

APPENDIX A: DEWEY-BURDOCK EMISSIONS INVENTORY

July 2012 Changes and Commitments

Changes Affecting Combustion Emissions

1. The combustion emissions tabulated in ER_RAI Table AQ1.1 did not account for equipment load factors (i.e., by default they assumed 100% duty at maximum horsepower). This is unrealistic and has been corrected to apply load factors ranging from 25% to 59%, depending on the equipment and application. Most construction equipment was assigned a 40% load factor, typical of the construction and mining industries. Drills were assigned 59% to account for more continuous and intensive use (EPA, Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling--Compression-Ignition, April 2004), and utility vehicles often idled or operated at relatively low speeds were assigned 25%.
2. The combustion emissions tabulated in ER_RAI Table AQ1.1 used very low emission factors for diesel-powered equipment, mistakenly based on standards set by EPA for heavy-duty highway engines. These factors have been corrected to reflect off-road Tier 3 engine emission standards for construction and support equipment. Emission standards for drill rig engines have been corrected to Tier 1 standards. These corrections apply to NO_x, CO, and PM₁₀ for all diesel engines, with the addition of THC (total hydrocarbons) for Tier 1 engines. EPA's AP-42 guidance was used for the remaining pollutants. PM_{2.5} has been characterized as 97% of PM₁₀ (EPA, Exhaust and Crankcase Emission Factors for Nonroad Engine Modeling--Compression-Ignition, April 2004).
3. The choice of Tier 1 engines to estimate drill rig emissions is based on the uncertain availability of Tier 2 rigs among drilling contractors in the region. On the other hand, Powertech has determined that lowering drill rig engine horsepower from 550 to 300 hp is feasible. This change will more than offset the difference between Tier 1 and Tier 2 emission levels (lowering total NO_x emissions by 12 tons/year).
4. Powertech is prepared to commit to Tier 1 (or higher) drill rig engines and Tier 3 (or higher) construction equipment engines, consistent with the changes outlined above.
5. The combustion emissions tabulated in ER_RAI Table AQ1.1 did not include the drilling rig dedicated to deep disposal wells. Engine emissions from this rig have been added to the construction tailpipe emission inventory.

Changes Affecting Fugitive PM₁₀ Emissions

1. The silt content used in previous fugitive dust calculations (ER_RAI Table AQ9.1) for unpaved roads was 32.1%. This is unrealistically high and probably due to a transposition of units (from a silt loading of 32.1 g/m² to a silt content of 32.1%). The silt content has been corrected to 8.5%, typical of western surface mines and unpaved industrial roads. EPA's AP-42 document, Table 13.2.2-1, shows average silt content of 8.4% for western surface mine pit haul roads and 8.5% for construction sites.
2. The fugitive emission calculations in ER_RAI Table AQ9.1 did not account for wind erosion on disturbed acres. This source is significant and has been added to the current revision.

3. The fugitive emission calculations in ER_RAI Table AQ9.1 did not account for water spray as a means of road dust control, despite the inclusion of 15 water trucks operating for approximately 30,000 hours per year during construction. The current revision credits water spray for 50% control of all fugitive emissions generated from unpaved roads. This conservative factor is specified by the Wyoming Department of Environmental Quality, Air Quality Division, in its regulation of surface coal mines. EPA's AP-42 document, Figure 13.2.2-2, indicates control efficiencies of up to 95% from spraying water on roads. The graph shows that doubling the road surface moisture content achieves 75% control. Various Environmental Impact Studies conducted by the U.S. Bureau of Land Management and the U.S. Bureau of Reclamation also cite 50% reduction in fugitive dust emissions by watering road surfaces.
4. The fugitive emission calculations in ER_RAI Table AQ9.1 did not include the drilling rig dedicated to deep disposal wells. This source of fugitive emissions is extremely small, but has been added to the current version for completeness.
5. The fugitive emission calculations in ER_RAI Table AQ9.1 assumed 113 passenger vehicles during the construction phase, 60 during the operations phase, and 15 each for the restoration and decommissioning phases. The construction and restoration traffic counts are unreasonably high, based on manpower and support personnel projections. For the construction phase, the number of passenger vehicles has been revised downward to 57 vehicles per day. For the restoration phase, the number of passenger vehicles has been revised downward to 6 vehicles per day. It should be noted that calculation of fugitive emissions from passenger vehicles (and delivery truck traffic) includes public unpaved roads as well as project roads.
6. Estimation of light-duty trucks (pickups) were also revised to conform more closely with the construction and operation plan.
7. Fugitive emissions from public roads are now shown separately from on-site fugitive emissions.

