀ ⁴	0.0022	3,216	0.50	60	24	5,066.64	3.52	15.41
¹ AP-42 (EPA, 1996), Section 3.3, Gasoline and Diesel Industrial Engines. Table 3.3-1, "Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines." ² Drilling engine horsepower based on Rig # 232, data provided by WDEQ/Questar. ³ The overall load factor is based on Rig #232, data provided by WDEQ/Questar. ⁴ PM _{2.5} assumed equivalent to PM ₁₀ for drilling engines.								

Table D.1.24
Pinedale Anticline - Drilling Emissions - Tier 1 - Summer Rigs

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Pinedale Anticline Scenario: Summer Rigs Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - Tier 1 Date: 6/30/2005						
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.0187	3,216	0.50	60	24	43,157.12	29.97	131.27
NOx	0.015	3,216	0.50	60	24	35,033.43	24.33	106.56
SO ₂	0.00035	3,216	0.50	60	24	795.62	0.55	2.42
VOC	0.0022	3,216	0.50	60	24	5,077.31	3.53	15.44
PM ₁₀ ⁴	0.00088	3,216	0.50	60	24	2,030.92	1.41	6.18

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

² Drilling engine horsepower based on Rig # 232, data provided by WDEQ/Questar.

³ The overall load factor is based on Rig #232, data provided by WDEQ/Questar.

⁴ The SO₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets.

⁵ PM2.5 assumed equivalent to PM10 for drilling engines.

Table D.1.25
Pinedale Anticline - Drilling Emissions - AP-42 - Other Winter Rigs

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Pinedale Anticline Scenario: Other Winter Rigs Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA AP-42 Date: 6/30/2005				
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.00668	5,000	0.44	60	24	21,272.86	14.77	64.70
NO _x	0.031	5,000	0.44	60	24	98,721.36	68.56	300.28
SO ₂	0.00205	5,000	0.44	60	24	6,528.35	4.53	19.86
VOC	0.0025	5,000	0.44	60	24	7,961.40	5.53	24.22
PM ₁₀ ⁴	0.0022	5,000	0.44	60	24	7,006.03	4.87	21.31
¹ AP-42 (EPA, 1996), Section 3.3, Gasoline and Diesel Industrial Engines. Table 3.3-1, "Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines." ² Drilling engine horsepower based on 5/26/2005 e-mail from Carol Kruse, BLM. ³ The overall load factor is calculated based on the average load factor of Rig #236, the largest rig data on the Anticline was available for, data provided by WDEQ/Questar. ⁴ PM _{2.5} assumed equivalent to PM ₁₀ for drilling engines.								

Table D.1.26
Pinedale Anticline - Drilling Emissions - Tier 1 - Other Winter Rigs

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Pinedale Anticline Project Scenario: Other Winter Rigs Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA Tier 1 Date: 6/30/2005				
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions Per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.0187	5,000	0.44	60	24	59,676.71	41.44	181.52
NOx	0.015	5,000	0.44	60	24	48,443.45	33.64	147.35
SO ₂ ⁴	0.00035	5,000	0.44	60	24	1,100.17	0.76	3.35
VOC	0.0022	5,000	0.44	60	24	7,020.79	4.88	21.35
PM ₁₀ ⁵	0.00088	5,000	0.44	60	24	2,808.32	1.95	8.54
¹ Emission factor for Tier 1 engine taken from Diesel Net, Emissions Standards: USA: Nonroad Diesel Engines, Table 1, "EPA Tier 1-3 Nonroad Diesel Engine Emission Standards, g/kWh (g/bhp-hr)." Available on-line at http://www.dieselnets.com/standards/us/offroad.html . ² Drilling engine horsepower based on 5/26/2005 e-mail from Carol Kruse, BLM. ³ The overall load factor is calculated based on the average load factor of Rig #236, the largest rig data on the Anticline was available for, data provided by WDEQ/Questar. ⁴ The SO ₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets. ⁵ PM2.5 assumed equivalent to PM10 for drilling engines.								

Table D.1.27
Pinedale Anticline - Completion Flaring Emissions

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Pinedale Anticline Scenario: Completion Flaring Activity: Flaring Date: 6/2/2005		
Assumptions:				
Hours of Operation:	3 days	Jonah II EIS		
	24 hours/day	Jonah II EIS		
Gas Flared:	5 MMCFD	Jonah II EIS		
Gas Heat Content:	1000 Btu/scf	Jonah II EIS		
Pollutant	Pollutant Emission Factor ¹		Emissions per Well	
	(lb/MMCF)	(lb/hr - Max)	(lb/well)	(ton/well)
NO _x ¹	68.00	14.17	1020	0.51
CO ¹	370.00	77.08	5550	2.78
VOCs ¹	63.00	13.13	945	0.47
PM ₁₀ ²	7.60	1.58	114	0.06
PM _{2.5} ²	7.60	1.58	114	0.06
SO ₂	0.00	0.00	0.00	0.00
Benzene ²	0.0021	0.0004	0.03	0.0000
Formaldehyde ²	0.0750	0.02	1.13	0.0006
Hexane ²	1.80	0.38	27.00	0.0135
Toluene ²	0.0034	0.0007	0.051	0.0000
¹ AP-42, Tables 13.5-1 and 13.5-2, 9/91. ² AP-42, Tables 1.4-2 and 1.4-3 (3/98). Note: Table data presented as found in "Pinedale Anticline Oil and Gas Exploration and Development Project Draft Environmental Impact Statement", Technical Report, BLM, Pinedale Field Office, November, 1999.				

Table D.1.28
Pinedale Anticline - Summary - 2002

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317			Project: Pinedale Anticline Project Scenario: Estimated 2002 Drilling and Completion Emissions 3,216 hp, 100 % Tier 0 Date: 6/30/2005					
Month	Pollutant	# of Operating Drilling Rigs	# of Operating Flares	#232 Rig Emissions (Tier 0) (lb/hr)	Tier 0 Fraction	Average Drilling Emissions per Rig ¹ (lb/hr)	Total Emissions from all Rigs ¹ (lb/hr)	Flaring Emissions ² (lb/hr)
January	NO _x	4	2	28.85	1.0	28.85	115.39	28.33
	SO ₂			3.28		3.28		0.00
	PM ₁₀			3.52		3.52		3.17
February	NO _x	3	1	28.85	1.0	28.85	86.54	14.17
	SO ₂			3.28		3.28		0.00
	PM ₁₀			3.52		3.52		1.58
March	NO _x	3	1	28.85	1.0	28.85	86.54	14.17
	SO ₂			3.28		3.28		0.00
	PM ₁₀			3.52		3.52		1.58
April	NO _x	1	1	28.85	1.0	28.85	28.85	14.17
	SO ₂			3.28		3.28		0.00
	PM ₁₀			3.52		3.52		1.58
May	NO _x	7	3	28.85	1.0	28.85	201.93	42.50
	SO ₂			3.28		3.28		0.00
	PM ₁₀			3.52		3.52		4.75
June	NO _x	3	1	28.85	1.0	28.85	86.54	14.17
	SO ₂			3.28		3.28		0.00
	PM ₁₀			3.52		3.52		1.58
July	NO _x	8	4	28.85	1.0	28.85	230.78	56.67
	SO ₂			3.28		3.28		0.00
	PM ₁₀			3.52		3.52		6.33
August	NO _x	5	2	28.85	1.0	28.85	144.24	28.33
	SO ₂			3.28		3.28		0.00
	PM ₁₀			3.52		3.52		3.17
September	NO _x	3	1	28.85	1.0	28.85	86.54	14.17
	SO ₂			3.28		3.28		0.00
	PM ₁₀			3.52		3.52		1.58
October	NO _x	3	1	28.85	1.0	28.85	86.54	14.17
	SO ₂			3.28		3.28		0.00
	PM ₁₀			3.52		3.52		1.58
November	NO _x	0	0	28.85	1.0	28.85	0.00	0.00
	SO ₂			3.28		3.28		0.00
	PM ₁₀			3.52		3.52		0.00
December	NO _x	1	1	28.85	1.0	28.85	28.85	14.17
	SO ₂			3.28		3.28		0.00
	PM ₁₀			3.52		3.52		1.58

¹ Emissions are calculated based on 3,216 hp Questar Rig #232 at Tier 0 emissions.
² Flaring Emissions based on data from the "Pinedale Anticline Oil and Gas Exploration and Development Project Draft Environmental Impact Statement Technical Report", BLM, November, 1999.

