Appendix O

Air Emissions Inventory

TABLE OF CONTENTS

Section Page

O. AIR EMISSIONS INVENTORY O-1

O.1 BLM Authorized Actions within the Planning Area Emissions Inventory Tables O-2
O.2 BLM Authorized Actions: Percent Contribution to BLM Emissions By Activity..... O-23
O.3 BLM plus Non-federal Oil and Gas Actions within the Planning Area Emissions Inventory Tables O-27
O.4 BLM plus Non-federal Oil and Gas Actions within the Planning Area: Emission Summaries by Pollutant O-33
O.5 Inputs and Assumptions for Emissions Inventory O-41

TABLES

Page

O-1 Oil and Gas – BLM Only – Base Year (Conventional + Coal Bed Natural Gas + Shale)..... O-3
O-2 Oil and Gas – BLM Only – Alternative A (Conventional + Coal Bed Natural Gas + Shale) .. O-4
O-3 Oil and Gas – BLM Only – Alternative B (Conventional + Coal Bed Natural Gas + Shale)... O-5
O-4 Oil and Gas – BLM Only – Alternative C (Conventional + Coal Bed Natural Gas + Shale) .. O-6
O-5 Oil and Gas – BLM Only – Alternative D (Conventional + Coal Bed Natural Gas + Shale) .. O-7
O-6 Coal – Base Year O-8
O-7 Coal – Alternatives A and D, Year 10 ..... O-8
O-8 Coal – Alternatives B and C, Year 10 ..... O-9
O-9 Coal – Alternatives A and D, Year 20 ..... O-9
O-10 Coal – Alternatives B and C, Year 20 ..... O-10
O-11 Uranium – Base Year O-10
O-12 Uranium – Alternatives A, B, C, and D, Year 10 ..... O-11
O-13 Uranium – Alternatives A, B, C, and D, Year 20 ..... O-11
O-14 Sand and Gravel – Base Year O-11
O-15 Sand and Gravel – Alternative A, Year 10 ..... O-12
O-16 Sand and Gravel – Alternative B, Year 10 ..... O-12
O-17 Sand and Gravel – Alternative C, Year 10 ..... O-12
O-18 Sand and Gravel – Alternative D, Year 10 ..... O-13
O-19 Sand and Gravel – Alternative A, Year 20 ..... O-13
O-20 Sand and Gravel – Alternative B, Year 20 ..... O-13
O-21 Sand and Gravel – Alternative C, Year 20 ..... O-14
O-22 Sand and Gravel – Alternative D, Year 20 ..... O-14
O-23 Travel and Transportation Management – Base Year O-14
O-24 Travel and Transportation Management – Alternative A, Year 10 ..... O-15
O-25 Travel and Transportation Management – Alternative B, Year 10 ..... O-15
O-26 Travel and Transportation Management – Alternative C, Year 10 ..... O-15
O-27 Travel and Transportation Management – Alternative D, Year 10 ..... O-16
O-28 Travel and Transportation Management – Alternative A, Year 20 ..... O-16
O-29 Travel and Transportation Management – Alternative B, Year 20 ..... O-16
O-30 Travel and Transportation Management – Alternative C, Year 20 ..... O-17
O-31 Travel and Transportation Management – Alternative D, Year 20 ..... O-17
O-32 Prescribed Fire and Mechanical Treatments – Base Year O-18
O-33 Prescribed Fire and Mechanical Treatments – Alternative A, Year 10 and Year 20 ..... O-18
O-34 Prescribed Fire and Mechanical Treatments – Alternative B, Year 10 and Year 20 ..... O-19

O-35 Prescribed Fire and Mechanical Treatments – Alternative C, Year 10 and Year 20 ..... O-19
O-36 Prescribed Fire and Mechanical Treatments – Alternative D, Year 10 and Year 20 ..... O-20
O-37 Livestock Grazing – Base Year O-20
O-38 Livestock Grazing – Alternative A, Year 10 and Year 20 ..... O-21
O-39 Livestock Grazing – Alternative B, Year 10 and Year 20 ..... O-21
O-40 Livestock Grazing – Alternative C, Year 10 and Year 20 ..... O-21
O-41 Livestock Grazing – Alternative D, Year 10 and Year 20 ..... O-22
O-42 Lands and Realty Right-of-ways – Base Year O-22
O-43 Lands and Realty Right-of-ways – Alternatives A, B, C, and D, Year 10 and Year 20 ..... O-22
O-44 BLM + Non-federal Oil and Gas, Alternative A O-28
O-45 BLM + Non-federal Oil and Gas, Alternative B O-29
O-46 BLM + Non-federal Oil and Gas, Alternative C O-30
O-47 BLM + Non-federal Oil and Gas, Alternative D O-31
O-48 Volatile Organic Compounds O-34
O-49 Nitrogen Oxides O-35
O-50 Particulate Matter - PM10 ..... O-36
O-51 Particulate Matter – $PM_{2.5}$ O-37
O-52 Sulfur Dioxide (SO_2) O-38
O-53 Hazardous Air Pollutants (HAPs) O-39
O-54 Input Assumptions for BLM Actions and Non-federal Oil and Gas Development within the Planning Area O-42
O-55 Emissions Controls Assumptions for Oil and Gas Calculations O-43
O-56 Descriptions of Emissions Controls O-44
O-57 Projected Well Numbers per Revised RFD (BLM 2012a) O-45

FIGURES

Page

O-1 VOC Emissions O-24
O-2 NO_x Emissions O-25
O-3 $PM_{2.5}$ Emissions O-26

APPENDIX O
AIR EMISSIONS INVENTORY

Emission inventories for development and production activities within the Planning Area were compiled for this analysis for total nitrogen oxides (NOx), sulfur dioxide (SO_2), carbon monoxide (CO), carbon dioxide (CO_2), particulate matter less than or equal to 10 microns in size (PM_{10}), particulate matter less than or equal to 2.5 microns in size ($PM_{2.5}$), volatile organic compounds (VOC), and hazardous air pollutants (HAPs). Lead emissions are negligible and were not calculated in the inventory. In addition, methane (CH_4), nitrous oxide (N_2O) and carbon dioxide (CO_2) emissions were included in the inventory for purposes of quantifying greenhouse gas (GHG) emissions.

Operational, production, and construction activity data used to estimate emissions for proposed emission sources were obtained from Grand Junction Field Office staff, the Reasonable Foreseeable Development Scenario for Oil and Gas for the Grand Junction Field Office (BLM 2012), the Mineral Potential Report (BLM 2010a), and from NEPA analyses currently being conducted for BLM actions within the planning area. Emission factors used to estimate proposed emissions were obtained primarily from the following sources: (1) EPA's *AP-42 Compilation of Air Pollutant Emission Factors* (USEPA 1995); (2) EPA's NONROAD2008a Emissions Model (USEPA 2009); (3) EPA's MOVES2010a Motor Vehicle Emissions Simulator (USEPA 2010); (4) API *Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Natural Gas Industry* (API 2009); (5) Colorado Department of Public Health and Environment (CDPHE); and (6) Western Governor's Association - Western Regional Air Partnership (WRAP). The inventory accounted for all applicable emissions controls such as CDPHE Regulation 7 and Federal New Source Performance Standards (NSPS).

The following tables provide additional details on the emissions that were analyzed to determine potential impacts to air quality. Tables are also provided that show the input parameters and assumptions used to calculate the

emissions. For additional details on the methods, data, and assumptions used to calculate emissions, the Air Quality Technical Support Document will be provided upon request.

O.1 BLM AUTHORIZED ACTIONS WITHIN THE PLANNING AREA EMISSIONS INVENTORY TABLES

- Oil and Gas Development
  - Combined Conventional, CBNG, Shale
- Solid Mineral Development
  - Coal
  - Uranium
  - Sand and Gravel
- Travel and Transportation Management
- Vegetation
  - Prescribed Fire and Mechanical Treatments
- Livestock Grazing
- Lands and Realty
  - Right of Ways

Table O-1
Oil and Gas – BLM Only – Base Year
(Conventional + Coal Bed Natural Gas + Shale)

Category	VOC	CO	NOx	PM10	PM2.5	SO2	HAPs	CO2e
Base Year BLM								
Completion Engines	7.43	75.90	131.84	4.34	4.21	3.32	0.93	15,439
Completion Venting	1.57	0.00	0.00	0.00	0.00	0.00	0.08	308
Condensate Tanks	7.17	0.00	0.00	0.00	0.00	0.00	0.35	24
Construction Equipment	0.19	1.10	2.51	0.17	0.16	0.05	0.02	249
Dehydrators	32.47	0.00	0.00	0.00	0.00	0.00	17.01	957
Drilling Engines	3.86	39.42	68.47	2.25	2.18	1.72	0.48	8,018
Field Compressor Engines	5.53	694.98	412.88	3.63	3.63	0.11	0.61	6,954
Flaring	0.13	0.56	0.10	0.00	0.00	0.00	0.05	172
Fracing Engines	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Fugitive Dust	0.00	0.00	0.00	20.56	2.09	0.00	0.00	0
Fugitive Leaks	416.40	0.00	0.00	0.00	0.00	0.00	20.14	83,619
Heaters	12.53	191.44	227.90	17.32	17.32	0.00	1.75	275,147
Midstream Compressor Engines	23.29	233.80	293.15	1.83	1.83	0.12	2.58	5,040
Other Midstream	66.27	16.84	27.79	0.60	0.60	0.06	18.83	39,898
Other Production	46.74	30.09	130.77	7.37	7.15	3.19	3.01	21,781
Pneumatic Devices	167.05	0.00	0.00	0.00	0.00	0.00	8.08	32,879
Pneumatic Pumps	15.57	0.00	0.00	0.00	0.00	0.00	0.75	3,064
Traffic	0.29	1.28	2.53	28.43	2.94	0.01	0.03	342
Water Injection Pumps	2.24	2.31	2.95	14.53	1.13	51.44	0.28	5,206
Well Blowdowns	4.03	0.00	0.00	0.00	0.00	0.00	0.20	794
BLM Totals	**812.75**	**1,287.71**	**1,300.90**	**101.01**	**43.24**	**60.02**	**75.18**	**499,890**

Table O-2
Oil and Gas – BLM Only – Alternative A
(Conventional + Coal Bed Natural Gas + Shale)

Category	VOC	CO	NOx	PM10	PM2.5	SO2	HAPs	CO2e
Project Year 10								
Completion Engines	4.85	49.61	86.18	2.83	2.75	0.07	0.60	10,092
Completion Venting	0.52	0.00	0.00	0.00	0.00	0.00	0.02	103
Condensate Tanks	30.31	0.00	0.00	0.00	0.00	0.00	0.21	100
Construction Equipment	0.11	0.66	1.52	0.10	0.10	0.03	0.01	150
Dehydrators	26.97	0.00	0.00	0.00	0.00	0.00	14.06	1,181
Drilling Engines	3.77	38.49	66.86	2.20	2.13	0.05	0.47	7,829
Field Compressor Engines	4.96	404.57	233.36	2.26	2.26	0.07	0.55	4,342
Flaring	0.54	2.28	0.42	0.00	0.00	0.00	0.22	704
Fracing Engines	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Fugitive Dust	0.00	0.00	0.00	12.69	1.29	0.00	0.00	0
Fugitive Leaks	260.42	0.00	0.00	0.00	0.00	0.00	12.57	60,614
Heaters	8.01	122.35	145.65	11.07	11.07	0.00	1.12	175,848
Midstream Compressor Engines	90.64	229.85	130.82	6.37	6.37	2.38	10.03	7,866
Other Midstream	110.08	32.92	28.54	1.48	1.48	1.31	14.72	31,647
Other Production	30.39	22.22	94.64	5.30	5.14	2.31	2.00	15,065
Pneumatic Devices	104.29	0.00	0.00	0.00	0.00	0.00	5.04	20,556
Pneumatic Pumps	9.60	0.00	0.00	0.00	0.00	0.00	0.46	1,892
Traffic	0.21	0.93	1.93	21.07	2.18	0.01	0.02	258
Water Injection Pumps	1.69	1.74	2.21	10.91	0.85	38.63	0.21	3,910
Well Blowdowns	2.52	0.00	0.00	0.00	0.00	0.00	0.12	496
Project Year 10 Totals	**689.87**	**905.61**	**792.13**	**76.29**	**35.63**	**44.85**	**62.44**	**342,651**
Project Year 20								
Completion Engines	4.77	48.72	84.63	2.78	2.70	0.07	0.59	9,910
Completion Venting	0.50	0.00	0.00	0.00	0.00	0.00	0.02	99
Condensate Tanks	38.23	0.00	0.00	0.00	0.00	0.00	0.19	126
Construction Equipment	0.11	0.65	1.49	0.10	0.10	0.03	0.01	148
Dehydrators	27.14	0.00	0.00	0.00	0.00	0.00	14.13	1,310
Drilling Engines	3.72	38.02	66.05	2.17	2.11	0.05	0.46	7,735
Field Compressor Engines	4.33	114.19	54.12	0.90	0.90	0.03	0.48	1,720
Flaring	0.66	2.80	0.51	0.00	0.00	0.00	0.26	864
Fracing Engines	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
Fugitive Dust	0.00	0.00	0.00	12.45	1.27	0.00	0.00	0
Fugitive Leaks	103.84	0.00	0.00	0.00	0.00	0.00	4.98	37,491
Heaters	3.47	52.98	63.08	4.79	4.79	0.00	0.49	76,154
Midstream Compressor Engines	103.75	257.47	107.42	7.14	7.14	2.45	11.48	9,249
Other Midstream	119.14	37.58	32.58	1.69	1.69	1.49	15.12	34,279
Other Production	14.12	14.31	58.32	3.22	3.12	1.42	0.99	8,319
Pneumatic Devices	41.28	0.00	0.00	0.00	0.00	0.00	2.00	8,185
Pneumatic Pumps	3.61	0.00	0.00	0.00	0.00	0.00	0.17	716
Traffic	0.14	0.63	1.44	13.54	1.41	0.01	0.02	189
Water Injection Pumps	1.12	1.16	1.48	7.27	0.57	25.74	0.14	2,606
Well Blowdowns	1.00	0.00	0.00	0.00	0.00	0.00	0.05	198
Project Year 20 Totals	**470.95**	**568.51**	**471.12**	**56.06**	**25.80**	**31.29**	**51.58**	**199,295**