Changes between October 8, 2012 and November 8, 2012 Protocol Submittals

1. Stationary equipment emissions were added to the emissions inventory in Appendix A.
2. Added CO to combustion emissions apportionment as reflected in Table B-2 of Appendix B.
3. Adjusted overall emissions apportionment to modeled sources to reflect portion of tailpipe emissions occurring off-site. This is reflected by a minor reduction in allocations to some of the on-site sources in Table B-3 of Appendix B.
4. Added stationary sources (heaters, pumps, dryer) to emissions timing diagram, as reflected in Table B-4 of Appendix B.
5. Standardized on 10-hours per day for equipment previously shown as 9 to 11 hours per day, to reduce variable emission rate factor modeling complexity. This is reflected in Table B-4 of Appendix B.
6. Decommissioning phase: corrected units error in the emission factor formula for loader, trackhoe and backhoe, which had already been corrected in other project phases. The result was an increase of approximately 3 tpy of PM₁₀ and 0.3 tpy for PM_{2.5} for years 7 through 14. This is reflected in the tables in the Protocol document and Appendix A.

7. Fugitive Emissions Summary: corrected PM_{2.5} calculation to avoid double counting wind erosion (once as 10% of total PM₁₀ emissions and again as 15% of PM₁₀ emissions from wind erosion). The result was a decrease of approximately 3 tpy of PM_{2.5} for all years. This is reflected in the tables in the Protocol document and Appendix A.
8. Emissions Summary: corrected off-site PM₁₀ emissions for each year by adding fugitive emissions from heavy duty diesel truck traffic during the well field construction and decommissioning phases. Also corrected a formula reference. The combined effect was to increase off-site PM₁₀ emissions by approximately 100 tpy for years 2 through 4 and 15 to 30 tpy for years 5 through 9. By virtue of the 10% ratio, this also increased PM_{2.5} emissions by similar proportions. This is reflected in the tables in the Protocol document and Appendix A.
9. Emissions Apportionment: added public access road as a modeled line/area source, and apportioned all off-site emissions to this source. This is reflected in Table B-1 of Appendix B.
10. Changed commuter traffic period to 2 hrs in am and 2 hrs in pm, as reflected in Table B-4 of Appendix B. The rationale for this was an expectation that different hours generally apply to different work functions (field vs. plant) and affiliations (contractors vs. employees). It is unrealistic to expect all workers to arrive in the same hour, or depart in the same hour.

December 2012 Changes and Commitments

1. Powertech committed to car-pooling and/or company transportation for commuters, to reduce daily traffic over the unpaved public road by roughly 50%. This lowered total tailpipe exhaust emissions by approximately 2 tpy for NO_x and CO, and 4 tpy for THC. Other pollutant totals were virtually unaffected. This is reflected in the tables in the Protocol document and Appendix A.
2. The reduction in commuter traffic also lowered on-site fugitive PM₁₀ emissions by approximately 5 to 11 tpy for years 1 through 9, and by a lesser amount for the remaining years. It lowered off-site fugitive PM₁₀ emissions by approximately 100 to 150 tpy during years 1 through 9, and by nearly 20 tpy for the remaining years. By virtue of the 10% ratio, this also decreased PM_{2.5} emissions by similar proportions, with the impact most noticeable in the off-site emissions. This is reflected in the Protocol document and in the tables in Appendix A. Table A-19 has been added to show the basis for estimating commuter vehicle traffic with car-pooling.
3. For AQRV modeling, the source emissions timing diagram was changed slightly to make it compatible with the CALPUFF scheme for entering variable emission rate factors. AERMOD allows monthly changes in emissions timing (as well as hour-of-day and day-of-week). CALPUFF is limited to seasons and hour-of-day. Timing for CALPUFF has been added to Appendix B as Table B-5.
4. Heavy Duty Diesel Truck emissions were reallocated at 90.8% to the off-site road, with on-site sources as follows: ½ of (100%-90.8%) to disturbed acreage, 1/3 of (100%-90.8%) to the CPP access road, 1/6 of (100%-90.8%) to the satellite access road. These proportions were based on the fugitive dust emissions inventory for various project phases. Re-allocations are reflected in Appendix B.
5. Product Transport Truck emissions were reallocated to 80% off-site road and 20% on-site (CPPAccessRd), as updated in Appendix B.
6. Added Table numbers to tables in Appendix A.