Table D.1.29
Pinedale Anticline - Summary - 2006

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317																	Project: Pinedale Anticline Scenario: Estimated 2006 Drilling and Completion Emissions Date: 6/30/2005		
Month	Pollutant	# of Operating Drilling Rigs	# of Operating Flares	Rig # 232 (Tier 0)	Rig # 235 (Tier 0)	Rig # 236 (Tier 0)	Caza Rig # 85 (Tier 1)	Caza Rig # 86 (Tier 1)	Caza Rig #24 (Tier 0/1)	Other Winter Rigs (Tier 0)	Other Winter Rigs (Tier 1)	Other Summer Rigs (Tier 0)	Other Summer Rigs (Tier 1)	Tier 0 Fraction	Tier 1 Fraction	Average Drilling Emissions per Rig ¹	Total Emissions from all Rigs ¹	Flaring Emissions ²	
				(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)			(lb/hr)	(lb/hr)	(lb/hr)	
January	NO _x	25	4	28.85	29.89	30.97	34.96	34.96	26.76	68.56	33.64	49.58	24.33	0.8	0.2	45.39	1134.70	56.67	
	SO ₂			3.28	3.35	3.97	0.79	0.79	1.63	4.53	0.76	3.28	0.55	0.8	0.2	2.88	72.03	-	
	PM ₁₀			3.52	3.59	4.26	2.03	2.03	2.35	4.87	1.95	3.52	1.41	0.8	0.2	3.35	83.73	6.33	
February	NO _x	25	4	28.85	29.89	30.97	34.96	34.96	26.76	68.56	33.64	49.58	24.33	0.8	0.2	45.39	1134.70	56.67	
	SO ₂			3.28	3.35	3.97	0.79	0.79	1.63	4.53	0.76	3.28	0.55	0.8	0.2	2.88	72.03	-	
	PM ₁₀			3.52	3.59	4.26	2.03	2.03	2.35	4.87	1.95	3.52	1.41	0.8	0.2	3.35	83.73	6.33	
March	NO _x	25	4	28.85	29.89	30.97	34.96	34.96	26.76	68.56	33.64	49.58	24.33	0.8	0.2	45.39	1134.70	56.67	
	SO ₂			3.28	3.35	3.97	0.79	0.79	1.63	4.53	0.76	3.28	0.55	0.8	0.2	2.88	72.03	-	
	PM ₁₀			3.52	3.59	4.26	2.03	2.03	2.35	4.87	1.95	3.52	1.41	0.8	0.2	3.35	83.73	6.33	
April	NO _x	25	4	28.85	29.89	30.97	34.96	34.96	26.76	68.56	33.64	49.58	24.33	0.8	0.2	45.39	1134.70	56.67	
	SO ₂			3.28	3.35	3.97	0.79	0.79	1.63	4.53	0.76	3.28	0.55	0.8	0.2	2.88	72.03	-	
	PM ₁₀			3.52	3.59	4.26	2.03	2.03	2.35	4.87	1.95	3.52	1.41	0.8	0.2	3.35	83.73	6.33	
May	NO _x	25	4	28.85	29.89	30.97	34.96	34.96	26.76	68.56	33.64	49.58	24.33	0.8	0.2	45.39	1134.70	56.67	
	SO ₂			3.28	3.35	3.97	0.79	0.79	1.63	4.53	0.76	3.28	0.55	0.8	0.2	2.88	72.03	-	
	PM ₁₀			3.52	3.59	4.26	2.03	2.03	2.35	4.87	1.95	3.52	1.41	0.8	0.2	3.35	83.73	6.33	
June	NO _x	30	5	28.85	29.89	30.97	34.96	34.96	26.76	68.56	33.64	49.58	24.33	0.8	0.2	45.24	1357.34	70.83	
	SO ₂			3.28	3.35	3.97	0.79	0.79	1.63	4.53	0.76	3.28	0.55	0.8	0.2	2.86	85.69	-	
	PM ₁₀			3.52	3.59	4.26	2.03	2.03	2.35	4.87	1.95	3.52	1.41	0.8	0.2	3.31	99.21	7.92	
July	NO _x	35	5	28.85	29.89	30.97	34.96	34.96	26.76	68.56	33.64	49.58	24.33	0.8	0.2	45.14	1579.98	70.83	
	SO ₂			3.28	3.35	3.97	0.79	0.79	1.63	4.53	0.76	3.28	0.55	0.8	0.2	2.84	99.36	-	
	PM ₁₀			3.52	3.59	4.26	2.03	2.03	2.35	4.87	1.95	3.52	1.41	0.8	0.2	3.28	114.70	7.92	
August	NO _x	35	5	28.85	29.89	30.97	34.96	34.96	26.76	68.56	33.64	49.58	24.33	0.8	0.2	45.14	1579.98	70.83	
	SO ₂			3.28	3.35	3.97	0.79	0.79	1.63	4.53	0.76	3.28	0.55	0.8	0.2	2.84	99.36	-	
	PM ₁₀			3.52	3.59	4.26	2.03	2.03	2.35	4.87	1.95	3.52	1.41	0.8	0.2	3.28	114.70	7.92	
September	NO _x	35	5	28.85	29.89	30.97	34.96	34.96	26.76	68.56	33.64	49.58	24.33	0.8	0.2	45.14	1579.98	70.83	
	SO ₂			3.28	3.35	3.97	0.79	0.79	1.63	4.53	0.76	3.28	0.55	0.8	0.2	2.84	99.36	-	
	PM ₁₀			3.52	3.59	4.26	2.03	2.03	2.35	4.87	1.95	3.52	1.41	0.8	0.2	3.28	114.70	7.92	
October	NO _x	30	5	28.85	29.89	30.97	34.96	34.96	26.76	68.56	33.64	49.58	24.33	0.8	0.2	45.24	1357.34	70.83	
	SO ₂			3.28	3.35	3.97	0.79	0.79	1.63	4.53	0.76	3.28	0.55	0.8	0.2	2.86	85.69	-	
	PM ₁₀			3.52	3.59	4.26	2.03	2.03	2.35	4.87	1.95	3.52	1.41	0.8	0.2	3.31	99.21	7.92	
November	NO _x	25	4	28.85	29.89	30.97	34.96	34.96	26.76	68.56	33.64	49.58	24.33	0.8	0.2	45.39	1134.70	56.67	
	SO ₂			3.28	3.35	3.97	0.79	0.79	1.63	4.53	0.76	3.28	0.55	0.8	0.2	2.88	72.03	-	
	PM ₁₀			3.52	3.59	4.26	2.03	2.03	2.35	4.87	1.95	3.52	1.41	0.8	0.2	3.35	83.73	6.33	
December	NO _x	25	4	28.85	29.89	30.97	34.96	34.96	26.76	68.56	33.64	49.58	24.33	0.8	0.2	45.39	1134.70	56.67	
	SO ₂			3.28	3.35	3.97	0.79	0.79	1.63	4.53	0.76	3.28	0.55	0.8	0.2	2.88	72.03	-	
	PM ₁₀			3.52	3.59	4.26	2.03	2.03	2.35	4.87	1.95	3.52	1.41	0.8	0.2	3.35	83.73	6.33	

¹ Emissions are calculated based on the 6 year-round drilling rigs from the WDEQ/Questar data, six (6) 5,000hp rigs to round out the winter drilling engines and the remainder as 3,216 hp rigs based on Questar Rig #232. The 6 rigs data is available for are based on Tier 0 or Tier 1 standards as appropriate per rig and engine from actual data. The other rigs use an 80% Tier 0, 20% Tier 1 ratio.

² Flaring Emissions based on data from the "Pinedale Anticline Oil and Gas Exploration and Development Project Draft Environmental Impact Statement Technical Report", BLM, November, 1999.

Table D.1.30
Pinedale Anticline - Summary - 2006-2002

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Pinedale Anticline Project Scenario: 2006-2002 Emissions and Modeling Scalars Date: 6/30/2005							
Month	Pollutant	Total Emissions from all Rigs (2006) (lb/hr)	Flaring Emissions (2006) (lb/hr)	Total Emissions from all Rigs (2002) (lb/hr)	Flaring Emissions (2002) (lb/hr)	Emissions Difference - Rigs - (2006 - 2002) (lb/hr)	Emissions Difference - Flares - (2006 - 2002) (lb/hr)	Rig Scalar	Flare Scalar
January	NO _x	1134.70	56.67	115.39	28.33	1019.31	28.33	0.6825	0.50
	SO ₂	72.03	0.00	13.11	0.00	58.91	0.00	0.6581	N/A
	PM ₁₀	83.73	6.33	14.07	3.17	69.65	3.17	0.6688	0.50
February	NO _x	1134.70	56.67	86.54	14.17	1048.15	42.50	0.7018	0.75
	SO ₂	72.03	0.00	9.84	0.00	62.19	0.00	0.6947	N/A
	PM ₁₀	83.73	6.33	10.56	1.58	73.17	4.75	0.7026	0.75
March	NO _x	1134.70	56.67	86.54	14.17	1048.15	42.50	0.7018	0.75
	SO ₂	72.03	0.00	9.84	0.00	62.19	0.00	0.6947	N/A
	PM ₁₀	83.73	6.33	10.56	1.58	73.17	4.75	0.7026	0.75
April	NO _x	1134.70	56.67	28.85	14.17	1105.85	42.50	0.7405	0.75
	SO ₂	72.03	0.00	3.28	0.00	68.75	0.00	0.7679	N/A
	PM ₁₀	83.73	6.33	3.52	1.58	80.21	4.75	0.7702	0.75
May	NO _x	1134.70	56.67	201.93	42.50	932.77	14.17	0.6246	0.25
	SO ₂	72.03	0.00	22.95	0.00	49.08	0.00	0.5482	N/A
	PM ₁₀	83.73	6.33	24.63	4.75	59.10	1.58	0.5675	0.25
June	NO _x	1357.34	70.83	86.54	14.17	1270.80	56.67	0.8509	1.00
	SO ₂	85.69	0.00	9.84	0.00	75.86	0.00	0.8473	N/A
	PM ₁₀	99.21	7.92	10.56	1.58	88.66	6.33	0.8513	1.00
July	NO _x	1579.98	70.83	230.78	56.67	1349.21	14.17	0.9034	0.25
	SO ₂	99.36	0.00	26.23	0.00	73.13	0.00	0.8169	N/A
	PM ₁₀	114.70	7.92	28.15	6.33	86.55	1.58	0.8311	0.25
August	NO _x	1579.98	70.83	144.24	28.33	1435.75	42.50	0.9614	0.75
	SO ₂	99.36	0.00	16.39	0.00	82.97	0.00	0.9268	N/A
	PM ₁₀	114.70	7.92	17.59	3.17	97.10	4.75	0.9324	0.75
September	NO _x	1579.98	70.83	86.54	14.17	1493.44	56.67	1.0000	1.00
	SO ₂	99.36	0.00	9.84	0.00	89.52	0.00	1.0000	N/A
	PM ₁₀	114.70	7.92	10.56	1.58	104.14	6.33	1.0000	1.00
October	NO _x	1357.34	70.83	86.54	14.17	1270.80	56.67	0.8509	1.00
	SO ₂	85.69	0.00	9.84	0.00	75.86	0.00	0.8473	N/A
	PM ₁₀	99.21	7.92	10.56	1.58	88.66	6.33	0.8513	1.00
November	NO _x	1134.70	56.67	0.00	0.00	1134.70	56.67	0.7598	1.00
	SO ₂	72.03	0.00	0.00	0.00	72.03	0.00	0.8045	N/A
	PM ₁₀	83.73	6.33	0.00	0.00	83.73	6.33	0.8040	1.00
December	NO _x	1134.70	56.67	28.85	14.17	1105.85	42.50	0.7405	0.75
	SO ₂	72.03	0.00	3.28	0.00	68.75	0.00	0.7679	N/A
	PM ₁₀	83.73	6.33	3.52	1.58	80.21	4.75	0.7702	0.75

Numbers that scalars are based on.

These scalars are used in model input files for modeling monthly emissions.

Table D.1.31
Riley Ridge - Drilling Emissions - AP-42

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Riley Ridge Scenario: Straight Drilling Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA AP-42 Date: 6/30/2005				
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.00668	2,100	0.42	--	24	--	5.93	25.96
NOx	0.031	2,100	0.42	--	24	--	27.50	120.47
SO ₂	0.00205	2,100	0.42	--	24	--	1.82	7.97
VOC	0.0025	2,100	0.42	--	24	--	2.22	9.72
PM ₁₀ ⁴	0.0022	2,100	0.42	--	24	--	1.95	8.55

¹ AP-42 (EPA, 1996), Section 3.3, Gasoline and Diesel Industrial Engines. Table 3.3-1, "Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines."
² Drilling engine horsepower based on 5/26/2005 e-mail from Carol Kruse, BLM.
³ The overall load factor is calculated based on average throttle setting of 65% and a load factor of 65%.
Therefore, the overall load factor = 0.65 * 0.65 = 0.42.
⁴ PM_{2.5} assumed equivalent to PM₁₀ for drilling engines.