Table O-3
Oil and Gas – BLM Only – Alternative B
(Conventional + Coal Bed Natural Gas + Shale)

Category	VOC	CO	NOx	PM10	PM2.5	SO2	HAPs	CO2e
Project Year 10								
Completion Engines	17.10	174.75	303.57	9.99	9.69	0.24	2.13	35,548
Completion Venting	1.81	0.00	0.00	0.00	0.00	0.00	0.09	359
Condensate Tanks	60.25	0.00	0.00	0.00	0.00	0.00	0.33	199
Construction Equipment	0.39	2.34	5.35	0.36	0.35	0.11	0.05	530
Dehydrators	45.80	0.00	0.00	0.00	0.00	0.00	23.85	2,209
Drilling Engines	13.29	135.86	236.02	7.76	7.53	0.19	1.66	27,638
Field Compressor Engines	9.85	471.93	255.92	3.00	3.00	0.09	1.09	5,751
Flaring	1.92	8.13	1.49	0.00	0.00	0.00	0.77	2,507
Fugitive Dust	0.00	0.00	0.00	44.69	4.55	0.00	0.00	0
Fugitive Leaks	345.75	0.00	0.00	0.00	0.00	0.00	16.64	96,979
Heaters	10.98	167.64	199.57	15.17	15.17	0.00	1.54	240,947
Midstream Compressor Engines	281.93	709.75	290.02	19.16	19.16	6.58	31.19	24,802
Other Midstream	319.41	100.77	87.36	4.54	4.54	4.00	40.52	91,901
Other Production	43.42	36.26	151.15	8.41	8.16	3.68	2.91	22,867
Pneumatic Devices	138.09	0.00	0.00	0.00	0.00	0.00	6.68	27,277
Pneumatic Pumps	10.77	0.00	0.00	0.00	0.00	0.00	0.52	2,129
Traffic	0.39	1.73	4.08	35.67	3.72	0.02	0.04	532
Water Injection Pumps	2.80	2.88	3.67	18.10	1.41	64.10	0.35	6,488
Well Blowdowns	3.34	0.00	0.00	0.00	0.00	0.00	0.16	659
Project Year 10 Totals	**1,307.29**	**1,812.05**	**1,538.20**	**166.84**	**77.26**	**79.01**	**130.52**	**589,322**
Project Year 20								
Completion Engines	10.10	173.86	173.86	1.99	1.93	0.24	1.26	35,364
Completion Venting	1.79	0.00	0.00	0.00	0.00	0.00	0.09	356
Condensate Tanks	77.83	0.00	0.00	0.00	0.00	0.00	0.35	258
Construction Equipment	0.40	2.35	5.38	0.36	0.35	0.12	0.05	533
Dehydrators	52.30	0.00	0.00	0.00	0.00	0.00	27.21	2,676
Drilling Engines	7.87	135.40	135.40	1.55	1.50	0.19	0.98	27,542
Field Compressor Engines	14.12	248.93	99.23	2.36	2.36	0.07	1.56	4,537
Flaring	2.46	10.41	1.91	0.00	0.00	0.00	0.99	3,211
Fugitive Dust	0.00	0.00	0.00	40.38	4.11	0.00	0.00	0
Fugitive Leaks	274.50	0.00	0.00	0.00	0.00	0.00	13.12	110,222
Heaters	9.40	143.57	170.92	12.99	12.99	0.00	1.32	206,351
Midstream Compressor Engines	353.61	872.24	308.11	24.04	24.04	8.00	39.12	31,628
Other Midstream	395.74	127.23	110.30	5.73	5.73	5.05	49.22	113,897
Other Production	39.08	42.38	171.34	9.44	9.16	4.17	2.79	23,919
Pneumatic Devices	108.88	0.00	0.00	0.00	0.00	0.00	5.27	21,628
Pneumatic Pumps	5.98	0.00	0.00	0.00	0.00	0.00	0.29	1,194
Traffic	0.39	1.73	3.74	37.34	3.88	0.02	0.04	497
Water Injection Pumps	3.35	3.45	4.40	21.65	1.68	76.68	0.42	7,761
Well Blowdowns	2.63	0.00	0.00	0.00	0.00	0.00	0.13	522
Project Year 20 Totals	**1,360.43**	**1,761.56**	**1,184.59**	**157.84**	**67.73**	**94.53**	**144.20**	**592,096**

Table O-4
Oil and Gas – BLM Only – Alternative C
(Conventional + Coal Bed Natural Gas + Shale)

Category	VOC	CO	NOx	PM10	PM2.5	SO2	HAPs	CO2e
Project Year 10								
Completion Engines	2.88	49.61	49.61	0.57	0.55	0.07	0.36	10,091
Completion Venting	0.52	0.00	0.00	0.00	0.00	0.00	0.02	103
Condensate Tanks	9.45	0.00	0.00	0.00	0.00	0.00	0.12	32
Construction Equipment	0.11	0.67	1.53	0.10	0.10	0.03	0.01	151
Dehydrators	13.54	0.00	0.00	0.00	0.00	0.00	7.07	534
Drilling Engines	2.24	38.49	38.49	0.44	0.43	0.05	0.28	7,829
Field Compressor Engines	3.98	391.09	228.85	2.12	2.12	0.06	0.44	4,060
Flaring	0.54	2.28	0.42	0.00	0.00	0.00	0.22	704
Fugitive Dust	0.00	0.00	0.00	7.50	0.77	0.00	0.00	0
Fugitive Leaks	260.42	0.00	0.00	0.00	0.00	0.00	12.57	60,614
Heaters	8.01	122.35	145.65	11.07	11.07	0.00	1.12	175,848
Midstream Compressor Engines	90.64	229.85	130.82	6.37	6.37	2.38	10.03	7,866
Other Midstream	110.08	32.92	28.54	1.48	1.48	1.31	14.72	31,647
Other Production	30.39	22.22	94.64	5.30	5.14	2.31	2.00	15,065
Pneumatic Devices	104.29	0.00	0.00	0.00	0.00	0.00	5.04	20,556
Pneumatic Pumps	8.76	0.00	0.00	0.00	0.00	0.00	0.42	1,727
Traffic	0.20	0.91	1.83	20.74	2.15	0.01	0.02	247
Water Injection Pumps	1.69	1.74	2.21	10.91	0.85	38.63	0.21	3,910
Well Blowdowns	2.52	0.00	0.00	0.00	0.00	0.00	0.12	496
Project Year 10 Totals	**650.25**	**892.11**	**722.59**	**66.60**	**31.02**	**44.85**	**54.79**	**341,478**
Project Year 20								
Completion Engines	2.83	48.72	9.33	0.42	0.41	0.07	0.35	9,909
Completion Venting	0.50	0.00	0.00	0.00	0.00	0.00	0.02	99
Condensate Tanks	10.73	0.00	0.00	0.00	0.00	0.00	0.08	36
Construction Equipment	0.11	0.66	1.51	0.10	0.10	0.03	0.01	149
Dehydrators	9.88	0.00	0.00	0.00	0.00	0.00	5.15	469
Drilling Engines	2.21	38.02	7.28	0.33	0.32	0.05	0.28	7,734
Field Compressor Engines	2.41	87.73	45.26	0.61	0.61	0.02	0.27	1,166
Flaring	0.66	2.80	0.51	0.00	0.00	0.00	0.26	864
Fugitive Dust	0.00	0.00	0.00	7.11	0.73	0.00	0.00	0
Fugitive Leaks	103.84	0.00	0.00	0.00	0.00	0.00	4.98	37,491
Heaters	3.47	52.98	63.08	4.79	4.79	0.00	0.49	76,154
Midstream Compressor Engines	103.75	257.47	107.42	7.14	7.14	2.45	11.48	9,249
Other Midstream	119.14	37.58	32.58	1.69	1.69	1.49	15.12	34,279
Other Production	14.12	14.31	58.32	3.22	3.12	1.42	0.99	8,319
Pneumatic Devices	41.28	0.00	0.00	0.00	0.00	0.00	2.00	8,185
Pneumatic Pumps	1.97	0.00	0.00	0.00	0.00	0.00	0.10	392
Traffic	0.13	0.57	1.21	12.68	1.31	0.01	0.01	162
Water Injection Pumps	1.12	1.16	1.48	7.27	0.57	25.74	0.14	2,606
Well Blowdowns	1.00	0.00	0.00	0.00	0.00	0.00	0.05	198
Project Year 20 Totals	**419.15**	**542.00**	**327.97**	**45.37**	**20.79**	**31.28**	**41.77**	**197,460**

Table O-5
Oil and Gas – BLM Only – Alternative D
(Conventional + Coal Bed Natural Gas + Shale)

Category	VOC	CO	NOx	PM10	PM2.5	SO2	HAPs	CO2e
Project Year 10								
Completion Engines	86.15	880.53	1,529.61	50.32	48.81	1.21	10.73	179,118
Completion Venting	8.44	0.00	0.00	0.00	0.00	0.00	0.41	1,682
Condensate Tanks	313.58	0.00	0.00	0.00	0.00	0.00	1.21	1,038
Construction Equipment	1.98	11.71	26.78	1.81	1.76	0.58	0.25	2,653
Dehydrators	182.31	0.00	0.00	0.00	0.00	0.00	94.72	9,988
Drilling Engines	68.60	701.12	1,217.94	40.06	38.86	0.96	8.55	142,621
Field Compressor Engines	35.02	818.40	371.92	6.77	6.77	0.21	3.87	12,995
Flaring	9.69	40.97	7.53	0.00	0.00	0.00	3.88	12,633
Fugitive Dust	0.00	0.00	0.00	224.21	22.80	0.00	0.00	0
Fugitive Leaks	785.71	0.00	0.00	0.00	0.00	0.00	37.60	303,652
Heaters	26.66	407.21	484.78	36.84	36.84	0.00	3.73	585,271
Midstream Compressor Engines	1,328.33	3,390.94	1,215.35	90.32	90.32	28.33	146.96	122,260
Other Midstream	1,451.85	483.33	419.01	21.75	21.75	19.19	173.71	418,098
Other Production	113.26	116.47	472.14	26.03	25.25	11.50	7.89	66,420
Pneumatic Devices	311.92	0.00	0.00	0.00	0.00	0.00	15.09	61,914
Pneumatic Pumps	19.28	0.00	0.00	0.00	0.00	0.00	0.93	3,837
Traffic	1.41	6.31	16.32	118.66	12.48	0.07	0.15	2,089
Water Injection Pumps	9.18	9.46	12.06	59.39	4.62	210.30	1.14	21,286
Well Blowdowns	7.53	0.00	0.00	0.00	0.00	0.00	0.36	1,495
Project Year 10 Totals	**4,760.90**	**6,866.44**	**5,773.43**	**676.17**	**310.26**	**272.33**	**511.19**	**1,949,050**
Project Year 20								
Completion Engines	51.10	879.64	879.64	10.05	9.75	1.20	6.37	178,925
Completion Venting	8.43	0.00	0.00	0.00	0.00	0.00	0.41	1,680
Condensate Tanks	412.32	0.00	0.00	0.00	0.00	0.00	1.52	1,364
Construction Equipment	2.00	11.80	27.06	1.83	1.77	0.58	0.25	2,684
Dehydrators	232.87	0.00	0.00	0.00	0.00	0.00	120.95	12,956
Drilling Engines	40.69	700.42	700.42	8.00	7.76	0.96	5.07	142,471
Field Compressor Engines	64.48	942.34	331.40	9.91	9.91	0.30	7.13	19,037
Flaring	13.93	58.89	10.82	0.00	0.00	0.00	5.57	18,159
Fugitive Dust	0.00	0.00	0.00	202.58	20.64	0.00	0.00	0
Fugitive Leaks	1,155.01	0.00	0.00	0.00	0.00	0.00	55.06	523,545
Heaters	40.79	622.94	741.59	56.36	56.36	0.00	5.71	895,327
Midstream Compressor Engines	1,719.00	4,297.12	1,471.26	118.08	118.08	36.77	190.18	160,374
Other Midstream	1,892.79	632.73	548.54	28.48	28.48	25.12	225.39	545,115
Other Production	172.73	202.79	813.28	44.69	43.35	19.80	12.59	111,011
Pneumatic Devices	456.80	0.00	0.00	0.00	0.00	0.00	22.09	90,949
Pneumatic Pumps	23.00	0.00	0.00	0.00	0.00	0.00	1.11	4,612
Traffic	1.85	8.28	18.05	177.15	18.41	0.08	0.20	2,391
Water Injection Pumps	16.11	16.60	21.16	104.22	8.11	369.06	2.01	37,354
Well Blowdowns	11.03	0.00	0.00	0.00	0.00	0.00	0.53	2,197
Project Year 20 Totals	**6,314.92**	**8,373.55**	**5,563.21**	**761.36**	**322.63**	**453.87**	**662.14**	**2,750,149**