Table A-1. Mobile Equipment Combustion Emission Factors

Basis For Equipment Tailpipe Emissions	Vehicle Parameters			Emission Factors (lb/hp-hr)								Total Equipment Hours Per Year by Phase				
	Horse-power	Load Factor	Fuel	THC	NO _x	CO	SO ₂	CO ₂	PM ₁₀	PM _{2.5}	Formaldehydes	Construction Facilities	Construction Wellfields	Operation	Aquifer Restoration	Decommissioning
Scraper	462	40%	Diesel	0.00247	0.00661	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046	1,299				2,601
Bulldozer	410	40%	Diesel	0.00247	0.00661	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046	433				867
Compactor	315	40%	Diesel	0.00247	0.00661	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046	433				867
Motor Grader	297	40%	Diesel	0.00247	0.00661	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046	1,196	763	416		867
Water Truck (1,500 gal)	325	40%	Diesel	0.00247	0.00661	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046	15,600	13,520	1,040		867
Fueling Truck	325	40%	Diesel	0.00247	0.00661	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046	130				520
Heavy Duty Diesel Truck	325	40%	Diesel	0.00247	0.00661	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046	2,080	520	520		1,388
Logging Truck	325	25%	Diesel	0.00247	0.00661	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046	8,320	8,320	2,080		
Electrical Pole Truck	325	25%	Diesel	0.00247	0.00661	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046	3,466	3,466			
Truck Mounted Drill Rig, Tier 1	300	59%	Diesel	0.00214	0.01512	0.01873	0.00205	1.15000	0.00089	0.00086	0.00046	33,800	33,800			
Deep Well Drill Rig, Tier 1	425	59%	Diesel	0.00214	0.01512	0.01873	0.00205	1.15000	0.00089	0.00086	0.00046	300	75			
Trackhoe	268	40%	Diesel	0.00247	0.00661	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046	3,120	3,120			1,300
Backhoe	93	40%	Diesel	0.00247	0.00661	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046	5,200	5,200			1,300
Loader	351	40%	Diesel	0.00247	0.00661	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046					650
Tractor	530	40%	Diesel	0.00247	0.03100	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046			160		650
Resin-hauling Semi Truck	430	40%	Diesel	0.00247	0.00661	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046			1,040		
Pump Pulling Truck	325	40%	Diesel	0.00247	0.00661	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046			6,240		2,130
Product Transport Truck	430	40%	Diesel	0.00247	0.00661	0.00573	0.00205	1.15000	0.00033	0.00032	0.00046			208		
Crane	516	25%	Diesel	0.00247	0.03100	0.00668	0.00205	1.15000	0.00220	0.00213	0.00046	694				693
Forklift	100	25%	Diesel	0.00247	0.03100	0.00668	0.00205	1.15000	0.00220	0.00213	0.00046	9,360	7,280	2,132		2,079
Manlift	50	25%	Diesel	0.00247	0.03100	0.00668	0.00205	1.15000	0.00220	0.00213	0.00046	4,160		208		2,772
Cementer	90	59%	LPG	0.00009	0.00118	0.00068	0.00000	1.13636	0.00006	0.00006	0.00000	8,320	8,320			2,130
Welding Equipment	47	40%	LPG	0.00009	0.00118	0.00068	0.00000	1.13636	0.00006	0.00006	0.00000	9,880				
HDPE Fusion Equipment	83	40%	LPG	0.00009	0.00118	0.00068	0.00000	1.13636	0.00006	0.00006	0.00000	6,240				
Light Duty Pickup	265	25%	Gasoline	0.02200	0.01100	0.00696	0.00059	1.08000	0.00072	0.00070	0.00049	10,000	6,500	18,736	2,912	4,000
Light Duty Passenger Vehicle	150	25%	Gasoline	0.02200	0.01100	0.00696	0.00059	1.08000	0.00072	0.00070	0.00049	3,575	2,600	4,388	813	1,138

Emission Factor Sources:

1. AP-42 Table 3.3-1, Emission Factors for Uncontrolled Gasoline and Diesel Industrial Engines (THC, SO₂, CO₂, Aldehydes)
2. EPA, Exhaust and Crankcase Emission Factors for Non-Road Engine Modeling - Compression Ignition, April 2004 (PM_{2.5})
3. EPA, Control of Emissions of Air Pollution from Non-Road Diesel Engines; Final Rule, Subpart 89.112, October 1998 (all Tiers: NO_x, CO, PM₁₀; THC for Tier 1)
4. EPA, AP-42 Table 1.5-1, Emission Factors for LPG Combustion