Table D.1.32
Riley Ridge - Drilling Emissions - Tier 1

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317			Project: Riley Ridge Scenario: Straight Drilling Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA Tier 1 Date: 6/30/2005					
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions Per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.0187	2,100	0.42	--	24	--	16.63	72.82
NOx	0.015	2,100	0.42	--	24	--	13.50	59.12
SO ₂ ⁴	0.00035	2,100	0.42	--	24	--	0.31	1.34
VOC	0.0022	2,100	0.42	--	24	--	1.96	8.57
PM ₁₀ ⁵	0.00088	2,100	0.42	--	24	--	0.78	3.43

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

² Drilling engine horsepower based on 5/26/2005 e-mail from Carol Kruse, BLM.

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

⁴ The SO₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets.

⁵ PM2.5 assumed equivalent to PM10 for drilling engines.

Table D.1.33
Riley Ridge - Completion Flaring Emissions

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317					Project: Riley Ridge Scenario: Completion Flaring Activity: Flaring Date: 6/30/2005		
Assumptions: Hours of Operation: 3 days Amount of Gas Flared: 2.5 MMSCF/well Average Heat Content: 1189.6 Btu/scf Average VOC Content: 6.50% weight Average Mol. Weight: 17.705 lb/lb-mol							
Pollutant	Emission Factor ¹		Operational Rate			Emissions per Well	
	(lb/MMBtu)	(lb/MMscf)	(MMBtu)	(MMscf)	(lb/hr - Max)	(lb/well)	(ton/well)
NOx	0.068	-	2974.00	-	2.81	202.23	0.10
CO	0.37	-	2974.00	-	15.28	1100.38	0.55
VOCs	-	-	-	-	2.10	151.20	0.0756
SO2	-	-	-	-	0.00	0.00	0.0000
TSP	-	7.60	-	2.50	0.26	19.00	0.0095
PM10	-	7.60	-	2.50	0.26	19.00	0.0095
PM2.5	-	7.60	-	2.50	0.26	19.00	0.0095
Benzene	-	0.0021	-	2.50	0.0001	0.0053	0.0000
Toluene	-	0.0034	-	2.50	0.0001	0.0085	0.0000
Hexane	-	1.8	-	2.50	0.06	4.50	0.0023
Formaldehyde	-	0.075	-	2.50	0.00	0.19	0.0001
¹ AP-42, Volume I, Section 13.5 (9/91). Note: Table data given as found in "Draft Air Quality Technical Support Document for the South Piney Natural Gas Development Project Environmental Impact Statement", August, 2004. - Riley Ridge assumed to be similar to South Piney.							

Table D.1.34
Riley Ridge - Summary - 2002

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Riley Ridge Scenario: Estimated 2002 Drilling and Completion Emissions 2,100 hp, 100 % Tier 0 Date: 6/30/2005						
Month	Pollutant	# of Operating Drilling Rigs	# of Operating Flares	Rig Emissions (Tier 0) (lb/hr)	Tier 0 Fraction	Average Drilling Emissions per Rig ¹ (lb/hr)	Total Emissions from all Rigs ¹ (lb/hr)	Flaring Emissions ² (lb/hr)
January	NO _x	0	0	27.50	1.0	27.50	0.00	0.00
	SO ₂			1.82	1.0	1.82	0.00	0.00
	PM ₁₀			1.95	1.0	1.95	0.00	0.00
February	NO _x	0	0	27.50	1.0	27.50	0.00	0.00
	SO ₂			1.82	1.0	1.82	0.00	0.00
	PM ₁₀			1.95	1.0	1.95	0.00	0.00
March	NO _x	0	0	27.50	1.0	27.50	0.00	0.00
	SO ₂			1.82	1.0	1.82	0.00	0.00
	PM ₁₀			1.95	1.0	1.95	0.00	0.00
April	NO _x	0	0	27.50	1.0	27.50	0.00	0.00
	SO ₂			1.82	1.0	1.82	0.00	0.00
	PM ₁₀			1.95	1.0	1.95	0.00	0.00
May	NO _x	1	1	27.50	1.0	27.50	27.50	2.81
	SO ₂			1.82	1.0	1.82	1.82	0.00
	PM ₁₀			1.95	1.0	1.95	1.95	0.26
June	NO _x	2	1	27.50	1.0	27.50	55.01	2.81
	SO ₂			1.82	1.0	1.82	3.64	0.00
	PM ₁₀			1.95	1.0	1.95	3.90	0.26
July	NO _x	2	1	27.50	1.0	27.50	55.01	2.81
	SO ₂			1.82	1.0	1.82	3.64	0.00
	PM ₁₀			1.95	1.0	1.95	3.90	0.26
August	NO _x	4	1	27.50	1.0	27.50	110.02	2.81
	SO ₂			1.82	1.0	1.82	7.28	0.00
	PM ₁₀			1.95	1.0	1.95	7.81	0.26
September	NO _x	2	1	27.50	1.0	27.50	55.01	2.81
	SO ₂			1.82	1.0	1.82	3.64	0.00
	PM ₁₀			1.95	1.0	1.95	3.90	0.26
October	NO _x	2	1	27.50	1.0	27.50	55.01	2.81
	SO ₂			1.82	1.0	1.82	3.64	0.00
	PM ₁₀			1.95	1.0	1.95	3.90	0.26
November	NO _x	1	1	27.50	1.0	27.50	27.50	2.81
	SO ₂			1.82	1.0	1.82	1.82	0.00
	PM ₁₀			1.95	1.0	1.95	1.95	0.26
December	NO _x	1	1	27.50	1.0	27.50	27.50	2.81
	SO ₂			1.82	1.0	1.82	1.82	0.00
	PM ₁₀			1.95	1.0	1.95	1.95	0.26

¹ Emissions are calculated based on 2,100 hp 100 % Tier 0 engines.
² Flaring Emissions based on data from the "Draft Air Quality Technical Support Document for the South Piney Natural Gas Development Project Environmental Impact Statement", August, 2004. Riley Ridge is assumed to be equivalent to South Piney.

Table D.1.35
Riley Ridge - Summary - 2006

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

Project: Riley Ridge
Scenario: Estimated 2006 Drilling and Completion Emissions
2,100 hp, 100 % Tier 0
Date: 6/30/2005

Month	Pollutant	# of Operating Drilling Rigs	# of Operating Flares	Rig Emissions (Tier 0) (lb/hr)	Tier 0 Fraction	Average Drilling Emissions per Rig ¹ (lb/hr)	Total Emissions from all Rigs ¹ (lb/hr)	Flaring Emissions ² (lb/hr)
January	NO _x	2	1	27.50	1.0	27.50	55.01	2.81
	SO ₂			1.82	1.0	1.82	3.64	0.00
	PM ₁₀			1.95	1.0	1.95	3.90	0.26
February	NO _x	2	1	27.50	1.0	27.50	55.01	2.81
	SO ₂			1.82	1.0	1.82	3.64	0.00
	PM ₁₀			1.95	1.0	1.95	3.90	0.26
March	NO _x	2	1	27.50	1.0	27.50	55.01	2.81
	SO ₂			1.82	1.0	1.82	3.64	0.00
	PM ₁₀			1.95	1.0	1.95	3.90	0.26
April	NO _x	2	1	27.50	1.0	27.50	55.01	2.81
	SO ₂			1.82	1.0	1.82	3.64	0.00
	PM ₁₀			1.95	1.0	1.95	3.90	0.26
May	NO _x	3	1	27.50	1.0	27.50	82.51	2.81
	SO ₂			1.82	1.0	1.82	5.46	0.00
	PM ₁₀			1.95	1.0	1.95	5.86	0.26
June	NO _x	3	1	27.50	1.0	27.50	82.51	2.81
	SO ₂			1.82	1.0	1.82	5.46	0.00
	PM ₁₀			1.95	1.0	1.95	5.86	0.26
July	NO _x	6	1	27.50	1.0	27.50	165.03	2.81
	SO ₂			1.82	1.0	1.82	10.91	0.00
	PM ₁₀			1.95	1.0	1.95	11.71	0.26
August	NO _x	6	1	27.50	1.0	27.50	165.03	2.81
	SO ₂			1.82	1.0	1.82	10.91	0.00
	PM ₁₀			1.95	1.0	1.95	11.71	0.26
September	NO _x	6	1	27.50	1.0	27.50	165.03	2.81
	SO ₂			1.82	1.0	1.82	10.91	0.00
	PM ₁₀			1.95	1.0	1.95	11.71	0.26
October	NO _x	3	1	27.50	1.0	27.50	82.51	2.81
	SO ₂			1.82	1.0	1.82	5.46	0.00
	PM ₁₀			1.95	1.0	1.95	5.86	0.26
November	NO _x	2	1	27.50	1.0	27.50	55.01	2.81
	SO ₂			1.82	1.0	1.82	3.64	0.00
	PM ₁₀			1.95	1.0	1.95	3.90	0.26
December	NO _x	2	1	27.50	1.0	27.50	55.01	2.81
	SO ₂			1.82	1.0	1.82	3.64	0.00
	PM ₁₀			1.95	1.0	1.95	3.90	0.26

¹ Emissions are calculated based on 2,100 hp 100 % Tier 0 engines.

² Flaring Emissions based on data from the "Draft Air Quality Technical Support Document for the South Piney Natural Gas Development Project Environmental Impact Statement", August, 2004. Riley Ridge is assumed to be equivalent to South Piney.