Table O-6
Coal – Base Year

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Construction Fugitive Dust	0	0	0	0	0	0	0	0	0	0	0	0
Construction Combustion Sources	0	0	0	0	0	0	0	0	0	0	0	0
Production Fugitives (dust, methane)	0	0	0	0	0	0	0	0	0	0	0	0
Production Combustion Sources (mining, heavy equipment, vehicle exhaust)	0	0	0	0	0	0	0	0	0	0	0	0
Production Point Sources	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-7
Coal – Alternatives A and D, Year 10

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Construction Fugitive Dust	30	9	0	0	0	0	0	0	0	0	0	0
Construction Combustion Sources	1	1	25	0	8	1	0	3,097	0	0	3,136	2,846
Production Fugitives (dust, methane)	23	7	0	0	0	0	0	0	106,389	0	2,234,164	2,027,372
Production Combustion Sources (mining, heavy equipment, vehicle exhaust)	4	1	101	0	13	5	0	13,079	0	1	13,317	12,085
Production Point Sources	3	1	91	0	0	0	0	0	0	0	0	0
Total	**60**	**19**	**217**	**0**	**21**	**6**	**1**	**16,176**	**106,389**	**1**	**2,250,618**	**2,042,303**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-8
Coal – Alternatives B and C, Year 10

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Construction Fugitive Dust	0	0	0	0	0	0	0	0	0	0	0	0
Construction Combustion Sources	0	0	0	0	0	0	0	0	0	0	0	0
Production Fugitives (dust, methane)	18	6	0	0	0	0	0	0	85,111	0	1,787,331	1,621,897
Production Combustion Sources (mining, heavy equipment, vehicle exhaust)	3	1	80.5	0	10	4	0	10,463	0	1	10,654	9,668
Production Point Sources	2	1	73	0	0	0	0	0	0	0	0	0
Total	**24**	**7**	**154**	**0**	**10**	**4**	**0**	**10,463**	**85,111**	**1**	**1,797,985**	**1,631,565**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-9
Coal – Alternatives A and D, Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Construction Fugitive Dust	0	0	0	0	0	0	0	0	0	0	0	0
Construction Combustion Sources	0	0	0	0	0	0	0	0	0	0	0	0
Production Fugitives (dust, methane)	32	10	0	0	0	0	0	0	148,944	0	3,127,829	2,838,321
Production Combustion Sources (mining, heavy equipment, vehicle exhaust)	6	2	141	0	18	7	1	18,310	0	1	18,644	16,919
Production Point Sources	4	1	128	0	0	0	0	0	0	0	0	0
Total	**42**	**12**	**269**	**0**	**18**	**7**	**1**	**18,310**	**148,944**	**1**	**3,146,474**	**2,855,239**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-10
Coal – Alternatives B and C, Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Construction Fugitive Dust	0	0	0	0	0	0	0	0	0	0	0	0
Construction Combustion Sources	0	0	0	0	0	0	0	0	0	0	0	0
Production Fugitives (dust, methane)	18	6	0	0	0	0	0	0	85,111	0	1,787,331	1,621,897
Production Combustion Sources (mining, heavy equipment, vehicle exhaust)	3	1	81	0	10	4	0	10,463	0	1	10,654	9,668
Production Point Sources	2	1	73	0	0	0	0	0	0	0	0	0
Total	**24**	**7**	**154**	**0**	**10**	**4**	**0**	**10,463**	**85,111**	**1**	**1,797,985**	**1,631,565**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-11
Uranium – Base Year

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
Extraction and Processing	0	0	0	0	0	0	0	0	0	0	0	0
Heavy Equipment	0	0	0	0	0	0	0	0	0	0	0	0
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-12
Uranium – Alternatives A, B, C, and D, Year 10

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	222	26	107	0	102	11	1	14,093	1	0	14,178	12,866
Extraction and Processing	132	124	0	0	0	0	0	0	0	0	0	0
Heavy Equipment	16	15	257	6	100	18	2	28,849	0	0	28,926	26,249
Total	**369**	**166**	**364**	**7**	**203**	**29**	**3**	**42,942**	**1**	**0**	**43,104**	**39,115**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-13
Uranium – Alternatives A, B, C, and D, Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	444	52	214	1	205	22	2	28,185	1	0	28,356	25,731
Extraction and Processing	263	249	0	0	0	0	0	0	0	0	0	0
Heavy Equipment	32	31	514	13	201	36	4	57,698	1	0	57,852	52,498
Total	**739**	**331**	**727**	**13**	**406**	**58**	**6**	**85,883**	**2**	**1**	**86,208**	**78,229**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-14
Sand and Gravel – Base Year

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	208	21	10	0	7	1	0	1,294	0	0	1,299	1,179
Extraction and Processing	23	6	0	0	0	0	0	0	0	0	0	0
Heavy Equipment	0	0	4	0	2	0	0	400	0	0	401	364
Total	**231**	**27**	**14**	**0**	**9**	**1**	**0**	**1,694**	**0**	**0**	**1,701**	**1,543**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-15
Sand and Gravel – Alternative A, Year 10

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	208	21	10	0	7	1	0	1,294	0	0	1,299	1,179
Extraction and Processing	23	6	0	0	0	0	0	0	0	0	0	0
Heavy Equipment	0	0	4	0	2	0	0	400	0	0	401	364
Total	**231**	**27**	**14**	**0**	**9**	**1**	**0**	**1,694**	**0**	**0**	**1,701**	**1,543**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-16
Sand and Gravel – Alternative B, Year 10

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	52	5	3	0	2	0	0	323	0	0	325	295
Extraction and Processing	6	1	0	0	0	0	0	0	0	0	0	0
Heavy Equipment	0	0	1	0	0	0	0	100	0	0	100	91
Total	**58**	**7**	**3**	**0**	**2**	**0**	**0**	**423**	**0**	**0**	**425**	**386**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-17
Sand and Gravel – Alternative C, Year 10

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	52	5	3	0	2	0	0	323	0	0	325	295
Extraction and Processing	6	1	0	0	0	0	0	0	0	0	0	0
Heavy Equipment	0	0	1	0	0	0	0	100	0	0	100	91
Total	**58**	**7**	**3**	**0**	**2**	**0**	**0**	**423**	**0**	**0**	**425**	**386**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-18
Sand and Gravel – Alternative D, Year 10

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	208	21	10	0	7	1	0	1,294	0	0	1,299	1,179
Extraction and Processing	23	6	0	0	0	0	0	0	0	0	0	0
Heavy Equipment	0	0	4	0	2	0	0	400	0	0	401	364
Total	**231**	**27**	**14**	**0**	**9**	**1**	**0**	**1,694**	**0**	**0**	**1,701**	**1,543**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-19
Sand and Gravel – Alternative A, Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	208	21	10	0	7	1	0	1,294	0	0	1,299	1,179
Extraction and Processing	23	6	0	0	0	0	0	0	0	0	0	0
Heavy Equipment	0	0	4	0	2	0	0	400	0	0	401	364
Total	**231**	**27**	**14**	**0**	**9**	**1**	**0**	**1,694**	**0**	**0**	**1,701**	**1,543**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-20
Sand and Gravel – Alternative B, Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	52	5	3	0	2	0	0	323	0	0	325	295
Extraction and Processing	6	1	0	0	0	0	0	0	0	0	0	0
Heavy Equipment	0	0	1	0	0	0	0	100	0	0	100	91
Total	**58**	**7**	**3**	**0**	**2**	**0**	**0**	**423**	**0**	**0**	**425**	**386**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-21
Sand and Gravel – Alternative C, Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	52	5	3	0	2	0	0	323	0	0	325	295
Extraction and Processing	6	1	0	0	0	0	0	0	0	0	0	0
Heavy Equipment	0	0	1	0	0	0	0	100	0	0	100	91
Total	**58**	**7**	**3**	**0**	**2**	**0**	**0**	**423**	**0**	**0**	**425**	**386**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-22
Sand and Gravel – Alternative D, Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	208	21	10	0	7	1	0	1,294	0	0	1,299	1,179
Extraction and Processing	23	6	0	0	0	0	0	0	0	0	0	0
Heavy Equipment	0	0	4	0	2	0	0	400	0	0	401	364
Total	**231**	**27**	**14**	**0**	**9**	**1**	**0**	**1,694**	**0**	**0**	**1,701**	**1,543**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-23
Travel and Transportation Management – Base Year

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.27	0.00	0.00	0.27	0.24
Maintenance Equipment	0.08	0.01	0.06	0.00	0.05	0.01	0.00	7.46	0.00	0.00	7.48	6.79
Recreational Vehicles	1,216.70	127.16	2.85	0.05	375.33	228.76	22.88	1,648.96	2.69	0.05	1,720.65	1,561.39
Total	**1,216.82**	**127.18**	**2.92**	**0.06**	**375.38**	**228.76**	**22.88**	**1,656.69**	**2.69**	**0.05**	**1,728.40**	**1,568.42**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-24
Travel and Transportation Management – Alternative A, Year 10

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	0.06	0.01	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.00	0.34	0.31
Maintenance Equipment	0.10	0.02	0.08	0.00	0.07	0.01	0.00	9.62	0.00	0.00	9.65	8.76
Recreational Vehicles	1,568.87	163.97	3.68	0.07	483.96	294.97	29.50	2,126.25	3.47	0.06	2,218.69	2,013.33
Total	**1,569.03**	**163.99**	**3.76**	**0.07**	**484.03**	**294.98**	**29.50**	**2,136.21**	**3.47**	**0.06**	**2,228.68**	**2,022.39**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-25
Travel and Transportation Management – Alternative B, Year 10

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Equipment	0	0	0	0	0	0	0	10	0	0	10	9
Recreational Vehicles	1,569	164	4	0	484	295	29	2,126	3	0	2,219	2,013
Total	**1,569**	**164**	**4**	**0**	**484**	**295**	**29**	**2,136**	**3**	**0**	**2,229**	**2,022**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-26
Travel and Transportation Management – Alternative C, Year 10

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Equipment	0	0	0	0	0	0	0	7	0	0	7	7
Recreational Vehicles	1,166	122	3	0	360	219	22	1,580	3	0	1,649	1,496
Total	**1,166**	**122**	**3**	**0**	**360**	**219**	**22**	**1,587**	**3**	**0**	**1,656**	**1,503**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-27
Travel and Transportation Management – Alternative D, Year 10

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Equipment	0	0	0	0	0	0	0	10	0	0	10	9
Recreational Vehicles	1,569	164	4	0	484	295	29	2,126	3	0	2,219	2,013
Total	**1,569**	**164**	**4**	**0**	**484**	**295**	**29**	**2,136**	**3**	**0**	**2,229**	**2,022**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-28
Travel and Transportation Management – Alternative A, Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	0.07	0.01	0.00	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.42	0.38
Maintenance Equipment	0.12	0.02	0.10	0.00	0.08	0.01	0.00	11.88	0.00	0.00	11.91	10.81
Recreational Vehicles	1,936.56	202.40	4.54	0.09	597.38	364.10	36.41	2,624.56	4.28	0.08	2,738.66	2,485.17
Total	**1,936.75**	**202.43**	**4.64**	**0.09**	**597.47**	**364.11**	**36.41**	**2,636.86**	**4.28**	**0.08**	**2,750.99**	**2,496.37**

Table O-29
Travel and Transportation Management – Alternative B, Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Equipment	0	0	0	0	0	0	0	12	0	0	12	11
Recreational Vehicles	1,937	202	5	0	597	364	36	2,625	4	0	2,739	2,485
Total	**1,937**	**202**	**5**	**0**	**597**	**364**	**36**	**2,637**	**4**	**0**	**2,751**	**2,496**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-30
Travel and Transportation Management – Alternative C, Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Equipment	0	0	0	0	0	0	0	7	0	0	7	7
Recreational Vehicles	1,166	122	3	0	360	219	22	1,580	3	0	1,649	1,496
Total	**1,166**	**122**	**3**	**0**	**360**	**219**	**22**	**1,587**	**3**	**0**	**1,656**	**1,503**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-31
Travel and Transportation Management – Alternative D, Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	0	0	0	0	0	0	0	0	0	0	0	0
Maintenance Equipment	0	0	0	0	0	0	0	12	0	0	12	11
Recreational Vehicles	1,937	202	5	0	597	364	36	2,625	4	0	2,739	2,485
Total	**1,937**	**202**	**5**	**0**	**597**	**364**	**36**	**2,637**	**4**	**0**	**2,751**	**2,496**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-32
Prescribed Fire and Mechanical Treatments – Base Year