Table A-2. Mobile Equipment Combustion Emission Summary

DEWEY-BURDOCK PROJECT PHASE SCHEDULE														
Phase/Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Construction - Facilities/Wellfields														
Construction - Wellfields Only														
Operation														
Aquifer Restoration														
Decommissioning														

Pollutant	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
THC	21.06	34.03	34.03	36.48	36.48	36.48	42.42	42.42	25.76	8.40	5.94	5.94	5.94	5.94
NO _x	70.72	76.49	76.49	77.72	77.72	77.72	90.13	90.13	27.54	13.64	12.41	12.41	12.41	12.41
CO	73.39	77.87	77.87	78.64	78.64	78.64	85.75	85.75	17.20	7.89	7.11	7.11	7.11	7.11
SO ₂	11.25	11.97	11.97	12.04	12.04	12.04	14.25	14.25	4.26	2.27	2.21	2.21	2.21	2.21
CO ₂	7,081	7,690	7,690	7,811	7,811	7,811	9,229	9,229	3,182	1,539	1,418	1,418	1,418	1,418
PM ₁₀	4.13	4.44	4.44	4.52	4.52	4.52	5.14	5.14	1.51	0.70	0.62	0.62	0.62	0.62
PM _{2.5}	4.00	4.31	4.31	4.39	4.39	4.39	4.99	4.99	1.47	0.68	0.60	0.60	0.60	0.60
Formaldehyde	2.68	3.04	3.04	3.10	3.10	3.10	3.65	3.65	1.30	0.61	0.55	0.55	0.55	0.55

Table A-3. Mobile Equipment THC Emissions

MOBILE EQUIPMENT THC EMISSIONS PER YEAR														
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Scraper	0.30	0.00	0.00	0.00	0.00	0.00	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59
Bulldozer	0.09	0.00	0.00	0.00	0.00	0.00	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
Compactor	0.07	0.00	0.00	0.00	0.00	0.00	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
Motor Grader	0.18	0.17	0.17	0.17	0.17	0.17	0.30	0.30	0.19	0.13	0.13	0.13	0.13	0.13
Water Truck (1,500 gal)	2.50	2.34	2.34	2.34	2.34	2.34	2.48	2.48	0.31	0.14	0.14	0.14	0.14	0.14
Fueling Truck	0.02	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Heavy Duty Diesel Truck	0.33	0.17	0.17	0.17	0.17	0.17	0.39	0.39	0.31	0.22	0.22	0.22	0.22	0.22
Logging Truck	0.83	1.04	1.04	1.04	1.04	1.04	1.04	1.04	0.21	0.00	0.00	0.00	0.00	0.00
Electrical Pole Truck	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.00	0.00	0.00	0.00	0.00	0.00
Truck Mounted Drill Rig, Tier 1	6.39	6.39	6.39	6.39	6.39	6.39	6.39	6.39	0.00	0.00	0.00	0.00	0.00	0.00
Deep Well Drill Rig, Tier 1	0.08	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Trackhoe	0.41	0.41	0.41	0.41	0.41	0.41	0.59	0.59	0.17	0.17	0.17	0.17	0.17	0.17
Backhoe	0.24	0.24	0.24	0.24	0.24	0.24	0.30	0.30	0.06	0.06	0.06	0.06	0.06	0.06
Loader	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Tractor	0.00	0.04	0.04	0.04	0.04	0.04	0.21	0.21	0.21	0.17	0.17	0.17	0.17	0.17
Resin-hauling Semi Truck	0.00	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.00	0.00	0.00	0.00	0.00
Pump Pulling Truck	0.00	1.00	1.00	1.00	1.00	1.00	1.34	1.34	1.34	0.34	0.34	0.34	0.34	0.34
Product Transport Truck	0.00	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.00	0.00	0.00	0.00	0.00
Crane	0.11	0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Forklift	0.29	0.29	0.29	0.29	0.29	0.29	0.35	0.35	0.13	0.06	0.06	0.06	0.06	0.06
Manlift	0.06	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05	0.04	0.04	0.04	0.04	0.04
Cementer	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.01	0.01	0.01	0.01	0.01	0.01
Welding Equipment	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HDPE Fusion Equipment	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light Duty Pickup	7.29	18.39	18.39	20.51	20.51	20.51	23.43	23.43	18.69	5.04	2.92	2.92	2.92	2.92
Light Duty Passenger Vehicle	1.47	2.88	2.88	3.22	3.22	3.22	3.69	3.69	2.61	0.80	0.47	0.47	0.47	0.47
TOTAL	21.06	34.03	34.03	36.48	36.48	36.48	42.42	42.42	25.76	8.40	5.94	5.94	5.94	5.94