Table D.1.36
Riley Ridge - Summary - 2006-2002

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Riley Ridge Project Scenario: 2006-2002 Emissions and Modeling Scalars Date: 6/30/2005							
Month	Pollutant	Total Emissions from all Rigs (2006) (lb/hr)	Flaring Emissions (2006) (lb/hr)	Total Emissions from all Rigs (2002) (lb/hr)	Flaring Emissions (2002) (lb/hr)	Emissions Difference - Rigs - (2006 - 2002) (lb/hr)	Emissions Difference - Flares - (2006 - 2002) (lb/hr)	Rig Scalar	Flare Scalar
January	NO _x	55.01	2.81	0.00	0.00	55.01	2.81	0.50	1.00
	SO ₂	3.64	0.00	0.00	0.00	3.64	0.00	0.50	N/A
	PM ₁₀	3.90	0.26	0.00	0.00	3.90	0.26	0.50	1.00
February	NO _x	55.01	2.81	0.00	0.00	55.01	2.81	0.50	1.00
	SO ₂	3.64	0.00	0.00	0.00	3.64	0.00	0.50	N/A
	PM ₁₀	3.90	0.26	0.00	0.00	3.90	0.26	0.50	1.00
March	NO _x	55.01	2.81	0.00	0.00	55.01	2.81	0.50	1.00
	SO ₂	3.64	0.00	0.00	0.00	3.64	0.00	0.50	N/A
	PM ₁₀	3.90	0.26	0.00	0.00	3.90	0.26	0.50	1.00
April	NO _x	55.01	2.81	0.00	0.00	55.01	2.81	0.50	1.00
	SO ₂	3.64	0.00	0.00	0.00	3.64	0.00	0.50	N/A
	PM ₁₀	3.90	0.26	0.00	0.00	3.90	0.26	0.50	1.00
May	NO _x	82.51	2.81	27.50	2.81	55.01	0.00	0.50	0.00
	SO ₂	5.46	0.00	1.82	0.00	3.64	0.00	0.50	N/A
	PM ₁₀	5.86	0.26	1.95	0.26	3.90	0.00	0.50	0.00
June	NO _x	82.51	2.81	55.01	2.81	27.50	0.00	0.25	0.00
	SO ₂	5.46	0.00	3.64	0.00	1.82	0.00	0.25	N/A
	PM ₁₀	5.86	0.26	3.90	0.26	1.95	0.00	0.25	0.00
July	NO _x	165.03	2.81	55.01	2.81	110.02	0.00	1.00	0.00
	SO ₂	10.91	0.00	3.64	0.00	7.28	0.00	1.00	N/A
	PM ₁₀	11.71	0.26	3.90	0.26	7.81	0.00	1.00	0.00
August	NO _x	165.03	2.81	110.02	2.81	55.01	0.00	0.50	0.00
	SO ₂	10.91	0.00	7.28	0.00	3.64	0.00	0.50	N/A
	PM ₁₀	11.71	0.26	7.81	0.26	3.90	0.00	0.50	0.00
September	NO _x	165.03	2.81	55.01	2.81	110.02	0.00	1.00	0.00
	SO ₂	10.91	0.00	3.64	0.00	7.28	0.00	1.00	N/A
	PM ₁₀	11.71	0.26	3.90	0.26	7.81	0.00	1.00	0.00
October	NO _x	82.51	2.81	55.01	2.81	27.50	0.00	0.25	0.00
	SO ₂	5.46	0.00	3.64	0.00	1.82	0.00	0.25	N/A
	PM ₁₀	5.86	0.26	3.90	0.26	1.95	0.00	0.25	0.00
November	NO _x	55.01	2.81	27.50	2.81	27.50	0.00	0.25	0.00
	SO ₂	3.64	0.00	1.82	0.00	1.82	0.00	0.25	N/A
	PM ₁₀	3.90	0.26	1.95	0.26	1.95	0.00	0.25	0.00
December	NO _x	55.01	2.81	27.50	2.81	27.50	0.00	0.25	0.00
	SO ₂	3.64	0.00	1.82	0.00	1.82	0.00	0.25	N/A
	PM ₁₀	3.90	0.26	1.95	0.26	1.95	0.00	0.25	0.00

Numbers that scalars are based on.

These scalars are used in model input files for modeling monthly emissions.

Table D.1.37
 South Piney - Drilling Emissions - Tier 1 - Deep Wells

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: South Piney Scenario: CBM Drill Rig Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - AP-42 Date: 6/30/2005				
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.00668	2,100	0.40	10	24	1,346.69	5.61	24.58
NOx	0.031	2,100	0.40	10	24	6,249.60	26.04	114.06
SO ₂	0.00205	2,100	0.40	10	24	413.28	1.72	7.54
VOC	0.0025	2,100	0.40	10	24	504.00	2.10	9.20
PM ₁₀ ⁴	0.0022	2,100	0.40	10	24	443.52	1.85	8.09
¹ AP-42 (EPA, 1996), Section 3.3, Gasoline and Diesel Industrial Engines. Table 3.3-1, "Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines." ² Drilling engine horsepower based on 5/26/2005 e-mail from Carol Kruse, BLM. ³ Load factor taken from "Draft Air Quality Technical Support Document for the South Piney Natural Gas Development Project EIS" (McVehil-Monnett, 2004) ⁴ PM _{2.5} assumed equivalent to PM ₁₀ for drilling engines.								

Table D.1.38
South Piney - Drilling Emissions - Tier 1 - Deep Wells

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: South Piney Scenario: CBM Drill Rig Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA Tier 1 Date: 6/30/2005				
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions Per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.0187	2,100	0.40	10	24	3,777.86	15.74	68.95
NOx	0.015	2,100	0.40	10	24	3,066.73	12.78	55.97
SO ₂ ⁴	0.00035	2,100	0.40	10	24	69.65	0.29	1.27
VOC	0.0022	2,100	0.40	10	24	444.45	1.85	8.11
PM ₁₀ ⁵	0.00088	2,100	0.40	10	24	177.78	0.74	3.24

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

² Drilling engine horsepower based on 5/26/2005 e-mail from Carol Kruse, BLM.

³ Load factor taken from "Draft Air Quality Technical Support Document for the South Piney Natural Gas Development Project EIS" (McVehil-Monnett, 2004)

⁴ The SO₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets.

⁵ PM_{2.5} assumed equivalent to PM₁₀ for drilling engines.

Table D.1.39
South Piney - Drilling Emissions - Tier 1 - Deep Wells

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: South Piney Scenario: Deep Drill Rig Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - AP-42 Date: 6/30/2005				
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.00668	2,600	0.40	12	24	2,000.79	6.95	30.43
NOx	0.031	2,600	0.40	12	24	9,285.12	32.24	141.21
SO ₂	0.00205	2,600	0.40	12	24	614.02	2.13	9.34
VOC	0.0025	2,600	0.40	12	24	748.80	2.60	11.39
PM ₁₀ ⁴	0.0022	2,600	0.40	12	24	658.94	2.29	10.02
¹ AP-42 (EPA, 1996), Section 3.3, Gasoline and Diesel Industrial Engines. Table 3.3-1, "Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines." ² Drilling engine horsepower based on 5/26/2005 e-mail from Carol Kruse, BLM. ³ Load factor taken from "Draft Air Quality Technical Support Document for the South Piney Natural Gas Development Project EIS" (McVehil-Monnett, 2004) ⁴ PM _{2.5} assumed equivalent to PM ₁₀ for drilling engines.								

Table D.1.40
South Piney - Drilling Emissions - Tier 1 - Deep Wells

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: South Piney Scenario: Deep Drill Rig Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA Tier 1 Date: 6/30/2005				
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions Per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.0187	2,600	0.40	12	24	5,612.82	19.49	85.36
NOx	0.015	2,600	0.40	12	24	4,556.29	15.82	69.29
SO ₂ ⁴	0.00035	2,600	0.40	12	24	103.48	0.36	1.57
VOC	0.0022	2,600	0.40	12	24	660.33	2.29	10.04
PM ₁₀ ⁵	0.00088	2,600	0.40	12	24	264.13	0.92	4.02
¹ Emission factor for Tier 1 engine taken from Diesel Net, Emissions Standards: USA: Nonroad Diesel Engines, Table 1, "EPA Tier 1-3 Nonroad Diesel Engine Emission Standards, g/kWh (g/bhp-hr)." Available on-line at http://www.dieselnet.com/standards/us/offroad.html . ² Drilling engine horsepower based on 5/26/2005 e-mail from Carol Kruse, BLM. ³ Load factor taken from "Draft Air Quality Technical Support Document for the South Piney Natural Gas Development Project EIS" (McVehil-Monnett, 2004) ⁴ The SO ₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets. ⁵ PM2.5 assumed equivalent to PM10 for drilling engines.								

Table D.1.41
 South Piney - Completion Flaring Emissions - CBM Wells

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: South Piney Scenario: Completion Flaring Activity: Flaring Formation: Mesa Verde Date: 6/30/2005			
Assumptions: Hours of Operation: 3 days Amount of Gas Flared: 0.25 MMSCF/well Average Heat Content: 1048.413 Btu/scf Average VOC Content: 2.50% weight Average Mol. Weight: 17.705 lb/lb-mol							
Pollutant	Emission Factor ¹		Operational Rate			Emissions per Well	
	(lb/MMBtu)	(lb/MMscf)	(MMBtu)	(MMscf)	(lb/hr - Max)	(lb/well)	(ton/well)
NOx	0.068	-	262.10	-	0.25	17.82	0.01
CO	0.37	-	262.10	-	1.35	96.98	0.05
VOCs	-	-	-	-	0.08	5.90	0.0030
SO2	-	-	-	-	0.00	0.00	0.0000
TSP	-	7.60	-	0.25	0.03	1.90	0.0010
PM10	-	7.60	-	0.25	0.03	1.90	0.0010
PM2.5	-	7.60	-	0.25	0.03	1.90	0.0010
Benzene	-	0.0021	-	0.25	0.0000	0.0005	0.0000
Toluene	-	0.0034	-	0.25	0.0000	0.0009	0.0000
Hexane	-	1.8	-	0.25	0.01	0.45	0.0002
Formaldehyde	-	0.075	-	0.25	0.00	0.02	0.0000
¹ AP-42, Volume I, Section 13.5 (9/91). Note: Data taken from "Draft Air Quality Technical Support Document for the South Piney Natural Gas Development Project Environmental Impact Statement", August, 2004.							

Table D.1.42
 South Piney - Completion Flaring Emissions - Deep Wells

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317					Project: South Piney Scenario: Completion Flaring Activity: Flaring Formation: Frontier Date: 6/30/2005		
Assumptions: Hours of Operation: 3 days Amount of Gas Flared: 2.5 MMSCF/well Average Heat Content: 1189.6 Btu/scf Average VOC Content: 6.50% weight Average Mol. Weight: 17.705 lb/lb-mol							
Pollutant	Emission Factor ¹		Operational Rate			Emissions per Well	
	(lb/MMBtu)	(lb/MMscf)	(MMBtu)	(MMscf)	(lb/hr - Max)	(lb/well)	(ton/well)
NOx	0.068	-	2974.00	-	2.81	202.23	0.10
CO	0.37	-	2974.00	-	15.28	1100.38	0.55
VOCs	-	-	-	-	2.10	151.20	0.0756
SO2	-	-	-	-	0.00	0.00	0.0000
TSP	-	7.60	-	2.50	0.26	19.00	0.0095
PM10	-	7.60	-	2.50	0.26	19.00	0.0095
PM2.5	-	7.60	-	2.50	0.26	19.00	0.0095
Benzene	-	0.0021	-	2.50	0.0001	0.0053	0.0000
Toluene	-	0.0034	-	2.50	0.0001	0.0085	0.0000
Hexane	-	1.8	-	2.50	0.06	4.50	0.0023
Formaldehyde	-	0.075	-	2.50	0.00	0.19	0.0001
¹ AP-42, Volume I, Section 13.5 (9/91). Note: Table data given as found in "Draft Air Quality Technical Support Document for the South Piney Natural Gas Development Project Environmental Impact Statement", August, 2004.							