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Fugitive Dust - Mechanical Treatment	468	70	0	0	0	0	0	0	0	0	0	0
Fugitive Dust - Prescribed Fire	5	1	0	0	0	0	0	0	0	0	0	0
Smoke - Prescribed Fire	3	3	1	0	36	2	0	0	2	2	532	483
Commuter Vehicles - Mechanical Treatment	0	0	0	0	0	0	0	21	0	0	25	23
Commuter Vehicles - Prescribed Fire	0	0	0	0	0	0	0	11	0	0	11	10
Maintenance Equipment - Mechanical Treatment	18	17	208	5	278	56	6	25,421	0	0	25,579	23,211
Maintenance Equipment - Prescribed Fire	0	0	8	0	5	1	0	942	0	0	948	860
Total	**494**	**91**	**217**	**6**	**319**	**59**	**6**	**26,397**	**2**	**2**	**27,095**	**24,587**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-33
Prescribed Fire and Mechanical Treatments – Alternative A, Year 10 and Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Fugitive Dust - Mechanical Treatment	239	36	0	0	0	0	0	0	0	0	0	0
Fugitive Dust - Prescribed Fire	9	1	0	0	0	0	0	0	0	0	0	0
Smoke - Prescribed Fire	6	5	1	0	61	3	0	0	3	3	909	824
Commuter Vehicles - Mechanical Treatment	0	0	0	0	0	0	0	11	0	0	13	12
Commuter Vehicles - Prescribed Fire	0	0	0	0	0	0	0	20	0	0	20	18
Maintenance Equipment - Mechanical Treatment	9	9	106	3	142	29	3	12,982	0	0	13,063	11,854
Maintenance Equipment - Prescribed Fire	1	1	13	0	8	1	0	1,610	0	0	1,620	1,470
Total	**263**	**52**	**121**	**4**	**212**	**33**	**3**	**14,623**	**3**	**3**	**15,623**	**14,177**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-34
Prescribed Fire and Mechanical Treatments – Alternative B, Year 10 and Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Fugitive Dust - Mechanical Treatment	239	36	0	0	0	0	0	0	0	0	0	0
Fugitive Dust - Prescribed Fire	9	1	0	0	0	0	0	0	0	0	0	0
Smoke - Prescribed Fire	6	5	1	0	61	3	0	0	3	3	909	824
Commuter Vehicles - Mechanical Treatment	0	0	0	0	0	0	0	11	0	0	13	12
Commuter Vehicles - Prescribed Fire	0	0	0	0	0	0	0	20	0	0	20	18
Maintenance Equipment - Mechanical Treatment	9	9	106	3	142	29	3	12,982	0	0	13,063	11,854
Maintenance Equipment - Prescribed Fire	1	1	13	0	8	1	0	1,610	0	0	1,620	1,470
Total	**263**	**52**	**121**	**4**	**212**	**33**	**3**	**14,623**	**3**	**3**	**15,623**	**14,177**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-35
Prescribed Fire and Mechanical Treatments – Alternative C, Year 10 and Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Fugitive Dust - Mechanical Treatment	191	29	0	0	0	0	0	0	0	0	0	0
Fugitive Dust - Prescribed Fire	10	2	0	0	0	0	0	0	0	0	0	0
Smoke - Prescribed Fire	7	6	2	0	74	3	0	0	3	3	1,090	989
Commuter Vehicles - Mechanical Treatment	0	0	0	0	0	0	0	9	0	0	10	9
Commuter Vehicles - Prescribed Fire	0	0	0	0	0	0	0	23	0	0	23	21
Maintenance Equipment - Mechanical Treatment	7	7	85	2	114	23	2	10,386	0	0	10,450	9,483
Maintenance Equipment - Prescribed Fire	1	1	16	0	10	2	0	1,932	0	0	1,944	1,764
Total	**217**	**44**	**103**	**3**	**197**	**28**	**3**	**12,350**	**4**	**4**	**13,518**	**12,267**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-36
Prescribed Fire and Mechanical Treatments – Alternative D, Year 10 and Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Fugitive Dust - Mechanical Treatment	299	45	0	0	0	0	0	0	0	0	0	0
Fugitive Dust - Prescribed Fire	6	1	0	0	0	0	0	0	0	0	0	0
Smoke - Prescribed Fire	4	4	1	0	46	2	0	0	2	2	681	618
Commuter Vehicles - Mechanical Treatment	0	0	0	0	0	0	0	14	0	0	16	15
Commuter Vehicles - Prescribed Fire	0	0	0	0	0	0	0	15	0	0	15	13
Maintenance Equipment - Mechanical Treatment	11	11	133	3	177	36	4	16,228	0	0	16,328	14,817
Maintenance Equipment - Prescribed Fire	1	1	10	0	6	1	0	1,208	0	0	1,215	1,102
Total	**321**	**61**	**144**	**4**	**230**	**39**	**4**	**17,464**	**3**	**2**	**18,255**	**16,566**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

Table O-37
Livestock Grazing – Base Year

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Heavy Equipment	0.37	0.05	0.09	0.00	0.03	0.01	0.00	11.86	0.00	0.00	11.89	10.79
Commuting Vehicles	1.00	0.11	0.26	0.00	0.72	0.06	0.01	43.11	0.00	0.00	43.74	39.69
OHVs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Enteric	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2,554.31	0.00	53,640.53	48,675.62
Total	**1.38**	**0.16**	**0.35**	**0.00**	**0.75**	**0.07**	**0.01**	**54.97**	**2,554.31**	**0.00**	**53,696.16**	**48,726.10**

Table O-38
Livestock Grazing – Alternative A, Year 10 and Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Heavy Equipment	0.36	0.05	0.09	0.00	0.03	0.01	0.00	11.31	0.00	0.00	11.34	10.29
Commuting Vehicles	0.95	0.10	0.25	0.00	0.69	0.06	0.01	41.11	0.00	0.00	41.71	37.85
OHVs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Enteric	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2,435.78	0.00	51,151.45	46,416.92
Total	**1.31**	**0.15**	**0.34**	**0.00**	**0.72**	**0.06**	**0.01**	**52.42**	**2,435.79**	**0.00**	**51,204.50**	**46,465.06**

Table O-39
Livestock Grazing – Alternative B, Year 10 and Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Heavy Equipment	0.36	0.05	0.09	0.00	0.03	0.01	0.00	11.28	0.00	0.00	11.31	10.26
Commuting Vehicles	0.95	0.10	0.25	0.00	0.68	0.06	0.01	41.01	0.00	0.00	41.61	37.76
OHVs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Enteric	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2,429.71	0.00	51,023.92	46,301.20
Total	**1.31**	**0.15**	**0.34**	**0.00**	**0.72**	**0.06**	**0.01**	**52.29**	**2,429.71**	**0.00**	**51,076.84**	**46,349.22**

Table O-40
Livestock Grazing – Alternative C, Year 10 and Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Heavy Equipment	0.21	0.03	0.05	0.00	0.02	0.00	0.00	6.55	0.00	0.00	6.57	5.96
Commuting Vehicles	0.55	0.06	0.14	0.00	0.40	0.03	0.00	23.82	0.00	0.00	24.16	21.93
OHVs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Enteric	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1,411.12	0.00	29,633.42	26,890.58
Total	**0.76**	**0.09**	**0.20**	**0.00**	**0.42**	**0.04**	**0.00**	**30.37**	**1,411.12**	**0.00**	**29,664.16**	**26,918.47**

Table O-41
Livestock Grazing – Alternative D, Year 10 and Year 20

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Heavy Equipment	0.36	0.05	0.09	0.00	0.03	0.01	0.00	11.31	0.00	0.00	11.34	10.29
Commuting Vehicles	0.95	0.10	0.25	0.00	0.69	0.06	0.01	41.11	0.00	0.00	41.71	37.85
OHVs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Enteric	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2,435.78	0.00	51,151.45	46,416.92
Total	**1.31**	**0.15**	**0.34**	**0.00**	**0.72**	**0.06**	**0.01**	**52.42**	**2,435.79**	**0.00**	**51,204.50**	**46,465.06**

Table O-42
Lands and Realty Right-of-ways – Base Year

Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	1.67	0.18	0.35	0.01	0.08	0.02	0.00	40.83	0.00	0.00	42.16	38.26
Heavy Equipment	0.35	0.09	0.68	0.02	0.32	0.05	0.01	72.11	0.00	0.00	72.30	65.61
Total	**2.02**	**0.27**	**1.03**	**0.02**	**0.40**	**0.08**	**0.01**	**112.94**	**0.01**	**0.00**	**114.47**	**103.87**

[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

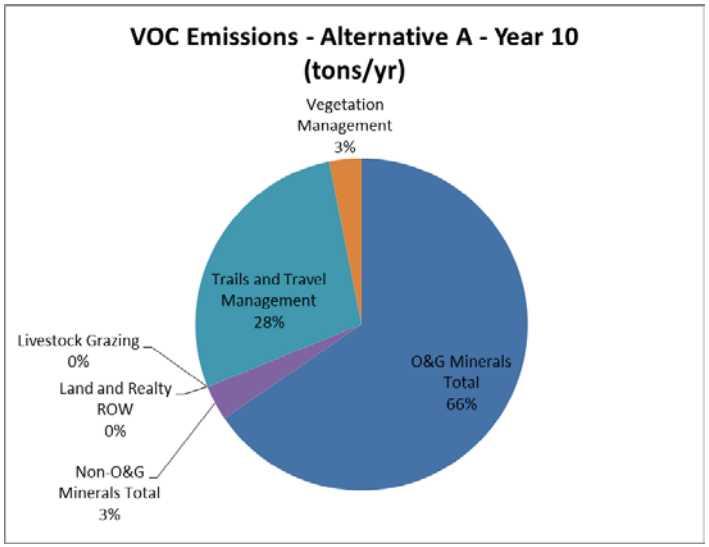
Table O-43
Lands and Realty Right-of-ways – Alternatives A, B, C, and D, Year 10 and Year 20

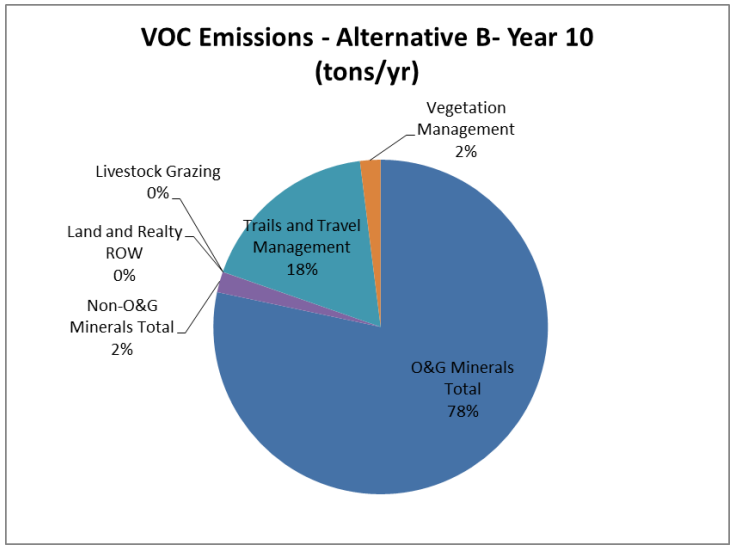
Activity	Annual Emissions (Tons)											
	PM10	PM2.5	NO_x	SO_2	CO	VOC	HAPs[a]	CO_2	CH_4	N_2O	CO_2eq	CO_2eq metric Tonnes
Commuter Vehicles	1.67	0.18	0.35	0.01	0.08	0.02	0.00	40.83	0.00	0.00	42.16	38.26
Heavy Equipment	0.35	0.09	0.68	0.02	0.32	0.05	0.01	72.11	0.00	0.00	72.30	65.61
Total	**2.02**	**0.27**	**1.03**	**0.02**	**0.40**	**0.08**	**0.01**	**112.94**	**0.01**	**0.00**	**114.47**	**103.87**

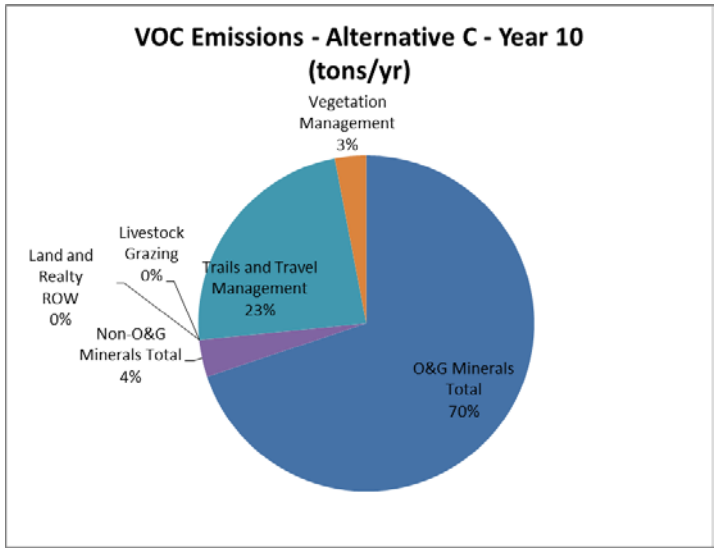
[a] HAPs = Hazardous Air Pollutants; assumed = VOCs * 0.1