Table A-4. Mobile Equipment NO_x Emissions

MOBILE EQUIPMENT NO _x EMISSIONS PER YEAR															
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	
Scraper	0.79	0.00	0.00	0.00	0.00	0.00	1.59	1.59	1.59	1.59	1.59	1.59	1.59	1.59	
Bulldozer	0.23	0.00	0.00	0.00	0.00	0.00	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	
Compactor	0.18	0.00	0.00	0.00	0.00	0.00	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	
Motor Grader	0.47	0.46	0.46	0.46	0.46	0.46	0.80	0.80	0.50	0.34	0.34	0.34	0.34	0.34	
Water Truck (1,500 gal)	6.70	6.25	6.25	6.25	6.25	6.25	6.63	6.63	0.82	0.37	0.37	0.37	0.37	0.37	
Fueling Truck	0.06	0.00	0.00	0.00	0.00	0.00	0.22	0.22	0.22	0.22	0.22	0.22	0.22	0.22	
Heavy Duty Diesel Truck	0.89	0.45	0.45	0.45	0.45	0.45	1.04	1.04	0.82	0.60	0.60	0.60	0.60	0.60	
Logging Truck	2.23	2.79	2.79	2.79	2.79	2.79	2.79	2.79	0.56	0.00	0.00	0.00	0.00	0.00	
Electrical Pole Truck	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.00	0.00	0.00	0.00	0.00	0.00	
Truck Mounted Drill Rig, Tier 1	45.22	45.22	45.22	45.22	45.22	45.22	45.22	45.22	0.00	0.00	0.00	0.00	0.00	0.00	
Deep Well Drill Rig, Tier 1	0.57	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.00	0.00	0.00	0.00	0.00	0.00	
Trackhoe	1.11	1.11	1.11	1.11	1.11	1.11	1.57	1.57	0.46	0.46	0.46	0.46	0.46	0.46	
Backhoe	0.64	0.64	0.64	0.64	0.64	0.64	0.80	0.80	0.16	0.16	0.16	0.16	0.16	0.16	
Loader	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	
Tractor	0.00	0.53	0.53	0.53	0.53	0.53	2.66	2.66	2.66	2.14	2.14	2.14	2.14	2.14	
Resin-hauling Semi Truck	0.00	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.00	0.00	0.00	0.00	0.00	
Pump Pulling Truck	0.00	2.68	2.68	2.68	2.68	2.68	3.60	3.60	3.60	0.91	0.91	0.91	0.91	0.91	
Product Transport Truck	0.00	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.00	0.00	0.00	0.00	0.00	
Crane	1.39	0.00	0.00	0.00	0.00	0.00	1.39	1.39	1.39	1.39	1.39	1.39	1.39	1.39	
Forklift	3.63	3.65	3.65	3.65	3.65	3.65	4.45	4.45	1.63	0.81	0.81	0.81	0.81	0.81	
Manlift	0.81	0.04	0.04	0.04	0.04	0.04	0.58	0.58	0.58	0.54	0.54	0.54	0.54	0.54	
Cementer	0.26	0.26	0.26	0.26	0.26	0.26	0.33	0.33	0.07	0.07	0.07	0.07	0.07	0.07	
Welding Equipment	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
HDPE Fusion Equipment	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Light Duty Pickup	3.64	9.20	9.20	10.26	10.26	10.26	11.71	11.71	9.35	2.52	1.46	1.46	1.46	1.46	
Light Duty Passenger Vehicle	0.74	1.44	1.44	1.61	1.61	1.61	1.84	1.84	1.31	0.40	0.23	0.23	0.23	0.23	
TOTAL	70.72	76.49	76.49	77.72	77.72	77.72	90.13	90.13	27.54	13.64	12.41	12.41	12.41	12.41	