Table D.1.43
South Piney - Summary - 2002

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317														Project: South Piney Scenario: Estimated 2002 Drilling and Completion Emissions 77% CBM Wells, 23% Deep Gas Wells 2100 hp CBM, 2,600 hp Deep Date: 6/30/2005		
Month	Pollutant	# of Operating Drilling Rigs	# of Operating Flares	CBM Rig (Tier 0) (lb/hr)	Deep Rig (Tier 0) (lb/hr)	CBM Flaring (lb/hr)	Deep Flaring (lb/hr)	CBM Fraction	Deep Fraction	Tier 0 Fraction	Average Drilling Emissions per Rig ¹ (lb/hr)	Total Emissions from all Rigs ¹ (lb/hr)	Flaring Emissions ² (lb/hr)			
January	NO _x	0	0	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	0.00	0.00			
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	0.00	0.00			
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	0.00	0.00			
February	NO _x	0	0	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	0.00	0.00			
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	0.00	0.00			
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	0.00	0.00			
March	NO _x	0	0	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	0.00	0.00			
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	0.00	0.00			
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	0.00	0.00			
April	NO _x	0	0	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	0.00	0.00			
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	0.00	0.00			
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	0.00	0.00			
May	NO _x	0	0	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	0.00	0.00			
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	0.00	0.00			
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	0.00	0.00			
June	NO _x	0	0	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	0.00	0.00			
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	0.00	0.00			
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	0.00	0.00			
July	NO _x	0	0	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	0.00	0.00			
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	0.00	0.00			
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	0.00	0.00			
August	NO _x	0	0	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	0.00	0.00			
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	0.00	0.00			
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	0.00	0.00			
September	NO _x	2	1	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	54.93	0.84			
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	3.63	0.00			
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	3.90	0.08			
October	NO _x	0	0	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	0.00	0.00			
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	0.00	0.00			
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	0.00	0.00			
November	NO _x	2	1	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	54.93	0.84			
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	3.63	0.00			
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	3.90	0.08			
December	NO _x	1	1	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	27.47	0.84			
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	1.82	0.00			
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	1.95	0.08			

¹ Emissions are calculated based on all Tier 0 rigs, 77% of which are 2,100 hp CBM rigs and 23% are 2,600 hp deep gas rigs.

² Flaring Emissions based on data from the "Draft Air Quality Technical Support Document for the South Piney Natural Gas Development Project Environmental Impact Statement", August, 2004. Flaring is also ratioed to 77% CBM completions and 23% deep gas completions.

Table D.1.44
South Piney - Summary - 2006

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: South Piney Scenario: Estimated 2006 Drilling and Completion Emissions 77% CBM Wells, 23% Deep Gas Wells 2100 hp CBM, 2,600 hp Deep Date: 6/30/2005									
Month	Pollutant	# of Operating Drilling Rigs	# of Operating Flares	CBM Rig (Tier 0) (lb/hr)	Deep Rig (Tier 0) (lb/hr)	CBM Flaring (lb/hr)	Deep Flaring (lb/hr)	CBM Fraction	Deep Fraction	Tier 0 Fraction	Average Drilling Emissions per Rig ¹ (lb/hr)	Total Emissions from all Rigs ¹ (lb/hr)	Flaring Emissions ² (lb/hr)
January	NO _x	0	0	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	0.00	0.00
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	0.00	0.00
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	0.00	0.00
February	NO _x	0	0	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	0.00	0.00
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	0.00	0.00
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	0.00	0.00
March	NO _x	0	0	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	0.00	0.00
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	0.00	0.00
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	0.00	0.00
April	NO _x	0	0	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	0.00	0.00
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	0.00	0.00
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	0.00	0.00
May	NO _x	3	1	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	82.40	0.84
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	5.45	0.00
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	5.85	0.08
June	NO _x	3	1	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	82.40	0.84
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	5.45	0.00
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	5.85	0.08
July	NO _x	3	1	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	82.40	0.84
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	5.45	0.00
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	5.85	0.08
August	NO _x	3	1	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	82.40	0.84
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	5.45	0.00
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	5.85	0.08
September	NO _x	3	1	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	82.40	0.84
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	5.45	0.00
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	5.85	0.08
October	NO _x	3	1	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	82.40	0.84
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	5.45	0.00
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	5.85	0.08
November	NO _x	0	0	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	0.00	0.00
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	0.00	0.00
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	0.00	0.00
December	NO _x	0	0	26.04	32.24	0.25	2.81	0.77	0.23	1.0	27.47	0.00	0.00
	SO ₂			1.72	2.13	0.00	0.00	0.77	0.23	1.0	1.82	0.00	0.00
	PM ₁₀			1.85	2.29	0.03	0.26	0.77	0.23	1.0	1.95	0.00	0.00

¹ Emissions are calculated based on all Tier 0 rigs, 77% of which are 2,100 hp CBM rigs and 23% are 2,600 hp deep gas rigs.

² Flaring Emissions based on data from the "Draft Air Quality Technical Support Document for the South Piney Natural Gas Development Project Environmental Impact Statement", August, 2004.

Flaring is also ratioed to 77% CBM completions and 23% deep gas completions.

Table D.1.45
South Piney - Summary - 2006-2002

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: South Piney Project Scenario: 2006-2002 Emissions and Modeling Scalars Date: 6/30/2005							
Month	Pollutant	Total Emissions from all Rigs (2006) (lb/hr)	Flaring Emissions (2006) (lb/hr)	Total Emissions from all Rigs (2002) (lb/hr)	Flaring Emissions (2002) (lb/hr)	Emissions Difference - Rigs - (2006 - 2002) (lb/hr)	Emissions Difference - Flares - (2006 - 2002) (lb/hr)	Rig Scalar	Flare Scalar
January	NO _x	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	SO ₂	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
	PM ₁₀	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
February	NO _x	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	SO ₂	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
	PM ₁₀	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
March	NO _x	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	SO ₂	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
	PM ₁₀	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
April	NO _x	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	SO ₂	0.00	0.00	0.00	0.00	0.00	0.00	0.00	N/A
	PM ₁₀	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
May	NO _x	82.40	0.84	0.00	0.00	82.40	0.84	1.00	1.00
	SO ₂	5.45	0.00	0.00	0.00	5.45	0.00	1.00	N/A
	PM ₁₀	5.85	0.08	0.00	0.00	5.85	0.08	1.00	1.00
June	NO _x	82.40	0.84	0.00	0.00	82.40	0.84	1.00	1.00
	SO ₂	5.45	0.00	0.00	0.00	5.45	0.00	1.00	N/A
	PM ₁₀	5.85	0.08	0.00	0.00	5.85	0.08	1.00	1.00
July	NO _x	82.40	0.84	0.00	0.00	82.40	0.84	1.00	1.00
	SO ₂	5.45	0.00	0.00	0.00	5.45	0.00	1.00	N/A
	PM ₁₀	5.85	0.08	0.00	0.00	5.85	0.08	1.00	1.00
August	NO _x	82.40	0.84	0.00	0.00	82.40	0.84	1.00	1.00
	SO ₂	5.45	0.00	0.00	0.00	5.45	0.00	1.00	N/A
	PM ₁₀	5.85	0.08	0.00	0.00	5.85	0.08	1.00	1.00
September	NO _x	82.40	0.84	54.93	0.84	27.47	0.00	0.33	0.00
	SO ₂	5.45	0.00	3.63	0.00	1.82	0.00	0.33	N/A
	PM ₁₀	5.85	0.08	3.90	0.08	1.95	0.00	0.33	0.00
October	NO _x	82.40	0.84	0.00	0.00	82.40	0.84	1.00	1.00
	SO ₂	5.45	0.00	0.00	0.00	5.45	0.00	1.00	N/A
	PM ₁₀	5.85	0.08	0.00	0.00	5.85	0.08	1.00	1.00
November	NO _x	0.00	0.00	54.93	0.84	-54.93	-0.84	-0.67	-1.00
	SO ₂	0.00	0.00	3.63	0.00	-3.63	0.00	-0.67	N/A
	PM ₁₀	0.00	0.00	3.90	0.08	-3.90	-0.08	-0.67	-1.00
December	NO _x	0.00	0.00	27.47	0.84	-27.47	-0.84	-0.33	-1.00
	SO ₂	0.00	0.00	1.82	0.00	-1.82	0.00	-0.33	N/A
	PM ₁₀	0.00	0.00	1.95	0.08	-1.95	-0.08	-0.33	-1.00

Numbers that scalars are based on. These scalars are used in model input files for modeling monthly emissions.

Table D.1.46
Jack Morrow Hills - Drilling Emissions - AP-42

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Jack Morrow Hills Scenario: Straight Drilling Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA AP-42 Date: 6/30/2005				
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.00668	2,100	0.42	--	24	--	5.93	25.96
NOx	0.031	2,100	0.42	--	24	--	27.50	120.47
SO ₂	0.00205	2,100	0.42	--	24	--	1.82	7.97
VOC	0.0025	2,100	0.42	--	24	--	2.22	9.72
PM ₁₀ ⁴	0.0022	2,100	0.42	--	24	--	1.95	8.55

¹ AP-42 (EPA, 1996), Section 3.3, Gasoline and Diesel Industrial Engines. Table 3.3-1, "Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines."
² Drilling engine horsepower based on 5/26/2005 e-mail from Carol Kruse, BLM.
³ The overall load factor is calculated based on average throttle setting of 65% and a load factor of 65%.
Therefore, the overall load factor = 0.65 * 0.65 = 0.42.
⁴ PM_{2.5} assumed equivalent to PM₁₀ for drilling engines.

Table D.1.47
Jack Morrow Hills - Drilling Emissions - Tier 1

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317			Project: Jack Morrow Hills Scenario: Straight Drilling Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA Tier 1 Date: 6/30/2005					
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions Per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.0187	2,100	0.42	--	24	--	16.63	72.82
NOx	0.015	2,100	0.42	--	24	--	13.50	59.12
SO ₂ ⁴	0.00035	2,100	0.42	--	24	--	0.31	1.34
VOC	0.0022	2,100	0.42	--	24	--	1.96	8.57
PM ₁₀ ⁵	0.00088	2,100	0.42	--	24	--	0.78	3.43

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

² Drilling engine horsepower based on 5/26/2005 e-mail from Carol Kruse, BLM.

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

⁴ The SO₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets.

⁵ PM_{2.5} assumed equivalent to PM₁₀ for drilling engines.