O.2 BLM AUTHORIZED ACTIONS: PERCENT CONTRIBUTION TO BLM EMISSIONS BY ACTIVITY

Figure O-1
VOC Emissions







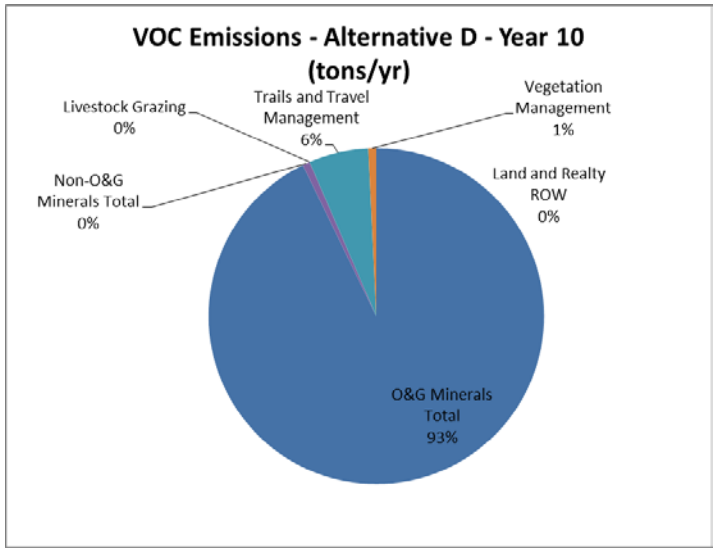
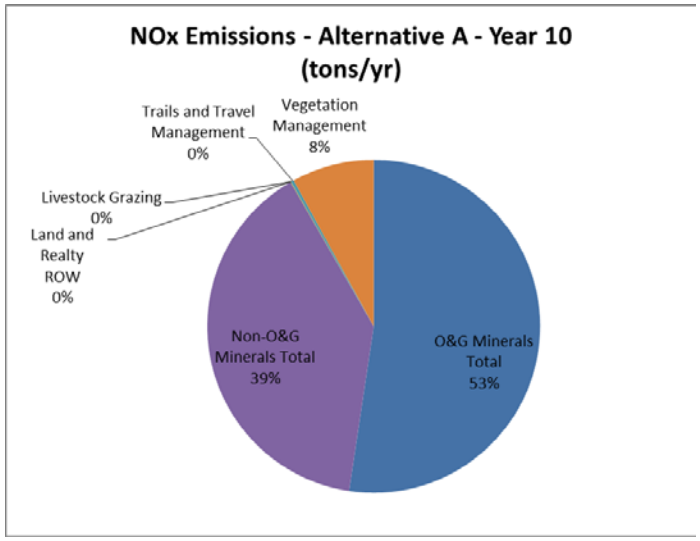
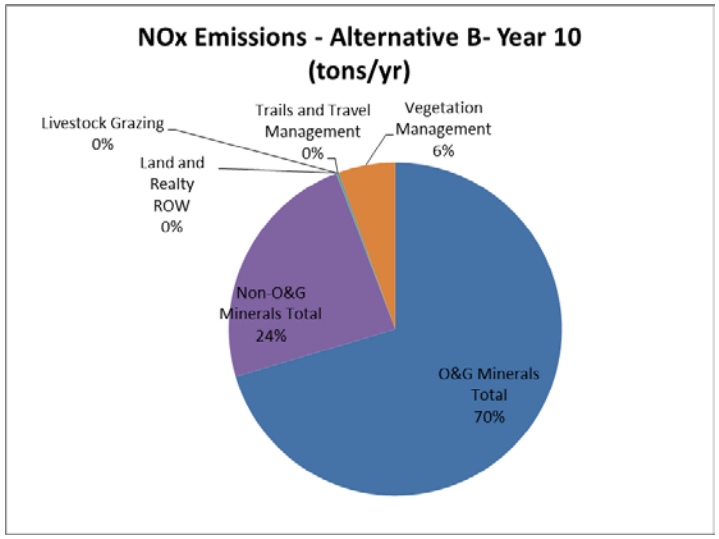
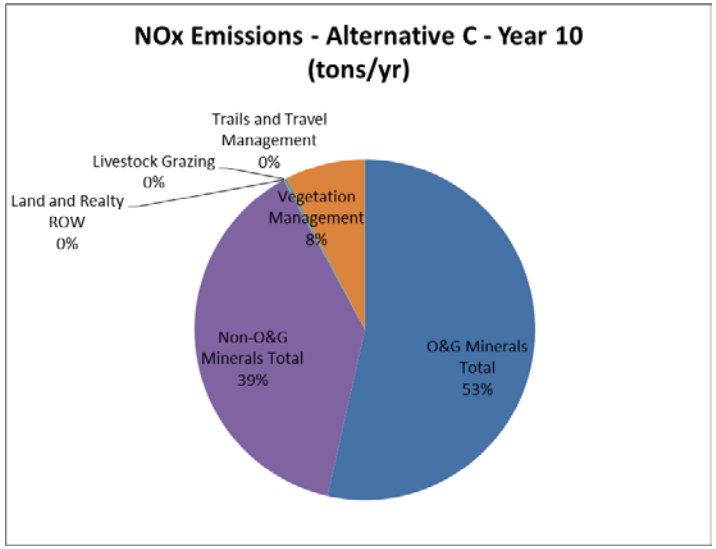


Figure O-2
NO_x Emissions







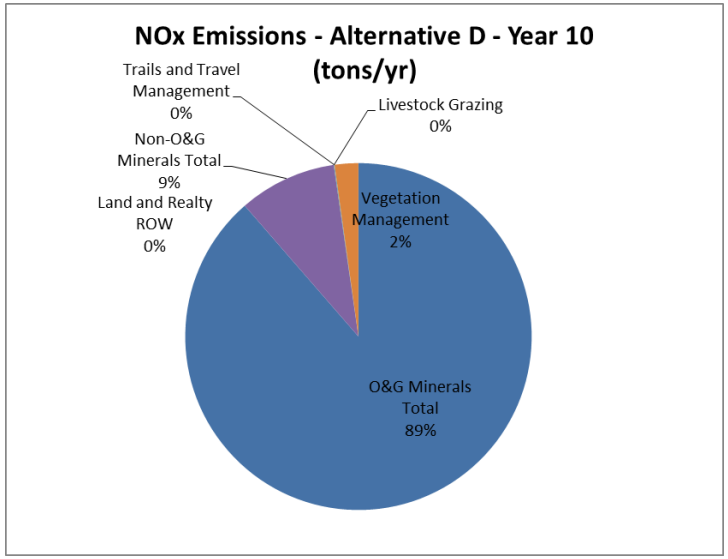
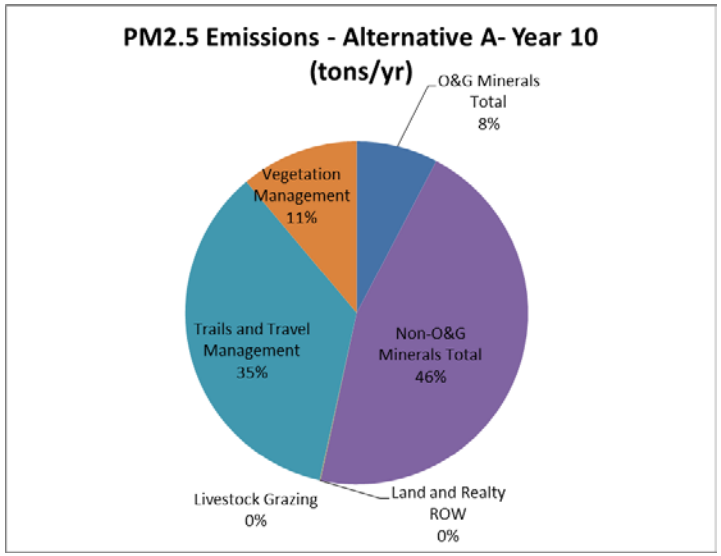
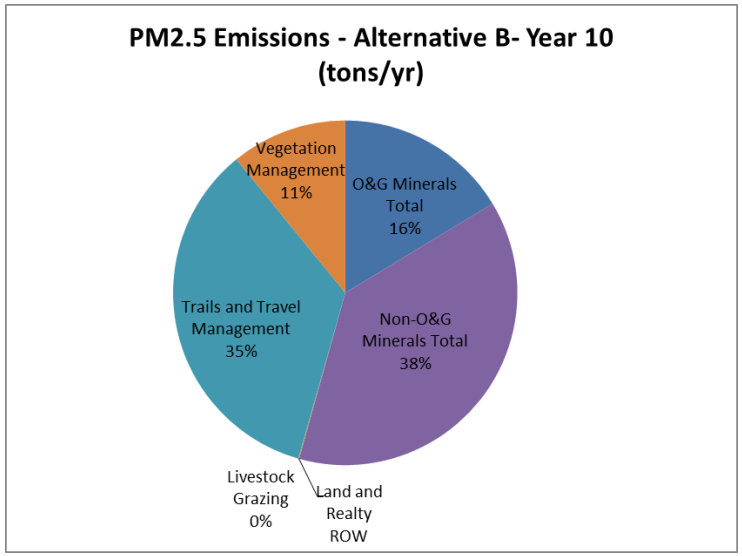
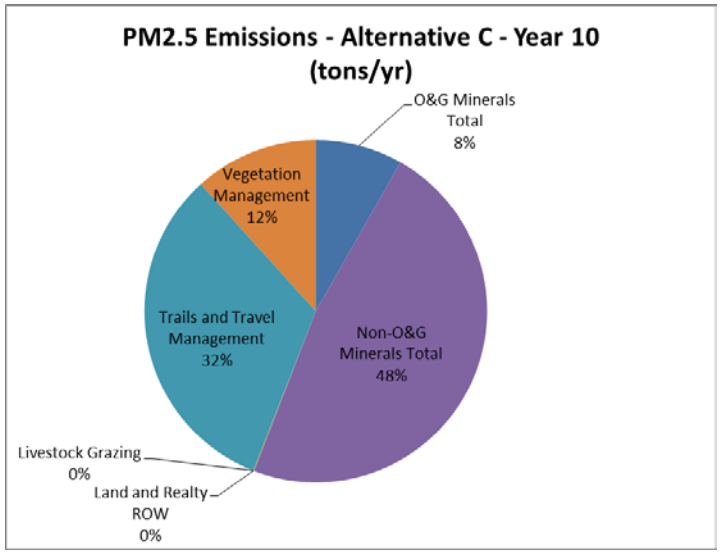
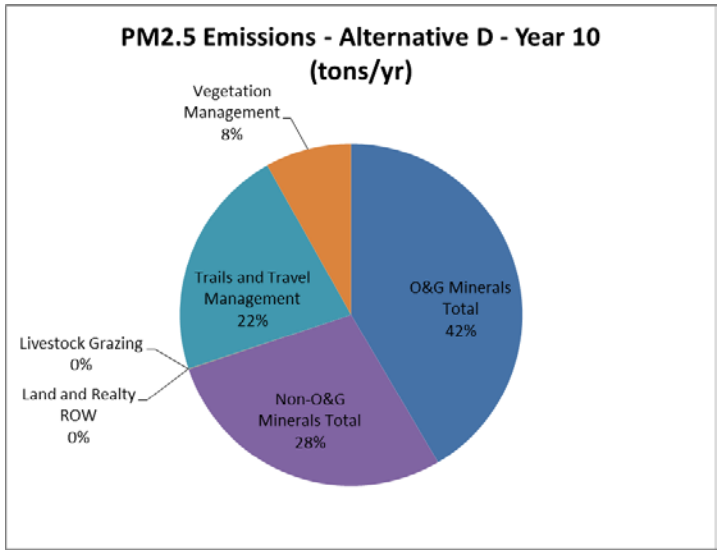


Figure O-3
$PM_{2.5}$ Emissions









O.3 BLM PLUS NON-FEDERAL OIL AND GAS ACTIONS WITHIN THE PLANNING AREA EMISSIONS INVENTORY TABLES

- Oil and Gas Development – BLM + Private/Fee
  - Combined Conventional, CBNG, Shale