Table A-5. Mobile Equipment CO Emissions

MOBILE EQUIPMENT CO EMISSIONS PER YEAR															
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14	
Scraper	0.69	0.00	0.00	0.00	0.00	0.00	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	
Bulldozer	0.20	0.00	0.00	0.00	0.00	0.00	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	
Compactor	0.16	0.00	0.00	0.00	0.00	0.00	0.31	0.31	0.31	0.31	0.31	0.31	0.31	0.31	
Motor Grader	0.41	0.40	0.40	0.40	0.40	0.40	0.70	0.70	0.44	0.29	0.29	0.29	0.29	0.29	
Water Truck (1,500 gal)	5.81	5.42	5.42	5.42	5.42	5.42	5.74	5.74	0.71	0.32	0.32	0.32	0.32	0.32	
Fueling Truck	0.05	0.00	0.00	0.00	0.00	0.00	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	
Heavy Duty Diesel Truck	0.77	0.39	0.39	0.39	0.39	0.39	0.90	0.90	0.71	0.52	0.52	0.52	0.52	0.52	
Logging Truck	1.94	2.42	2.42	2.42	2.42	2.42	2.42	2.42	0.48	0.00	0.00	0.00	0.00	0.00	
Electrical Pole Truck	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.00	0.00	0.00	0.00	0.00	0.00	
Truck Mounted Drill Rig, Tier 1	56.03	56.03	56.03	56.03	56.03	56.03	56.03	56.03	0.00	0.00	0.00	0.00	0.00	0.00	
Deep Well Drill Rig, Tier 1	0.70	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.00	0.00	0.00	0.00	0.00	0.00	
Trackhoe	0.96	0.96	0.96	0.96	0.96	0.96	1.36	1.36	0.40	0.40	0.40	0.40	0.40	0.40	
Backhoe	0.55	0.55	0.55	0.55	0.55	0.55	0.69	0.69	0.14	0.14	0.14	0.14	0.14	0.14	
Loader	0.00	0.00	0.00	0.00	0.00	0.00	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	
Tractor	0.00	0.10	0.10	0.10	0.10	0.10	0.49	0.49	0.49	0.39	0.39	0.39	0.39	0.39	
Resin-hauling Semi Truck	0.00	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.00	0.00	0.00	0.00	0.00	
Pump Pulling Truck	0.00	2.32	2.32	2.32	2.32	2.32	3.12	3.12	3.12	0.79	0.79	0.79	0.79	0.79	
Product Transport Truck	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.00	0.00	0.00	0.00	0.00	
Crane	0.30	0.00	0.00	0.00	0.00	0.00	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	
Forklift	0.78	0.79	0.79	0.79	0.79	0.79	0.96	0.96	0.35	0.17	0.17	0.17	0.17	0.17	
Manlift	0.17	0.01	0.01	0.01	0.01	0.01	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	
Cementer	0.15	0.15	0.15	0.15	0.15	0.15	0.19	0.19	0.04	0.04	0.04	0.04	0.04	0.04	
Welding Equipment	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
HDPE Fusion Equipment	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Light Duty Pickup	2.31	5.82	5.82	6.49	6.49	6.49	7.41	7.41	5.91	1.59	0.92	0.92	0.92	0.92	
Light Duty Passenger Vehicle	0.47	0.91	0.91	1.02	1.02	1.02	1.17	1.17	0.83	0.25	0.15	0.15	0.15	0.15	
TOTAL	73.39	77.87	77.87	78.64	78.64	78.64	85.75	85.75	17.20	7.89	7.11	7.11	7.11	7.11	