Table D.1.48
Jack Morrow Hills - Completion Flaring Emissions

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317			Project: Jack Morrow Hills Scenario: All Scenarios Activity: Completion/Testing Flaring Emissions: Gas Flaring without High Pressure Flowback Separator Units Date: 6/30/2005						
Flaring Specifications:									
Total Volume of Gas Emitted	35000	mcf							
Total Volume of Condensate Emitted	250	bbls							
Average Heat Content	1092.9	BTU/scf							
Flaring/Flowback Activity Duration	120	hrs/well							
Flaring Duration	80	hr/well							
Pre-ignition Flow-back Duration	40	hr/well							
Pre-ignition Flow-back Time Involving a Gas Stream	10	%							
Actual Hours Gas is Vented	4	hrs							
Total Hours in which Gas is Vented or Flared ¹	84	hrs							
Average Flowrate of Gas ²	416.67	mcf/hr							
Total Volume of Gas Vented ³	1,666.67	mcf							
Total Volume of Flared Gas ⁴	33,333.33	mcf							
Average Flowrate of Condensate	2.98	bbls/hr							
Pre-flare Volume of Condensate	11.90	bbls							
Volume of Condensate Flared	238.10	bbls							
Activity	Volume	Volume Units	Pollutant	Emission Factor	Emission Factor Units	Emission Factor Source ⁶	Total Emissions (tons)	Duration (hours)	Hourly Emissions (lb/hr)
Venting - Natural Gas ⁵	1,666.67	mcf	VOC	4.70	lb / 1000 scf	Gas Constituent Analysis	3.91	4	1,956.87
			HAP (total)	0.17	lb / 1000 scf	Gas Constituent Analysis	0.14	4	71.37
			n-Hexane	0.08	lb / 1000 scf	Gas Constituent Analysis	0.070	4	35.13
			Benzene	0.026	lb / 1000 scf	Gas Constituent Analysis	0.022	4	10.75
			Toluene	0.041	lb / 1000 scf	Gas Constituent Analysis	0.034	4	17.02
			Ethylbenzene	0.0019	lb / 1000 scf	Gas Constituent Analysis	0.0016	4	0.80
			Xylenes	0.018	lb / 1000 scf	Gas Constituent Analysis	0.015	4	7.67
			Flaring - Natural Gas	33,333.33	mcf	NOx	0.068	lb / 10 ⁶ BTU	AP-42 Section 13.5
CO	0.37	lb / 10 ⁶ BTU	AP-42 Section 13.5			6.74	80	168.49	
VOC	2.35	lb / 1000 scf	Gas Constituent Analysis			39.14	80	978.43	
HAP (total)	0.09	lb / 1000 scf	Gas Constituent Analysis			1.43	80	35.69	
n-Hexane	0.042	lb / 1000 scf	Gas Constituent Analysis			0.70	80	17.57	
Benzene	0.013	lb / 1000 scf	Gas Constituent Analysis			0.22	80	5.38	
Toluene	0.020	lb / 1000 scf	Gas Constituent Analysis			0.34	80	8.51	
Ethylbenzene	0.001	lb / 1000 scf	Gas Constituent Analysis			0.016	80	0.40	
Xylenes	0.009	lb / 1000 scf	Gas Constituent Analysis	0.15	80	3.83			
Flaring - Condensate	238.10	bbls	VOC	121.98	lb/bbl	Condensate Constituent Analysis	14.52	80	363.03
			HAP (total)	25.85	lb/bbl	Condensate Constituent Analysis	3.08	80	76.93
			n-hexane	4.59	lb/bbl	Condensate Constituent Analysis	0.55	80	13.67
			Benzene	1.42	lb/bbl	Condensate Constituent Analysis	0.17	80	4.22
			Toluene	6.11	lb/bbl	Condensate Constituent Analysis	0.73	80	18.19
			Ethylbenzene	0.74	lb/bbl	Condensate Constituent Analysis	0.09	80	2.19
			Xylenes	12.99	lb/bbl	Condensate Constituent Analysis	1.55	80	38.66
			¹ Calculated as 10% * 40 hrs of pre-ignition flowback + 80 hrs of flaring. ² Calculated as 3500 mcf / 84 hrs. ³ Calculated as 416.67 mcf/hr * 4 hrs. ⁴ Calculated as 416.67 mcf/hr * 80 hrs. ⁵ An estimated 11.9 bbl of condensate are captured prior to flare ignition. Flashing from this condensate is not analyzed. ⁶ For all emission factors that used the constituent analysis, a 50% destruction rate was assumed. Note: Jack Morrow Hills completion flaring assumed to be similar to Jonah Infill Project estimated flaring.						

Table D.1.49
Jack Morrow Hills - Summary - 2002

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Jack Morrow Hills Scenario: Estimated 2002 Drilling and Completion Emissions 2,600 hp, 100% Tier 0 Date: 6/30/2005						
Month ¹	Pollutant	# of Operating Drilling Rigs	# of Operating Flares	Drill Rig (Tier 0) (lb/hr)	Tier 0 Fraction	Average Drilling Emissions per Rig ² (lb/hr)	Total Emissions from all Rigs ² (lb/hr)	Flaring Emissions ³ (lb/hr)
All	NO _x	1	1	27.50	1.0	27.50	27.50	30.97
	SO ₂			1.82	1.0	1.82	1.82	-
	PM ₁₀			1.95	1.0	1.95	1.95	-
¹ All months have equal numbers of 1 drilling rig and 1 flare. ² Emissions based on 100% Tier 0 engines. ³ Flaring emissions taken from the "Draft Air Quality Technical Support Document for the Jonah Infill Drilling Project Environmental Impact Statement", November, 2004. Jack Morrow Hills flaring assumed to be equivalent to that calculated for the Jonah Infill Project.								

Table D.1.50
Jack Morrow Hills - Summary - 2006

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Jack Morrow Hills Scenario: Estimated 2006 Drilling and Completion Emissions 2,600 hp, 100% Tier 0 Date: 6/30/2005						
Month ¹	Pollutant	# of Operating Drilling Rigs	# of Operating Flares	Drill Rig (Tier 0) (lb/hr)	Tier 0 Fraction	Average Drilling Emissions per Rig ² (lb/hr)	Total Emissions from all Rigs ² (lb/hr)	Flaring Emissions ³ (lb/hr)
All	NO _x	1	1	27.50	1.0	27.50	27.50	30.97
	SO ₂			1.82	1.0	1.82	1.82	-
	PM ₁₀			1.95	1.0	1.95	1.95	-
¹ All months have equal numbers of 1 drilling rig and 1 flare. ² Emissions based on 100% Tier 0 engines. ³ Flaring emissions taken from the "Draft Air Quality Technical Support Document for the Jonah Infill Drilling Project Environmental Impact Statement", November, 2004. Jack Morrow Hills flaring assumed to be equivalent to that calculated for the Jonah Infill Project.								

Table D.1.51
Wildcat Rigs - Drilling Emissions - AP-42

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Wildcat Rigs Scenario: Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA AP-42 Date: 6/30/2005				
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.00668	5,000	0.42	--	24	--	14.11	61.81
NOx	0.031	5,000	0.42	--	24	--	65.49	286.84
SO ₂	0.00205	5,000	0.42	--	24	--	4.33	18.97
VOC	0.0025	5,000	0.42	--	24	--	5.28	23.13
PM ₁₀ ⁴	0.0022	5,000	0.42	--	24	--	4.65	20.36

¹ AP-42 (EPA, 1996), Section 3.3, Gasoline and Diesel Industrial Engines. Table 3.3-1, "Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines."
² Drilling engine horsepower based on 5/26/2005 e-mail from Carol Kruse, BLM.
³ The overall load factor is calculated based on average throttle setting of 65% and a load factor of 65%.
Therefore, the overall load factor = 0.65 * 0.65 = 0.42.
⁴ PM_{2.5} assumed equivalent to PM₁₀ for drilling engines.

Table D.1.52
Wildcat Rigs - Drilling Emissions - Tier 1

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317				Project: Wildcat Rigs Scenario: Activity: Drilling Emissions: Diesel Combustion Emissions from Drilling Engines - EPA Tier 1 Date: 6/30/2005				
Pollutant	Pollutant Emission Factor ¹	Total Horsepower All Engines ²	Overall Load Factor ³	Drilling Activity Duration	Drilling Activity Duration	Emissions Per Well	Emissions per Rig	Yearly Emissions Per Rig Based on Continuous Operation
	(lb/hp-hr)	(hp)		(days/well)	(hours/day)	(lb/well)	(lb/hr)	(tpy)
CO	0.0187	5,000	0.42	--	24	--	39.59	173.39
NOx	0.015	5,000	0.42	--	24	--	32.14	140.75
SO ₂ ⁴	0.00035	5,000	0.42	--	24	--	0.73	3.20
VOC	0.0022	5,000	0.42	--	24	--	4.66	20.40
PM ₁₀ ⁵	0.00088	5,000	0.42	--	24	--	1.86	8.16

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

² Drilling engine horsepower based on 5/26/2005 e-mail from Carol Kruse, BLM.

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

⁴ The SO₂ emission factor is calculated assuming 26.4 gal/hr fuel consumption, with 0.05% sulfur content of #2 diesel fuel, and fuel density of 7.001 lb/gal. Fuel consumption rate taken from Caterpillar "Oilfield Mechanical Rig Power" specification sheets.

⁵ PM2.5 assumed equivalent to PM10 for drilling engines.

Table D.1.53
Wildcat Rigs - Summary - 2006

TRC Environmental Corporation 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Wildcat Rigs Scenario: Estimated 2006 Drilling Emissions 5,000 hp Tier 0 engines Date: 6/30/2005						
Month	Pollutant	# of Operating Drilling Rigs	# of Operating Flares	Other Summer Rigs (Tier 0) (lb/hr)	Tier 0 Fraction	Average Drilling Emissions per Rig ¹ (lb/hr)	Total Emissions from all Rigs ¹ (lb/hr)	Flaring Emissions ² (lb/hr)
January	NO _x	0	0	65.49	1.0	65.49	0.00	0.00
	SO ₂			4.33	1.0	4.33	0.00	0.00
	PM ₁₀			4.65	1.0	4.65	0.00	0.00
February	NO _x	0	0	65.49	1.0	65.49	0.00	0.00
	SO ₂			4.33	1.0	4.33	0.00	0.00
	PM ₁₀			4.65	1.0	4.65	0.00	0.00
March	NO _x	0	0	65.49	1.0	65.49	0.00	0.00
	SO ₂			4.33	1.0	4.33	0.00	0.00
	PM ₁₀			4.65	1.0	4.65	0.00	0.00
April	NO _x	0	0	65.49	1.0	65.49	0.00	0.00
	SO ₂			4.33	1.0	4.33	0.00	0.00
	PM ₁₀			4.65	1.0	4.65	0.00	0.00
May	NO _x	0	0	65.49	1.0	65.49	0.00	0.00
	SO ₂			4.33	1.0	4.33	0.00	0.00
	PM ₁₀			4.65	1.0	4.65	0.00	0.00
June	NO _x	0	0	65.49	1.0	65.49	0.00	0.00
	SO ₂			4.33	1.0	4.33	0.00	0.00
	PM ₁₀			4.65	1.0	4.65	0.00	0.00
July	NO _x	3	1	65.49	1.0	65.49	196.46	14.17
	SO ₂			4.33	1.0	4.33	12.99	0.00
	PM ₁₀			4.65	1.0	4.65	13.94	1.58
August	NO _x	3	1	65.49	1.0	65.49	196.46	14.17
	SO ₂			4.33	1.0	4.33	12.99	0.00
	PM ₁₀			4.65	1.0	4.65	13.94	1.58
September	NO _x	0	0	65.49	1.0	65.49	0.00	0.00
	SO ₂			4.33	1.0	4.33	0.00	0.00
	PM ₁₀			4.65	1.0	4.65	0.00	0.00
October	NO _x	0	0	65.49	1.0	65.49	0.00	0.00
	SO ₂			4.33	1.0	4.33	0.00	0.00
	PM ₁₀			4.65	1.0	4.65	0.00	0.00
November	NO _x	0	0	65.49	1.0	65.49	0.00	0.00
	SO ₂			4.33	1.0	4.33	0.00	0.00
	PM ₁₀			4.65	1.0	4.65	0.00	0.00
December	NO _x	0	0	65.49	1.0	65.49	0.00	0.00
	SO ₂			4.33	1.0	4.33	0.00	0.00
	PM ₁₀			4.65	1.0	4.65	0.00	0.00

¹ Emissions are calculated based on a 5,000 hp Drill Rig at Tier 0 emission factors and a 0.42 load factor
² Flaring Emissions based on data from the "Pinedale Anticline Oil and Gas Exploration and Development Project Draft Environmental Impact Statement Technical Report", BLM, November, 1999. Wildcat flaring assumed to be equivalent to Pinedale Anticline flaring.