Table O-44
BLM + Non-federal Oil and Gas, Alternative A

Category	VOC	CO	NOx	PM10	PM2.5	SO2	HAPs	CO2e
Project Year 10								
Completion Engines	32	332	577	19	18	0	4	67,550
Completion Venting	3	0	0	0	0	0	0	682
Condensate Tanks	425	0	0	0	0	0	12	1,396
Construction Equipment	1	4	10	1	1	0	0	1,006
Dehydrators	96	0	0	0	0	0	50	5,433
Drilling Engines	25	258	449	15	14	0	3	52,540
Field Compressor Engines	22	1,344	752	8	8	0	2	15,400
Flaring	5	21	4	0	0	0	2	6,467
Fracing Engines	0	0	0	0	0	0	0	0
Fugitive Dust	0	0	0	85	9	0	0	0
Fugitive Leaks	925	0	0	0	0	0	45	237,913
Heaters	29	442	526	40	40	0	4	634,746
Midstream Compressor Engines	592	1,499	821	42	42	15	66	51,666
Other Midstream	713	215	187	10	10	9	95	205,137
Other Production	113	88	371	21	20	9	8	57,438
Pneumatic Devices	370	0	0	0	0	0	18	72,979
Pneumatic Pumps	34	0	0	0	0	0	2	6,644
Traffic	1	4	9	87	9	0	0	1,222
Water Injection Pumps	7	7	9	44	3	155	1	15,664
Well Blowdowns	9	0	0	0	0	0	0	1,763
Project Year 10 Totals	**3,403**	**4,215**	**3,714**	**370**	**174**	**189**	**311**	**1,435,646**
Project Year 20								
Completion Engines	32	331	575	19	18	0	4	67,369
Completion Venting	3	0	0	0	0	0	0	678
Condensate Tanks	456	0	0	0	0	0	11	1,498
Construction Equipment	1	4	10	1	1	0	0	1,004
Dehydrators	100	0	0	0	0	0	52	6,403
Drilling Engines	25	258	448	15	14	0	3	52,445
Field Compressor Engines	30	819	394	6	6	0	3	12,089
Flaring	6	27	5	0	0	0	3	8,392
Fracing Engines	0	0	0	0	0	0	0	0
Fugitive Dust	0	0	0	85	9	0	0	0
Fugitive Leaks	729	0	0	0	0	0	35	251,294
Heaters	24	368	438	33	33	0	3	529,366
Midstream Compressor Engines	697	1,723	699	48	48	16	77	62,101
Other Midstream	798	252	219	11	11	10	101	229,712
Other Production	98	96	391	22	21	10	7	56,339
Pneumatic Devices	290	0	0	0	0	0	14	57,490
Pneumatic Pumps	25	0	0	0	0	0	1	5,045
Traffic	1	4	10	91	9	0	0	1,277
Water Injection Pumps	7	8	10	48	4	171	1	17,357
Well Blowdowns	7	0	0	0	0	0	0	1,389
Project Year 20 Totals	**3,331**	**3,891**	**3,199**	**379**	**175**	**209**	**316**	**1,361,245**

Table O-45
BLM + Non-federal Oil and Gas, Alternative B

Category	VOC	CO	NOx	PM10	PM2.5	SO2	HAPs	CO2e
Project Year 10								
Completion Engines	45	457	794	26	25	1	6	93,007
Completion Venting	5	0	0	0	0	0	0	938
Condensate Tanks	338	0	0	0	0	0	10	1,114
Construction Equipment	1	6	14	1	1	0	0	1,386
Dehydrators	94	0	0	0	0	0	49	4,984
Drilling Engines	35	356	618	20	20	0	4	72,348
Field Compressor Engines	27	1,411	775	9	9	0	3	16,808
Flaring	6	27	5	0	0	0	3	8,266
Fugitive Dust	0	0	0	117	12	0	0	0
Fugitive Leaks	1,010	0	0	0	0	0	49	274,278
Heaters	32	487	580	44	44	0	4	699,845
Midstream Compressor Engines	784	1,979	980	54	54	20	87	68,602
Other Midstream	923	283	245	13	13	11	120	265,391
Other Production	126	102	428	24	23	10	8	65,240
Pneumatic Devices	404	0	0	0	0	0	20	79,701
Pneumatic Pumps	32	0	0	0	0	0	2	6,349
Traffic	1	5	11	102	11	0	0	1,496
Water Injection Pumps	8	8	10	51	4	180	1	18,242
Well Blowdowns	10	0	0	0	0	0	0	1,925
Project Year 10 Totals	**3,880**	**5,121**	**4,460**	**461**	**215**	**223**	**366**	**1,679,920**
Project Year 20								
Completion Engines	27	456	456	5	5	1	3	92,819
Completion Venting	5	0	0	0	0	0	0	935
Condensate Tanks	340	0	0	0	0	0	8	1,125
Construction Equipment	1	6	14	1	1	0	0	1,400
Dehydrators	98	0	0	0	0	0	51	5,817
Drilling Engines	21	355	355	4	4	0	3	72,249
Field Compressor Engines	39	954	439	8	8	0	4	14,906
Flaring	8	35	6	0	0	0	3	10,734
Fugitive Dust	0	0	0	106	11	0	0	0
Fugitive Leaks	900	0	0	0	0	0	43	324,025
Heaters	30	459	546	42	42	0	4	659,563
Midstream Compressor Engines	947	2,338	900	65	65	22	105	84,480
Other Midstream	1,075	342	296	15	15	14	135	309,330
Other Production	123	124	504	28	27	12	9	71,939
Pneumatic Devices	358	0	0	0	0	0	17	70,933
Pneumatic Pumps	22	0	0	0	0	0	1	4,457
Traffic	1	5	11	110	11	0	0	1,428
Water Injection Pumps	10	10	13	63	5	222	1	22,512
Well Blowdowns	9	0	0	0	0	0	0	1,713
Project Year 20 Totals	**4,013**	**5,083**	**3,541**	**446**	**194**	**272**	**388**	**1,750,364**

Table O-46
BLM + Non-federal Oil and Gas, Alternative C

Category	VOC	CO	NOx	PM10	PM2.5	SO2	HAPs	CO2e
Project Year 10								
Completion Engines	19	332	332	4	4	0	2	67,546
Completion Venting	3	0	0	0	0	0	0	682
Condensate Tanks	199	0	0	0	0	0	7	660
Construction Equipment	1	4	10	1	1	0	0	1,013
Dehydrators	47	0	0	0	0	0	24	2,200
Drilling Engines	15	258	258	3	3	0	2	52,536
Field Compressor Engines	16	1,254	722	7	7	0	2	13,528
Flaring	5	21	4	0	0	0	2	6,467
Fugitive Dust	0	0	0	50	5	0	0	0
Fugitive Leaks	925	0	0	0	0	0	45	237,913
Heaters	29	442	526	40	40	0	4	634,746
Midstream Compressor Engines	592	1,499	821	42	42	15	66	51,666
Other Midstream	713	215	187	10	10	9	95	205,137
Other Production	113	88	371	21	20	9	8	57,438
Pneumatic Devices	370	0	0	0	0	0	18	72,979
Pneumatic Pumps	28	0	0	0	0	0	1	5,547
Traffic	1	4	9	85	9	0	0	1,148
Water Injection Pumps	7	7	9	44	3	155	1	15,664
Well Blowdowns	9	0	0	0	0	0	0	1,763
Project Year 10 Totals	**3,092**	**4,125**	**3,248**	**305**	**143**	**189**	**277**	**1,428,632**
Project Year 20								
Completion Engines	19	331	63	3	3	0	2	67,364
Completion Venting	3	0	0	0	0	0	0	678
Condensate Tanks	157	0	0	0	0	0	5	524
Construction Equipment	1	4	10	1	1	0	0	1,016
Dehydrators	35	0	0	0	0	0	18	2,144
Drilling Engines	15	258	49	2	2	0	2	52,442
Field Compressor Engines	17	641	334	4	4	0	2	8,355
Flaring	6	27	5	0	0	0	3	8,392
Fugitive Dust	0	0	0	48	5	0	0	0
Fugitive Leaks	729	0	0	0	0	0	35	251,294
Heaters	24	368	438	33	33	0	3	529,366
Midstream Compressor Engines	697	1,723	699	48	48	16	77	62,101
Other Midstream	798	252	219	11	11	10	101	229,712
Other Production	98	96	391	22	21	10	7	56,339
Pneumatic Devices	290	0	0	0	0	0	14	57,490
Pneumatic Pumps	14	0	0	0	0	0	1	2,856
Traffic	1	4	8	85	9	0	0	1,093
Water Injection Pumps	7	8	10	48	4	171	1	17,357
Well Blowdowns	7	0	0	0	0	0	0	1,389
Project Year 20 Totals	**2,920**	**3,712**	**2,227**	**306**	**141**	**209**	**271**	**1,349,912**

Table O-47
BLM + Non-federal Oil and Gas, Alternative D

Category	VOC	CO	NOx	PM10	PM2.5	SO2	HAPs	CO2e
Project Year 10								
Completion Engines	199	2,038	3,540	116	113	3	25	414,480
Completion Venting	25	0	0	0	0	0	1	5,026
Condensate Tanks	1,074	0	0	0	0	0	28	3,550
Construction Equipment	5	28	63	4	4	1	1	6,280
Dehydrators	365	0	0	0	0	0	190	18,711
Drilling Engines	144	1,476	2,565	84	82	2	18	300,336
Field Compressor Engines	105	2,489	1,136	20	20	1	12	39,348
Flaring	36	151	28	0	0	0	14	46,443
Fugitive Dust	0	0	0	527	54	0	0	0
Fugitive Leaks	2,368	0	0	0	0	0	114	722,815
Heaters	76	1,167	1,389	106	106	0	11	1,676,763
Midstream Compressor Engines	3,419	8,211	2,804	222	222	86	378	269,343
Other Midstream	3,893	1,141	989	51	51	45	530	1,118,780
Other Production	316	272	1,126	62	61	27	21	166,815
Pneumatic Devices	944	0	0	0	0	0	46	186,766
Pneumatic Pumps	59	0	0	0	0	0	3	11,627
Traffic	3	15	38	282	30	0	0	4,883
Water Injection Pumps	21	22	28	137	11	484	3	49,038
Well Blowdowns	23	0	0	0	0	0	1	4,511
Project Year 10 Totals	**13,076**	**17,009**	**13,704**	**1,613**	**753**	**650**	**1,395**	**5,045,517**
Project Year 20								
Completion Engines	118	2,036	2,036	23	23	3	15	414,091
Completion Venting	25	0	0	0	0	0	1	5,023
Condensate Tanks	1,312	0	0	0	0	0	32	4,341
Construction Equipment	5	28	64	4	4	1	1	6,353
Dehydrators	456	0	0	0	0	0	237	23,949
Drilling Engines	86	1,475	1,475	17	16	2	11	300,035
Field Compressor Engines	196	3,110	1,161	31	31	1	22	59,984
Flaring	51	215	39	0	0	0	20	66,243
Fugitive Dust	0	0	0	485	49	0	0	0
Fugitive Leaks	3,616	0	0	0	0	0	173	1,220,816
Heaters	119	1,818	2,165	165	165	0	17	2,613,263
Midstream Compressor Engines	4,402	10,392	3,219	287	287	109	487	349,578
Other Midstream	4,999	1,474	1,278	66	66	59	677	1,436,726
Other Production	487	464	1,900	105	102	46	34	274,992
Pneumatic Devices	1,439	0	0	0	0	0	70	285,063
Pneumatic Pumps	75	0	0	0	0	0	4	15,015
Traffic	4	20	42	417	43	0	0	5,636
Water Injection Pumps	36	37	48	235	18	831	5	84,082
Well Blowdowns	35	0	0	0	0	0	2	6,885
Project Year 20 Totals	**17,461**	**21,068**	**13,427**	**1,835**	**805**	**1,052**	**1,806**	**7,172,075**

This page intentionally left blank.