Table A-6. Mobile Equipment SO₂ Emissions

MOBILE EQUIPMENT SO ₂ EMISSIONS PER YEAR														
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Scraper	0.25	0.00	0.00	0.00	0.00	0.00	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49
Bulldozer	0.07	0.00	0.00	0.00	0.00	0.00	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Compactor	0.06	0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Motor Grader	0.15	0.14	0.14	0.14	0.14	0.14	0.25	0.25	0.16	0.11	0.11	0.11	0.11	0.11
Water Truck (1,500 gal)	2.08	1.94	1.94	1.94	1.94	1.94	2.06	2.06	0.25	0.12	0.12	0.12	0.12	0.12
Fueling Truck	0.02	0.00	0.00	0.00	0.00	0.00	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
Heavy Duty Diesel Truck	0.28	0.14	0.14	0.14	0.14	0.14	0.32	0.32	0.25	0.18	0.18	0.18	0.18	0.18
Logging Truck	0.69	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.17	0.00	0.00	0.00	0.00	0.00
Electrical Pole Truck	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.29	0.00	0.00	0.00	0.00	0.00	0.00
Truck Mounted Drill Rig, Tier 1	6.13	6.13	6.13	6.13	6.13	6.13	6.13	6.13	0.00	0.00	0.00	0.00	0.00	0.00
Deep Well Drill Rig, Tier 1	0.08	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Trackhoe	0.34	0.34	0.34	0.34	0.34	0.34	0.49	0.49	0.14	0.14	0.14	0.14	0.14	0.14
Backhoe	0.20	0.20	0.20	0.20	0.20	0.20	0.25	0.25	0.05	0.05	0.05	0.05	0.05	0.05
Loader	0.00	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Tractor	0.00	0.03	0.03	0.03	0.03	0.03	0.18	0.18	0.18	0.14	0.14	0.14	0.14	0.14
Resin-hauling Semi Truck	0.00	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.00	0.00	0.00	0.00	0.00
Pump Pulling Truck	0.00	0.83	0.83	0.83	0.83	0.83	1.12	1.12	1.12	0.28	0.28	0.28	0.28	0.28
Product Transport Truck	0.00	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.00	0.00	0.00	0.00	0.00
Crane	0.09	0.00	0.00	0.00	0.00	0.00	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Forklift	0.24	0.24	0.24	0.24	0.24	0.24	0.29	0.29	0.11	0.05	0.05	0.05	0.05	0.05
Manlift	0.05	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Cementer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Welding Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HDPE Fusion Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light Duty Pickup	0.20	0.49	0.49	0.55	0.55	0.55	0.63	0.63	0.50	0.14	0.08	0.08	0.08	0.08
Light Duty Passenger Vehicle	0.04	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.07	0.02	0.01	0.01	0.01	0.01
TOTAL	11.25	11.97	11.97	12.04	12.04	12.04	14.25	14.25	4.26	2.27	2.21	2.21	2.21	2.21

Table A-7. Mobile Equipment PM₁₀ Emissions

MOBILE EQUIPMENT PM ₁₀ EMISSIONS PER YEAR														
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Scraper	0.04	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Bulldozer	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Compactor	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Motor Grader	0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.04	0.03	0.02	0.02	0.02	0.02	0.02
Water Truck (1,500 gal)	0.34	0.31	0.31	0.31	0.31	0.31	0.33	0.33	0.04	0.02	0.02	0.02	0.02	0.02
Fueling Truck	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Heavy Duty Diesel Truck	0.04	0.02	0.02	0.02	0.02	0.02	0.05	0.05	0.04	0.03	0.03	0.03	0.03	0.03
Logging Truck	0.11	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.03	0.00	0.00	0.00	0.00	0.00
Electrical Pole Truck	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00
Truck Mounted Drill Rig, Tier 1	2.65	2.65	2.65	2.65	2.65	2.65	2.65	2.65	0.00	0.00	0.00	0.00	0.00	0.00
Deep Well Drill Rig, Tier 1	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Trackhoe	0.06	0.06	0.06	0.06	0.06	0.06	0.08	0.08	0.02	0.02	0.02	0.02	0.02	0.02
Backhoe	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.01
Loader	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Tractor	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02
Resin-hauling Semi Truck	0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00
Pump Pulling Truck	0.00	0.13	0.13	0.13	0.13	0.13	0.18	0.18	0.18	0.05	0.05	0.05	0.05	0.05
Product Transport Truck	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Crane	0.10	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Forklift	0.26	0.26	0.26	0.26	0.26	0.26	0.32	0.32	0.12	0.06	0.06	0.06	0.06	0.06
Manlift	0.06	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Cementer	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Welding Equipment	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HDPE Fusion Equipment	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light Duty Pickup	0.24	0.60	0.60	0.67	0.67	0.67	0.77	0.77	0.61	0.17	0.10	0.10	0.10	0.10
Light Duty Passenger Vehicle	0.05	0.09	0.09	0.11	0.11	0.11	0.12	0.12	0.09	0.03	0.02	0.02	0.02	0.02
TOTAL	4.13	4.44	4.44	4.52	4.52	4.52	5.14	5.14	1.51	0.70	0.62	0.62	0.62	0.62