Table D.1.54
 Compression Increases - Falcon Compressor Station

TRC Environmental 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Jonah Infill Drilling Project Scenario: All Scenarios Activity: Projected Jonah Field Increase in Compression Emissions: Falcon C.S. Date: 6/30/2005				
Fuel Combustion Source:						
Unit Description	Falcon Compressor Station					
Engine design increases (hp)	2,888					
Operating Parameters:						
Operated	24	hr/day,	7	days/wk,	365	days/yr.
Operating hours	8760					
Capacity (%)	100					
Annual Engine Load Factor:	0.9					
Potential Fuel Combustion for the Year for Unit:						
Volume of Natural Gas Combusted	167.00	MMSCF				
Assumes gas consumed at rate of	6601	Btu/hp-hr				
Heat Content	1000	Btu/scf				
Emission Data:						
	lb/hr	TPY	Method of Determination	Emission Factor ¹	Units	
PM10	0.0	0.0	AP-42	7.71E-05	lb/MMscf	
PM2.5	0.0	0.00	AP-43	7.71E-05	lb/MMscf	
Sulfur dioxide	0.0	0.0	Fuel Analysis	0.00	lb/MMscf	
Nitrogen oxides	4.0	17.6	BACT	0.7	g/hp-hr	
Carbon monoxide	1.7	7.5	Permitted Emissions ²	0.300	g/hp-hr	
VOC	2.9	12.5	Permitted Emissions ²	0.500	g/hp-hr	
Formaldehyde	0.5	2.0	Permitted Emissions ²	0.080	g/hp-hr	
¹ Based on a 4-stroke lean burn engine, taken from AP-42 Table 3.2-3. ² Emission rates taken from a Pinedale Anticline Permit for an engine with 0.7 g/hphr NOx.						

Table D.1.55
 Compression Increases - Luman Compressor Station

TRC Environmental 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Jonah Infill Drilling Project Scenario: All Scenarios Activity: Projected Jonah Field Increases Emissions: Luman C.S. Date: 6/30/2005				
Fuel Combustion Source:						
Unit Description	Luman Compressor Station					
Engine design increases (hp)	11,248					
Operating Parameters:						
Operated	24	hr/day,	7	days/wk,	365	days/yr.
Operating hours	8760					
Capacity (%)	100					
Annual Engine Load Factor:	0.9					
Potential Fuel Combustion for the Year for Unit:						
Volume of Natural Gas Combusted	650.41	MMSCF				
Assumes gas consumed at rate of	6601	Btu/hp-hr				
Heat Content	1000	Btu/scf				
Emission Data:						
	lb/hr	TPY	Method of Determination	Emission Factor ¹	Units	
PM10	0.0	0.0	AP-42	7.71E-05	lb/MMscf	
PM2.5	0.0	0.00	AP-43	7.71E-05	lb/MMscf	
Sulfur dioxide	0.0	0.0	Fuel Analysis	0.00	lb/MMscf	
Nitrogen oxides	15.6	68.4	BACT	0.7	g/hp-hr	
Carbon monoxide	6.7	29.3	Permitted Emissions ²	0.300	g/hp-hr	
VOC	11.2	48.9	Permitted Emissions ²	0.500	g/hp-hr	
Formaldehyde	1.8	7.8	Permitted Emissions ²	0.080	g/hp-hr	
¹ Based on a 4-stroke lean burn engine, taken from AP-42 Table 3.2-3.						
² Emission rates taken from a Pinedale Anticline Permit for an engine with 0.7 g/hphr NOx.						

Table D.1.56
Compression Increases - Bird Canyon Compressor Station

TRC Environmental 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Jonah Infill Drilling Project Scenario: All Scenarios Activity: Projected Jonah Field Increases Emissions: Bird Canyon C.S. Date: 6/30/2005			
Fuel Combustion Source: Unit Description Bird Canyon Compressor Station Engine design increases (hp) 30,928					
Operating Parameters: Operated 24 hr/day, 7 days/wk, 365 days/yr. Operating hours 8760 Capacity (%) 100 Annual Engine Load Factor: 0.9					
Potential Fuel Combustion for the Year for Unit: Volume of Natural Gas Combusted 1788.40 MMSCF Assumes gas consumed at rate of 6601 Btu/hp-hr Heat Content 1000 Btu/scf					
Emission Data:					
	lb/hr	TPY	Method of Determination	Emission Factor ¹	Units
PM10	0.0	0.0	AP-42	7.71E-05	lb/MMscf
PM2.5	0.0	0.00	AP-43	7.71E-05	lb/MMscf
Sulfur dioxide	0.0	0.0	Fuel Analysis	0.00	lb/MMscf
Nitrogen oxides	43.0	188.1	BACT	0.7	g/hp-hr
Carbon monoxide	18.4	80.6	Permitted Emissions ²	0.300	g/hp-hr
VOC	30.7	134.4	Permitted Emissions ²	0.500	g/hp-hr
Formaldehyde	4.9	21.5	Permitted Emissions ²	0.080	g/hp-hr
¹ Based on a 4-stroke lean burn engine, taken from AP-42 Table 3.2-3. ² Emission rates taken from Bird Canyon Permit for an engine with 0.7 g/hp-hr NOx.					

Table D.1.57
Compression Increases - Jonah Compressor Station

TRC Environmental 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Jonah Infill Drilling Project Scenario: All Scenarios Activity: Projected Jonah Field Increases Emissions: Jonah C.S. Date: 6/30/2005				
Fuel Combustion Source:						
Unit Description	Jonah Compressor Station					
Engine design increases (hp)	3,000					
Operating Parameters:						
Operated	24	hr/day,	7	days/wk,	365	days/yr.
Operating hours	8760					
Capacity (%)	100					
Annual Engine Load Factor:	0.9					
Potential Fuel Combustion for the Year for Unit:						
Volume of Natural Gas Combusted	173.47	MMSCF				
Assumes gas consumed at rate of	6601	Btu/hp-hr				
Heat Content	1000	Btu/scf				
Emission Data:						
	lb/hr	TPY	Method of Determination	Emission Factor ¹	Units	
PM10	0.0	0.0	AP-42	7.71E-05	lb/MMscf	
PM2.5	0.0	0.00	AP-43	7.71E-05	lb/MMscf	
Sulfur dioxide	0.0	0.0	Fuel Analysis	0.00	lb/MMscf	
Nitrogen oxides	4.2	18.3	BACT	0.7	g/hp-hr	
Carbon monoxide	1.8	7.8	Permitted Emissions ²	0.300	g/hp-hr	
VOC	3.0	13.0	Permitted Emissions ²	0.500	g/hp-hr	
Formaldehyde	0.5	2.1	Permitted Emissions ²	0.080	g/hp-hr	
¹ Based on a 4-stroke lean burn engine, taken from AP-42 Table 3.2-3. ² Emission rates taken from a Pinedale Anticline Permit for an engine with 0.7 g/hp-hr NOx.						

Table D.1.58
 Compression Increases - Paradise Compressor Station

TRC Environmental 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Jonah Infill Drilling Project Scenario: All Scenarios Activity: Projected Pinedale Anticline Increases Emissions: Paradise C.S. Date: 6/30/2005			
Fuel Combustion Source:					
Unit Description	Paradise Compressor Station				
Engine design increases (hp)	9,624				
Operating Parameters:					
Operated	24	hr/day,	7	days/wk,	365 days/yr.
Operating hours	8760				
Capacity (%)	100				
Annual Engine Load Factor:	0.9				
Potential Fuel Combustion for the Year for Unit:					
Volume of Natural Gas Combusted	556.51	MMSCF			
Assumes gas consumed at rate of	6601	Btu/hp-hr			
Heat Content	1000	Btu/scf			
Emission Data:					
	lb/hr	TPY	Method of Determination	Emission Factor ¹	Units
PM10	0.0	0.0	AP-42	7.71E-05	lb/MMscf
PM2.5	0.0	0.00	AP-43	7.71E-05	lb/MMscf
Sulfur dioxide	0.0	0.0	Fuel Analysis	0.00	lb/MMscf
Nitrogen oxides	13.4	58.5	BACT	0.7	g/hp-hr
Carbon monoxide	5.7	25.1	Permitted Emissions ²	0.300	g/hp-hr
VOC	9.5	41.8	Permitted Emissions ²	0.500	g/hp-hr
Formaldehyde	1.5	6.7	Permitted Emissions ²	0.080	g/hp-hr
¹ Based on a 4-stroke lean burn engine, taken from AP-42 Table 3.2-3. ² Emission rates taken from a Pinedale Anticline WDEQ permit for an engine with 0.7 g/hp-hr NO _x					

Table D.1.59
 Compression Increases - Gobblers Knob Compressor Station

TRC Environmental 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Jonah Infill Drilling Project Scenario: All Scenarios Activity: Projected Compression Increases Emissions: Gobblers Knob C.S. Date: 6/30/2005			
Fuel Combustion Source:					
Unit Description	Gobblers Knob Compressor Station (Comprised of Pinedale, Mesa 1, and Mesa 2)				
Engine design increases (hp)	1,160				
Operating Parameters:					
Operated	24	hr/day,	7	days/wk,	365 days/yr.
Operating hours	8760				
Capacity (%)	100				
Annual Engine Load Factor:	0.9				
Potential Fuel Combustion for the Year for Unit:					
Volume of Natural Gas Combusted	67.08	MMSCF			
Assumes gas consumed at rate of	6601	Btu/hp-hr			
Heat Content	1000	Btu/scf			
Emission Data:					
	lb/hr	TPY	Method of Determination	Emission Factor ¹	Units
PM10	0.0	0.0	AP-42	7.71E-05	lb/MMscf
PM2.5	0.0	0.00	AP-43	7.71E-05	lb/MMscf
Sulfur dioxide	0.0	0.0	Fuel Analysis	0.00	lb/MMscf
Nitrogen oxides	1.6	7.1	BACT	0.7	g/hp-hr
Carbon monoxide	0.7	3.0	Permitted Emissions ²	0.300	g/hp-hr
VOC	1.2	5.0	Permitted Emissions ²	0.500	g/hp-hr
Formaldehyde	0.2	0.8	Permitted Emissions ²	0.080	g/hp-hr
¹ Based on a 4-stroke lean burn engine, taken from AP-42 Table 3.2-3. ² Emission rates taken from a Pinedale Anticline WDEQ permit for an engine with 0.7 g/hp-hr NOx.					