O.4 BLM PLUS NON-FEDERAL OIL AND GAS ACTIONS WITHIN THE PLANNING AREA: EMISSION SUMMARIES BY POLLUTANT

Table O-48
Volatile Organic Compounds

	BLM Actions Only VOC Estimated Emissions (tons/yr)								
Emissions Generating Activity	base year	A Year 10	A Year 20	B Year 10	B Year 20	C Year 10	C Year 20	D Year 10	D Year 20
Oil and Gas - Conventional/CBNG	811	609	366	1,061	1,049	590	342	3,436	4,634
Oil and Gas - Shale	2	81	105	246	312	60	78	1,325	1,681
Fluid Minerals Total	***813***	***690***	***471***	***1,307***	***1,360***	***650***	***419***	***4,761***	***6,315***
Coal	0	6	7	4	4	4	4	6	7
Sand and Gravel	1	1	1	0	0	0	0	1	1
Uranium	0	29	58	29	58	29	58	29	58
Solid Minerals Total	***1***	***36***	***66***	***33***	***62***	***33***	***62***	***36***	***66***
Lands and Realty ROW	0	0	0	0	0	0	0	0	0
Livestock Grazing	0	0	0	0	0	0	0	0	0
Travel and Transportation Management	229	295	364	295	364	219	219	295	364
Vegetation –Prescribed Fire and Mechanical Treatment	59	33	33	33	33	28	28	39	39
Other Activities Total	***288***	***328***	***397***	***328***	***397***	***247***	***247***	***334***	***403***
TOTAL Alternative	1,102	1,054	934	1,669	1,820	931	729	5,131	6,784
	BLM + Non-Federal Oil and Gas within GJFO VOC Estimated Emissions (tons/yr)								
Emissions Generating Activity	base year	A Year 10	A Year 20	B Year 10	B Year 20	C Year 10	C Year 20	D Year 10	D Year 20
Oil and Gas - Conventional/CBNG	3,581	2,862	2,627	3,237	3,197	2,694	2,401	10,805	14,579
Oil and Gas - Shale	4	541	704	643	816	399	520	2,272	2,883
Fluid Minerals Total	***3,585***	***3,403***	***3,331***	***3,880***	***4,013***	***3,092***	***2,920***	***13,076***	***17,461***
Coal	0	6	7	4	4	4	4	6	7
Sand and Gravel	1	1	1	0	0	0	0	1	1
Uranium	0	29	58	29	58	29	58	29	58
Solid Minerals Total	***1***	***36***	***66***	***33***	***62***	***33***	***62***	***36***	***66***
Lands and Realty ROW	0	0	0	0	0	0	0	0	0
Livestock Grazing	0	0	0	0	0	0	0	0	0
Travel and Transportation Management	229	295	364	295	364	219	219	295	364
Vegetation –Prescribed Fire and Mechanical Treatment	59	33	33	33	33	28	28	39	39
Other Activities Total	***288***	***328***	***397***	***328***	***397***	***247***	***247***	***334***	***403***
TOTAL Alternative	3,874	3,767	3,794	4,241	4,473	3,373	3,230	13,447	17,931

Table O-49
Nitrogen Oxides

	BLM Actions Only NOx Estimated Emissions (tons/yr)								
Emissions Generating Activity	base year	A Year 10	A Year 20	B Year 10	B Year 20	C Year 10	C Year 20	D Year 10	D Year 20
Oil and Gas - Conventional/CBNG	1,295	630	280	976	650	598	215	2,752	2,696
Oil and Gas - Shale	6	162	191	563	534	125	113	3,021	2,867
Fluid Minerals Total	***1,301***	***792***	***471***	***1,538***	***1,185***	***723***	***328***	***5,773***	***5,563***
Coal	0	217	269	154	154	154	154	217	269
Sand and Gravel	14	14	14	3	3	3	3	14	14
Uranium	0	364	727	364	727	364	727	364	727
Solid Minerals Total	***14***	***594***	***1,010***	***521***	***884***	***521***	***884***	***594***	***1,010***
Lands and Realty ROW	1	1	1	1	1	1	1	1	1
Livestock Grazing	0	0	0	0	0	0	0	0	0
Travel and Transportation Management	3	4	5	4	5	3	3	4	5
Vegetation –Prescribed Fire and Mechanical Treatment	217	121	121	121	121	103	103	144	144
Other Activities Total	***221***	***126***	***127***	***126***	***127***	***107***	***107***	***149***	***150***
TOTAL Alternative	1,536	1,513	1,608	2,185	2,196	1,350	1,319	6,517	6,723
	BLM + Non-Federal Oil and Gas within GJFO NOx Estimated Emissions (tons/yr)								
Emissions Generating Activity	base year	A Year 10	A Year 20	B Year 10	B Year 20	C Year 10	C Year 20	D Year 10	D Year 20
Oil and Gas - Conventional/CBNG	8,703	2,643	1,931	2,988	2,143	2,426	1,483	8,520	8,508
Oil and Gas - Shale	27	1,071	1,268	1,472	1,398	822	744	5,184	4,919
Fluid Minerals Total	***8,730***	***3,714***	***3,199***	***4,460***	***3,541***	***3,248***	***2,227***	***13,704***	***13,427***
Coal	0	217	269	154	154	154	154	217	269
Sand and Gravel	14	14	14	3	3	3	3	14	14
Uranium	0	364	727	364	727	364	727	364	727
Solid Minerals Total	***14***	***594***	***1,010***	***521***	***884***	***521***	***884***	***594***	***1,010***
Lands and Realty ROW	1	1	1	1	1	1	1	1	1
Livestock Grazing	0	0	0	0	0	0	0	0	0
Travel and Transportation Management	3	4	5	4	5	3	3	4	5
Vegetation –Prescribed Fire and Mechanical Treatment	217	121	121	121	121	103	103	144	144
Other Activities Total	***221***	***126***	***127***	***126***	***127***	***107***	***107***	***149***	***150***
TOTAL Alternative	8,965	4,434	4,336	5,107	4,552	3,876	3,219	14,447	14,588

Table O-50
Particulate Matter - PM10

	BLM Actions Only PM10 Estimated Emissions (tons/yr)								
Emissions Generating Activity	base year	A Year 10	A Year 20	B Year 10	B Year 20	C Year 10	C Year 20	D Year 10	D Year 20
Oil and Gas - Conventional/CBNG	100	58	32	104	88	54	27	344	386
Oil and Gas - Shale	1	18	24	62	70	13	18	332	375
Fluid Minerals Total	***101***	***76***	***56***	***167***	***158***	***67***	***45***	***676***	***761***
Coal	0	60	42	24	24	24	24	60	42
Sand and Gravel	231	231	231	58	58	58	58	231	231
Uranium	0	369	739	369	739	369	739	369	739
Solid Minerals Total	***231***	***661***	***1,011***	***451***	***820***	***451***	***820***	***661***	***1,011***
Lands and Realty ROW	2	2	2	2	2	2	2	2	2
Livestock Grazing	1	1	1	1	1	1	1	1	1
Travel and Transportation Management	1,217	1,569	1,937	1,569	1,937	1,166	1,166	1,569	1,937
Vegetation –Prescribed Fire and Mechanical Treatment	494	263	263	263	263	217	217	321	321
Other Activities Total	***1,715***	***1,836***	***2,203***	***1,836***	***2,203***	***1,386***	***1,386***	***1,894***	***2,262***
TOTAL Alternative	2,047	2,573	3,271	2,454	3,182	1,903	2,251	3,231	4,034
	BLM + Non-Federal Oil and Gas within GJFO PM10 Estimated Emissions (tons/yr)								
Emissions Generating Activity	base year	A Year 10	A Year 20	B Year 10	B Year 20	C Year 10	C Year 20	D Year 10	D Year 20
Oil and Gas - Conventional/CBNG	904	251	219	297	262	222	188	1,042	1,191
Oil and Gas - Shale	4	119	160	163	184	83	119	571	644
Fluid Minerals Total	***909***	***370***	***379***	***461***	***446***	***305***	***306***	***1,613***	***1,835***
Coal	0	60	42	24	24	24	24	60	42
Sand and Gravel	231	231	231	58	58	58	58	231	231
Uranium	0	369	739	369	739	369	739	369	739
Solid Minerals Total	***231***	***661***	***1,011***	***451***	***820***	***451***	***820***	***661***	***1,011***
Lands and Realty ROW	2	2	2	2	2	2	2	2	2
Livestock Grazing	1	1	1	1	1	1	1	1	1
Travel and Transportation Management	1,217	1,569	1,937	1,569	1,937	1,166	1,166	1,569	1,937
Vegetation –Prescribed Fire and Mechanical Treatment	494	263	263	263	263	217	217	321	321
Other Activities Total	***1,715***	***1,836***	***2,203***	***1,836***	***2,203***	***1,386***	***1,386***	***1,894***	***2,262***
TOTAL Alternative	2,854	2,867	3,594	2,747	3,470	2,142	2,512	4,168	5,108

Table O-51
Particulate Matter – $PM_{2.5}$

	BLM Actions Only PM2.5 Estimated Emissions (tons/yr)								
Emissions Generating Activity	base year	A Year 10	A Year 20	B Year 10	B Year 20	C Year 10	C Year 20	D Year 10	D Year 20
Oil and Gas - Conventional/CBNG	43	28	16	50	42	26	14	166	183
Oil and Gas - Shale	0	8	10	27	26	5	7	144	139
Fluid Minerals Total	***43***	***36***	***26***	***77***	***68***	***31***	***21***	***310***	***323***
Coal	0	19	12	7	7	7	7	19	12
Sand and Gravel	27	27	27	7	7	7	7	27	27
Uranium	0	166	331	166	331	166	331	166	331
Solid Minerals Total	***27***	***212***	***371***	***180***	***345***	***180***	***345***	***212***	***371***
Lands and Realty ROW	0	0	0	0	0	0	0	0	0
Livestock Grazing	0	0	0	0	0	0	0	0	0
Travel and Transportation Management	127	164	202	164	202	122	122	164	202
Vegetation –Prescribed Fire and Mechanical Treatment	91	52	52	52	52	44	44	61	61
Other Activities Total	***219***	***216***	***254***	***216***	***254***	***166***	***166***	***225***	***264***
TOTAL Alternative	289	463	651	473	667	377	532	747	957
	BLM + Non-Federal Oil and Gas within GJFO PM2.5 Estimated Emissions (tons/yr)								
Emissions Generating Activity	base year	A Year 10	A Year 20	B Year 10	B Year 20	C Year 10	C Year 20	D Year 10	D Year 20
Oil and Gas - Conventional/CBNG	335	123	109	145	125	109	94	506	566
Oil and Gas - Shale	1	51	66	70	68	34	47	247	239
Fluid Minerals Total	***336***	***174***	***175***	***215***	***194***	***143***	***141***	***753***	***805***
Coal	0	19	12	7	7	7	7	19	12
Sand and Gravel	27	27	27	7	7	7	7	27	27
Uranium	0	166	331	166	331	166	331	166	331
Solid Minerals Total	***27***	***212***	***371***	***180***	***345***	***180***	***345***	***212***	***371***
Lands and Realty ROW	0	0	0	0	0	0	0	0	0
Livestock Grazing	0	0	0	0	0	0	0	0	0
Travel and Transportation Management	127	164	202	164	202	122	122	164	202
Vegetation –Prescribed Fire and Mechanical Treatment	91	52	52	52	52	44	44	61	61
Other Activities Total	***219***	***216***	***254***	***216***	***254***	***166***	***166***	***225***	***264***
TOTAL Alternative	582	602	800	611	793	489	653	1,190	1,439

Table O-52
Sulfur Dioxide (SO_2)

	BLM Actions Only SO2 Estimated Emissions (tons/yr)								
Emissions Generating Activity	base year	A Year 10	A Year 20	B Year 10	B Year 20	C Year 10	C Year 20	D Year 10	D Year 20
Oil and Gas - Conventional/CBNG	59	36	16	53	45	36	16	137	194
Oil and Gas - Shale	1	8	15	26	49	8	15	135	260
Fluid Minerals Total	***60***	***45***	***31***	***79***	***95***	***45***	***31***	***272***	***454***
Coal	0	0	0	0	0	0	0	0	0
Sand and Gravel	0	0	0	0	0	0	0	0	0
Uranium	0	7	13	7	13	7	13	7	13
Solid Minerals Total	***0***	***7***	***14***	***7***	***14***	***7***	***14***	***7***	***14***
Lands and Realty ROW	0	0	0	0	0	0	0	0	0
Livestock Grazing	0	0	0	0	0	0	0	0	0
Travel and Transportation Management	0	0	0	0	0	0	0	0	0
Vegetation –Prescribed Fire and Mechanical Treatment	6	4	4	4	4	3	3	4	4
Other Activities Total	***6***	***4***	***4***	***4***	***4***	***3***	***3***	***4***	***4***
TOTAL Alternative	66	55	49	89	112	55	48	283	472
	BLM + Non-Federal Oil and Gas within GJFO SO2 Estimated Emissions (tons/yr)								
Emissions Generating Activity	base year	A Year 10	A Year 20	B Year 10	B Year 20	C Year 10	C Year 20	D Year 10	D Year 20
Oil and Gas - Conventional/CBNG	290	138	114	155	143	138	114	417	605
Oil and Gas - Shale	4	51	94	68	129	50	94	233	447
Fluid Minerals Total	***294***	***189***	***209***	***223***	***272***	***189***	***209***	***650***	***1,052***
Coal	0	0	0	0	0	0	0	0	0
Sand and Gravel	0	0	0	0	0	0	0	0	0
Uranium	0	7	13	7	13	7	13	7	13
Solid Minerals Total	***0***	***7***	***14***	***7***	***14***	***7***	***14***	***7***	***14***
Lands and Realty ROW	0	0	0	0	0	0	0	0	0
Livestock Grazing	0	0	0	0	0	0	0	0	0
Travel and Transportation Management	0	0	0	0	0	0	0	0	0
Vegetation –Prescribed Fire and Mechanical Treatment	6	4	4	4	4	3	3	4	4
Other Activities Total	***6***	***4***	***4***	***4***	***4***	***3***	***3***	***4***	***4***
TOTAL Alternative	300	199	226	234	289	199	225	661	1,070

Table O-53
Hazardous Air Pollutants (HAPs)

	BLM Actions Only HAPS Estimated Emissions (tons/yr)								
Emissions Generating Activity	base year	A Year 10	A Year 20	B Year 10	B Year 20	C Year 10	C Year 20	D Year 10	D Year 20
Oil and Gas - Conventional/CBNG	75	59	47	117	128	51	37	440	576
Oil and Gas - Shale	0	4	5	13	16	4	5	72	86
Fluid Minerals Total	***75***	***62***	***52***	***131***	***144***	***55***	***42***	***511***	***662***
Coal	0	1	1	0	0	0	0	1	1
Sand and Gravel	0	0	0	0	0	0	0	0	0
Uranium	0	3	6	3	6	3	6	3	6
Solid Minerals Total	***0***	***4***	***7***	***3***	***6***	***3***	***6***	***4***	***7***
Lands and Realty ROW	0	0	0	0	0	0	0	0	0
Livestock Grazing	0	0	0	0	0	0	0	0	0
Travel and Transportation Management	23	29	36	29	36	22	22	29	36
Vegetation –Prescribed Fire and Mechanical Treatment	6	3	3	3	3	3	3	4	4
Other Activities Total	***29***	***33***	***40***	***33***	***40***	***25***	***25***	***33***	***40***
TOTAL Alternative	104	99	98	167	190	83	73	548	709
	BLM + Non-Federal Oil and Gas within GJFO HAPS Estimated Emissions (tons/yr)								
Emissions Generating Activity	base year	A Year 10	A Year 20	B Year 10	B Year 20	C Year 10	C Year 20	D Year 10	D Year 20
Oil and Gas - Conventional/CBNG	342	286	284	331	347	253	241	1,273	1,659
Oil and Gas - Shale	0	25	32	35	42	24	30	123	147
Fluid Minerals Total	***342***	***311***	***316***	***366***	***388***	***277***	***271***	***1,395***	***1,806***
Coal	0	1	1	0	0	0	0	1	1
Sand and Gravel	0	0	0	0	0	0	0	0	0
Uranium	0	3	6	3	6	3	6	3	6
Solid Minerals Total	***0***	***4***	***7***	***3***	***6***	***3***	***6***	***4***	***7***
Lands and Realty ROW	0	0	0	0	0	0	0	0	0
Livestock Grazing	0	0	0	0	0	0	0	0	0
Travel and Transportation Management	23	29	36	29	36	22	22	29	36
Vegetation –Prescribed Fire and Mechanical Treatment	6	3	3	3	3	3	3	4	4
Other Activities Total	***29***	***33***	***40***	***33***	***40***	***25***	***25***	***33***	***40***
TOTAL Alternative	371	347	362	402	434	305	302	1,432	1,853

This page intentionally left blank.

O.5 INPUTS AND ASSUMPTIONS FOR EMISSIONS INVENTORY

Table O-54
Input Assumptions for BLM Actions and Non-federal Oil and Gas Development within the Planning Area

Key Assumption	A	A	B	B	C	C	D	D
	Year 10	Year 20	Year 10	Year 20	Year 10	Year 20	Year 10	Year 20
Oil and Gas Development BLM								
con. / cbm wells	56	110	196	390	56	110	916	1,831
shale wells	55	110	195	390	55	110	1,054	2,107
Shale Gas - compression (total Hp)	3,170	4,163	11,168	14,732	3,170	4,163	60,242	79,518
Conv/CBM lateral compression (total Hp)	1,671	662	2,213	1,745	1,671	662	4,999	7,320
Conv/CBM wellhead compression (total Hp)	2,035	806	2,695	2,125	2,035	806	6,087	8,913
Conv/CBM midstream scalar: Gas Production Growth	0.88	0.91	2.43	2.94	0.88	0.91	10.36	13.44
drilling rate (wells/yr)	11		39		11		197	
Oil and Gas Development non-BLM								
con. / cbm wells	316	632	316	632	316	632	1,836	3,671
shale wells	316	632	316	632	316	632	754	1,507
Shale Gas - compression (total Hp)	18,056	23,855	18,056	23,855	18,056	23,855	43,079	56,862
Conv/CBM lateral compression (total Hp)	4,256	3,989	4,256	3,989	4,256	3,989	10,137	15,747
Conv/CBM wellhead compression (total Hp)	5,182	4,857	5,182	4,857	5,182	4,857	12,343	19,174
Conv/CBM midstream scalar: Gas Production Growth	0.97	1.05	0.97	1.05	0.97	1.05	4.37	5.53
drilling rate (wells/yr)	63		63		63		259	
Coal								
tons produced (MMt/yr)	10	14	8		8		10	14
acres disturbed	940	1250	320		320		620	930
Uranium								
tons produced (MMt/yr)	0.7	1.5	0.7	1.5	0.7	1.5	0.7	1.5
Sand and Gravel								
Production	160,790		40,198		40,198		160,790	
Acres	8		2		2		8	
Fire								
Acres	396		396		476		297	
Comp.Travel and Trans mgmnt								
1000 vehicle miles traveled per year	9,081	11,210	9,081	11,210	6,748	6,748	9,081	11,210
Livestock Grazing								
AUMs	34093		34008		19751		34093	
Lands-ROWs and Realty								
# of sites	6		6		6		6	
Acres	12		12		12		12	

Note: "Fire" only includes prescribed fires. Mechanical treatment acreages include 1,023 acres for Alternatives A and B, 819 acres for Alternative C, and 1,279 acres for Alternative D.

Table O-55
Emissions Controls Assumptions for Oil and Gas Calculations

Emission Controls - Control Percentages				
Dust Control	50%	50%	50%	80%
	50%	50%	80%	80%
Drill Rigs (control from basline to higher Tier engine)	0% (NOx) 0% (PM) 0% (VOC)	0% (NOx) 0% (PM) 0% (VOC)	-42% (NOx) -80% (PM) -41% (VOC)	0% (NOx) 0% (PM) 0% (VOC)
	0% (NOx) 0% (PM) 0% (VOC)	-42% (NOx) -80% (PM) -41% (VOC)	-89% (NOx) -85% (PM) -41% (VOC)	-42% (NOx) -80% (PM) -41% (VOC)
Completion Equipment (control from basline to higher Tier engine)	0% (NOx) 0% (PM) 0% (VOC)	0% (NOx) 0% (PM) 0% (VOC)	-42% (NOx) -80% (PM) -41% (VOC)	0% (NOx) 0% (PM) 0% (VOC)
	0% (NOx) 0% (PM) 0% (VOC)	-42% (NOx) -80% (PM) -41% (VOC)	-89% (NOx) -85% (PM) -41% (VOC)	-42% (NOx) -80% (PM) -41% (VOC)
Green Completions (combination flaring and closed loop)	88%	88%	88%	88%
	88%	88%	88%	88%
	45%	45%	45%	45%
	45%	45%	45%	45%
	45%	45%	45%	45%
	45%	45%	45%	45%
Liquids Removal System (haul traffic)	0%	0%	25%	0%
	0%	50%	50%	50%
Production Site Separator Heaters (consolidation)	0%	0%	0%	0%
	0%	0%	0%	0%
Production Site Tank Heaters (consolidation)	0%	0%	0%	0%
	0%	0%	0%	0%
Production Site Dehydrators (flaring)	10%	48%	76%	48%
	10%	48%	76%	48%
Production Site Condensate Tanks (flaring)	10%	48%	76%	48%
	10%	48%	76%	48%
Production Site Pneumatic Devices (percentage of devices that are low-bleed)	100%	100%	100%	100%
	100%	100%	100%	100%
Production Site Pneumatic Pumps (flaring)	10%	48%	76%	48%
	10%	48%	76%	48%
Production Site Pneumatic Pumps (electrification)	0%	0%	0%	0%
	0%	0%	0%	0%
Wellhead and Lateral Compressor Engines (electrification)	0%	0%	50%	0%
	0%	0%	50%	0%

Table O-56
Descriptions of Emissions Controls

Description	Alternative A	Alternative B	Alternative C	Alternative D
Emission Controls - Control Percentages				
Dust Control	watering	watering	watering	watering, chemical suppression, graveling or paving
	watering	watering	watering, chemical suppression, graveling or paving	watering, chemical suppression, graveling or paving
Drill Rigs (control from basline to higher Tier engine)	Tier II engines	Tier II engines	Tier IV engines	Tier II engines
	Tier II engines	Tier IV engines	Tier IV genset engin	Tier IV engines
Completion Equipment (control from basline to higher Tier engine)	Tier II engines	Tier II engines	Tier IV engines	Tier II engines
	Tier II engines	Tier IV engines	Tier IV genset engin	Tier IV engines
Green Completions (combination flaring and closed loop)	closed loop system and flaring control	closed loop system and flaring	closed loop system and flaring control	closed loop system and flaring control
	closed loop system and flaring control	closed loop system and flaring	closed loop system and flaring control	closed loop system and flaring control
Liquids Removal System (haul traffic)	none	none	pipeline system to elimate well site liquids storage and truck hauling	none
	none	pipeline system to elimate well site liquids storage and truck hauling	pipeline system to elimate well site liquids storage and truck hauling	pipeline system to elimate well site liquids storage and truck hauling
Production Site Separator Heaters (consolidation)	none	none	none	none
	none	none	none	none
Production Site Tank Heaters (consolidation)	none	none	none	none
	none	none	none	none
Production Site Dehydrators (flaring)	flaring control	flaring control	flaring control	flaring control
	flaring control	flaring control	flaring control	flaring control
Production Site Condensate Tanks (flaring)	flaring control	flaring control	flaring control	flaring control
	flaring control	flaring control	flaring control	flaring control
Production Site Pneumatic Devices (percentage of devices that are low-bleed)	usage of low-bleed pneumatic devices per Colorado requirements	usage of low-bleed pneumatic devices per Colorado requirements	usage of low-bleed pneumatic devices per Colorado requirements	usage of low-bleed pneumatic devices per Colorado requirements
	usage of low-bleed pneumatic devices per Colorado requirements	usage of low-bleed pneumatic devices per Colorado requirements	usage of low-bleed pneumatic devices per Colorado requirements	usage of low-bleed pneumatic devices per Colorado requirements
Production Site Pneumatic Pumps (flaring)	flaring control	flaring control	flaring control	flaring control
	flaring control	flaring control	flaring control	flaring control
Production Site Pneumatic Pumps (electrification)	none	none	none	none
	none	none	none	none
Wellhead and Lateral Compressor Engines (electrification)	none	none	electrification of compressor	none
	none	none	electrification of compressor	none
Wellhead, Lateral, Centralized Compressor Engines (CDPHE RICE and NSPS)	All engines required to meet Colorado RICE and Federal NSPS Standards			

Table O-57
Projected Well Numbers per Revised RFD (BLM 2012a)

Well Numbers By Alternative - Short Term and Long Term (Including Decline)									
	Baseline (2008)	Alternative A - No Action		Alternative B - Preferred		Alternative C - Conservation		Alternative D - Development	
		2018	2028	2018	2028	2018	2028	2018	2028
Total Cumulative Wells (New + Existing - decline)		***1,932***	***1,973***	***2,212***	***2,533***	***1,932***	***1,973***	***5,749***	***9,605***
Total BLM Wells (New + Existing - decline)		***499***	***293***	***779***	***853***	***499***	***293***	***2,358***	***4,011***
Total Non-BLM Wells (New + Existing - decline)		***1,433***	***1,680***	***1,433***	***1,680***	***1,433***	***1,680***	***3,391***	***5,594***
Cumulative New Wells		***743***	***1,484***	***1,023***	***2,044***	***743***	***1,484***	***4,560***	***9,116***
New BLM		***111***	***220***	***391***	***780***	***111***	***220***	***1,970***	***3,938***
New Non-BLM		***632***	***1,264***	***632***	***1,264***	***632***	***1,264***	***2,590***	***5,178***
- New BLM conv./dir.		51	101	179	357	51	101	837	1,674
- New BLM CBM		5	9	17	33	5	9	79	157
- New BLM shale gas		55	110	195	390	55	110	1,054	2,107
- New Non-BLM conv./dir.		308	616	308	616	308	616	1,789	3,578
- New Non-BLM CBM		8	16	8	16	8	16	47	93
- New Non-BLM shale gas		316	632	316	632	316	632	754	1,507
Cumulative Existing Wells (2008)	***1,891***	***1,189***	***489***	***1,189***	***489***	***1,189***	***489***	***1,189***	***489***
Existing BLM - decline	***704***	***388***	***73***	***388***	***73***	***388***	***73***	***388***	***73***
Existing Non-BLM - decline	***1,187***	***801***	***416***	***801***	***416***	***801***	***416***	***801***	***416***
- Existing BLM conv./dir.	661	358	56	358	56	358	56	358	56
- Existing BLM CBM	31	18	5	18	5	18	5	18	5
- Existing BLM shale gas	12	12	12	12	12	12	12	12	12
- Existing Non-BLM conv./dir.	1,155	777	399	777	399	777	399	777	399
- Existing Non-BLM CBM	15	7	0	7	0	7	0	7	0
- Existing Non-BLM shale gas	17	17	17	17	17	17	17	17	17
decline BLM conv./dir. (1999)		272	543	272	543	272	543	272	543
decline BLM conv./dir. (2000-2008)		31	62	31	62	31	62	31	62
decline BLM CBM (1999)		10	20	10	20	10	20	10	20
decline BLM CBM (2000-2008)		3	6	3	6	3	6	3	6
decline Non-BLM conv. (1999)		181	362	181	362	181	362	181	362
decline Non-BLM conv. (2000-2008)		197	394	197	394	197	394	197	394
decline Non-BLM CBM (1999)		8	15	8	15	8	15	8	15
decline Non-BLM CBM (2000-2008)		0	0	0	0	0	0	0	0
assume no decline of shale gas wells over 20 years		0	0	0	0	0	0	0	0

This page intentionally left blank.