Table D.1.60
 Compression Increases - Jack Morrow Hills Compressor Station

TRC Environmental 605 Skyline Drive Laramie, WY 82070 Phone: (307) 742-3843 Fax: (307) 745-8317		Project: Jonah Infill Drilling Project Scenario: All Scenarios Activity: Projected Compression Increases Emissions: Jack Morrow Hills C.S. Date: 6/30/2005				
Fuel Combustion Source: Unit Description Jack Morrow Hills Compressor Station Engine design increases (hp) 2,940						
Operating Parameters: Operated 24 hr/day, 7 days/wk, 365 days/yr. Operating hours 8760 Capacity (%) 100 Annual Engine Load Factor: 0.9						
Potential Fuel Combustion for the Year for Unit: Volume of Natural Gas Combusted 170.00 MMSCF Assumes gas consumed at rate of 6601 Btu/hp-hr Heat Content 1000 Btu/scf						
Emission Data:						
	lb/hr	TPY	Method of Determination	Emission Factor ¹	Units	
PM10	0.0	0.0	AP-42	7.71E-05	lb/MMscf	
PM2.5	0.0	0.00	AP-43	7.71E-05	lb/MMscf	
Sulfur dioxide	0.0	0.0	Fuel Analysis	0.00	lb/MMscf	
Nitrogen oxides	4.1	17.9	BACT	0.7	g/hp-hr	
Carbon monoxide	1.8	7.7	Permitted Emissions ²	0.300	g/hp-hr	
VOC	2.9	12.8	Permitted Emissions ²	0.500	g/hp-hr	
Formaldehyde	0.5	2.0	Permitted Emissions ²	0.080	g/hp-hr	
¹ Based on a 4-stroke lean burn engine, taken from AP-42 Table 3.2-3. ² Emission rates taken from surrounding area compression permits for an engine with 0.7 g/hp-hr NOx						

Table D.1.61
Permitted Source Inventory Increases - CO Sources

Facility Name	Site ID	Permit Number	County	Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)
Koch Exploration Co. LLC - Walker 3-1	169	03MF0434	Moffat	3.05	808.15	14.73	0.10	23.04	3.06	0.00	0.00
Questar Gas Management Co. - Lion C.S.	161	03MF0662	Moffat	4.57	866.48	12.50	0.30	14.30	0.00	0.00	0.00
Koch Exploration Co. LLC - Walker 12-5	168	03MF0808	Moffat	3.05	808.15	12.50	0.10	11.50	0.00	0.00	0.00
Koch Exploration Co. LLC - Walker 12-2	177	03MF0809	Moffat	2.13	833.15	12.50	0.10	31.23	2.07	2.22	2.22
Koch Exploration Co. LLC - Walker 12-4	178	03MF0810	Moffat	2.13	833.15	12.50	0.10	31.23	2.07	2.22	2.22
Koch Exploration Co. LLC - Walker 3-2	223	03MF0811	Moffat	2.13	833.15	12.50	0.10	31.23	2.07	2.22	2.22
Koch Exploration Co. LLC - Walker 3-4	224	03MF0812	Moffat	2.13	833.15	12.50	0.10	31.23	2.07	2.22	2.22
Koch Exploration Co. LLC - Walker 3-3	228	03MF0943	Moffat	2.13	833.15	11.34	0.10	31.23	2.07	2.22	2.22
Tom Brown, Inc. - Federal Land Bank 21-14	225	03MF0962	Moffat	9.05	294.26	11.34	0.76	1.44	0.00	0.00	0.00
Tom Brown, Inc. - Federal Land Bank 33-15	226	03MF0963	Moffat	32.93	829.82	12.50	0.76	1.44	0.00	0.00	0.00
Tom Brown, Inc. - Schroeder 33-32	229	03MF1025	Moffat	9.05	810.93	12.50	0.76	1.73	0.00	0.00	0.00
Blue Mountain Energy - Deserado Mine	14	03RB0569F	Rio Blanco	0.00	294.26	0.00	0.00	0.00	0.00	66.97	20.09
Blue Mountain Energy - Deserado Mine	14	03RB0570	Rio Blanco	0.00	294.26	0.00	0.00	0.00	0.00	54.86	54.86
KLT Gas Inc. - Pinyon Ridge Field	232	03RB0578	Rio Blanco	2.44	255.37	12.50	0.20	24.00	0.00	0.00	0.00
Blue Mountain Energy - Deserado Mine	14	12RB802-3F	Rio Blanco	22.38	294.26	7.77	0.67	0.00	0.00	8.69	2.61
Total Colorado State-Permitted Source Emissions								233.60	13.41	141.62	88.66

Table D.1.62
Permitted Source Inventory Increases - WY Sources

Company	Facility	Permit Number	County	Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)
Williams Field Services	Opal Gas Plant	MD-917	Lincoln	16.69	742.00	1.37	34.17	(550.60)	0.00	0.00	0.00
Bill Barrett Corporation	Wallace Creek Compressor Station	MD-954	Natrona	7.32	734.80	35.40	0.30	44.40	0.00	0.00	0.00
CREDO Petroleum Company	Marianne Compressor Station	MD-971	Sweetwater	9.05	509.82	12.50	0.76	3.90	0.00	0.00	0.00
Double Eagle Petroleum Company	Cow Creek Central Production Facility	MD-951	Carbon	9.05	509.82	12.50	0.76	9.90	0.00	0.00	0.00
Mountain Gas Resources	Granger Gas Plant	MD-963	Sweetwater	7.92	904.00	32.90	0.38	16.60	0.00	0.00	0.00
Mountain Gas Resources	Hay Reservoir Central Compressor Station	MD-975	Sweetwater	13.11	880.40	20.00	0.46	16.70	0.00	0.00	0.00
Mountain Gas Resources	Storm Shelter Compressor Station	MD-935	Sweetwater	9.05	509.82	12.50	0.76	3.30	0.00	0.00	0.00
Tom Brown Incorporated	Frenchie Draw Graham Unit Central Tank Battery	CT-3436	Sweetwater	15.00	422.00	10.00	0.31	4.00	0.00	0.00	0.00
Tom Brown Incorporated	Fuller Compressor Station	CT-3449	Fremont	8.23	895.37	15.70	0.30	47.90	0.00	0.00	0.00
Warren E & P, Inc.	Pacific Rim Generator Station #1	CT-3472	Sweetwater	9.05	509.82	12.50	0.76	10.50	0.00	0.00	0.00
Western Gas Resources, Inc.	Wild Rose Compressor Station	CT-3412	Sweetwater	6.70	903.70	32.90	0.38	120.60	0.00	0.00	0.00
Total Wyoming State-Permitted Source Emissions								(272.80)	-	-	-

Table D.1.63
Included RFFA

Company	Facility Name	Permit Number	County	Height (m)	Temperature (K)	Velocity (m/s)	Diameter (m)	NO _x (tpy)	SO ₂ (tpy)	PM ₁₀ (tpy)	PM _{2.5} (tpy)
Exxon Mobil Corporation	Shute Creek Treating Facility	MD-913	Lincoln	60.66	355.00	54.78	1.83	(33.20)	(0.06)	(3.20)	(3.20)
Sinclair Oil Company	Sinclair Refinery	MD-976	Carbon	17.77	389.37	5.24	1.83	(85.70)	0.00	0.00	0.00
Anadarko Gathering Company	Blue Sky	MD-950	Carbon	11.00	730.00	71.60	0.25	17.50	0.00	0.00	0.00
Anadarko Gathering Company	Doty Mountain Compressor Station	CT-3349	Carbon	11.00	730.40	71.60	0.25	46.70	0.00	0.00	0.00
Anadarko Gathering Company	Muddy Mountain Compressor Station	CT-3352	Carbon	11.00	730.40	71.60	0.25	46.70	0.00	0.00	0.00
Anadarko Gathering Company	Red Rim Compressor Station	CT-3393	Carbon	11.00	730.40	71.60	0.25	53.00	0.00	0.00	0.00
Bill Barrett Corporation	Cooper Reservoir Unit Compressor Station	MD-904	Natrona	5.80	648.70	45.84	0.30	25.40	0.00	0.00	0.00
Duke Energy Field Services, LP	Yates Bicycle Federal Compressor #18	CT-3477	Sweetwater	9.05	509.82	12.50	0.76	6.30	0.00	0.00	0.00
Duke Energy Field Services, LP	Yates Bicycle Federal Compressor #6	CT-3507	Sweetwater	9.05	509.82	12.50	0.76	6.30	0.00	0.00	0.00
Duke Energy Field Services, LP	Yates Huffly State Compressor #16	CT-3508	Sweetwater	9.05	509.82	12.50	0.76	6.30	0.00	0.00	0.00
FMC Wyoming Corporation	Soda Ash Facility - Green River Plant	MD-964	Sweetwater	25.49	361.71	17.29	1.04	24.30	0.00	6.10	6.10
Jonah Gas Gathering Company	JGGC/OTTCO Interconnect	MD-925	Lincoln	15.00	422.00	10.00	0.31	4.10	0.00	0.00	0.00
LeGrand Johnson	Hot Mix Asphalt Plant CT-3416	CT-3416	Uinta	14.12	350.04	10.03	0.91	65.20	24.70	12.70	12.70
McMurry Ready Mix	Hot Mix Asphalt Plant	MD-899	Carbon	14.12	350.04	10.03	0.91	23.50	15.10	8.50	8.50
Merit Energy Company	South Baggs Compressor Station	CT-3542	Carbon	9.05	509.82	12.50	0.76	16.20	0.00	0.00	0.00
New Mexico Resources, LLC	Bitter Creek Zeolite Mine/Processing Plant	CT-3490	Sweetwater	15.00	422.00	10.00	0.31	38.00	7.90	9.80	9.80
Rees's Enterprise	CT-3465	CT-3465	Uinta	11.68	326.21	15.37	0.73	98.20	8.00	51.90	51.90
Sinclair Oil Company	Sinclair Refinery	MD-976	Carbon	17.77	389.37	5.24	1.83	0.00	4.30	0.40	0.40
Tom Brown Incorporated	Frenchie Draw Satellite/Graham West Station	MD-980	Fremont	9.05	509.82	12.50	0.76	18.00	0.00	0.00	0.00
Tom Brown Incorporated	Frenchie Draw/Graham Unit #5	CT-3467	Fremont	9.05	509.82	12.50	0.76	36.00	0.00	0.00	0.00
Warren E & P, Inc.	Pacific Rim Compressor Station #1	CT-3471	Sweetwater	9.05	509.82	12.50	0.76	17.10	0.00	0.00	0.00
Total Wyoming RFFA Source Emissions								429.90	59.94	86.20	86.20