Table A-8. Mobile Equipment PM_{2.5} Emissions

MOBILE EQUIPMENT PM _{2.5} EMISSIONS PER YEAR														
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Scraper	0.04	0.00	0.00	0.00	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Bulldozer	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Compactor	0.01	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Motor Grader	0.02	0.02	0.02	0.02	0.02	0.02	0.04	0.04	0.02	0.02	0.02	0.02	0.02	0.02
Water Truck (1,500 gal)	0.32	0.30	0.30	0.30	0.30	0.30	0.32	0.32	0.04	0.02	0.02	0.02	0.02	0.02
Fueling Truck	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Heavy Duty Diesel Truck	0.04	0.02	0.02	0.02	0.02	0.02	0.05	0.05	0.04	0.03	0.03	0.03	0.03	0.03
Logging Truck	0.11	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.03	0.00	0.00	0.00	0.00	0.00
Electrical Pole Truck	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00
Truck Mounted Drill Rig, Tier 1	2.57	2.57	2.57	2.57	2.57	2.57	2.57	2.57	0.00	0.00	0.00	0.00	0.00	0.00
Deep Well Drill Rig, Tier 1	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Trackhoe	0.05	0.05	0.05	0.05	0.05	0.05	0.08	0.08	0.02	0.02	0.02	0.02	0.02	0.02
Backhoe	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.01
Loader	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Tractor	0.00	0.01	0.01	0.01	0.01	0.01	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02
Resin-hauling Semi Truck	0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.00	0.00	0.00	0.00	0.00
Pump Pulling Truck	0.00	0.13	0.13	0.13	0.13	0.13	0.17	0.17	0.17	0.04	0.04	0.04	0.04	0.04
Product Transport Truck	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Crane	0.10	0.00	0.00	0.00	0.00	0.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Forklift	0.25	0.25	0.25	0.25	0.25	0.25	0.31	0.31	0.11	0.06	0.06	0.06	0.06	0.06
Manlift	0.06	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Cementer	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Welding Equipment	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HDPE Fusion Equipment	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light Duty Pickup	0.23	0.58	0.58	0.65	0.65	0.65	0.74	0.74	0.59	0.16	0.09	0.09	0.09	0.09
Light Duty Passenger Vehicle	0.05	0.09	0.09	0.10	0.10	0.10	0.12	0.12	0.08	0.03	0.01	0.01	0.01	0.01
TOTAL	4.00	4.31	4.31	4.39	4.39	4.39	4.99	4.99	1.47	0.68	0.60	0.60	0.60	0.60

Table A-9. Mobile Equipment CO₂ Emissions

MOBILE EQUIPMENT CO ₂ EMISSIONS PER YEAR														
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Scraper	138	0	0	0	0	0	276	276	276	276	276	276	276	276
Bulldozer	41	0	0	0	0	0	82	82	82	82	82	82	82	82
Compactor	31	0	0	0	0	0	63	63	63	63	63	63	63	63
Motor Grader	82	81	81	81	81	81	140	140	88	59	59	59	59	59
Water Truck (1,500 gal)	1,166	1,088	1,088	1,088	1,088	1,088	1,153	1,153	143	65	65	65	65	65
Fueling Truck	10	0	0	0	0	0	39	39	39	39	39	39	39	39
Heavy Duty Diesel Truck	155	78	78	78	78	78	181	181	143	104	104	104	104	104
Logging Truck	389	486	486	486	486	486	486	486	97	0	0	0	0	0
Electrical Pole Truck	162	162	162	162	162	162	162	162	0	0	0	0	0	0
Truck Mounted Drill Rig, Tier 1	3,440	3,440	3,440	3,440	3,440	3,440	3,440	3,440	0	0	0	0	0	0
Deep Well Drill Rig, Tier 1	43	11	11	11	11	11	11	11	0	0	0	0	0	0
Trackhoe	192	192	192	192	192	192	272	272	80	80	80	80	80	80
Backhoe	111	111	111	111	111	111	139	139	28	28	28	28	28	28
Loader	0	0	0	0	0	0	52	52	52	52	52	52	52	52
Tractor	0	20	20	20	20	20	99	99	99	79	79	79	79	79
Resin-hauling Semi Truck	0	103	103	103	103	103	103	103	103	0	0	0	0	0
Pump Pulling Truck	0	466	466	466	466	466	626	626	626	159	159	159	159	159
Product Transport Truck	0	21	21	21	21	21	21	21	21	0	0	0	0	0
Crane	51	0	0	0	0	0	51	51	51	51	51	51	51	51
Forklift	135	135	135	135	135	135	165	165	61	30	30	30	30	30
Manlift	30	1	1	1	1	1	21	21	21	20	20	20	20	20
Cementer	251	251	251	251	251	251	315	315	64	64	64	64	64	64
Welding Equipment	106	0	0	0	0	0	0	0	0	0	0	0	0	0
HDPE Fusion Equipment	118	0	0	0	0	0	0	0	0	0	0	0	0	0
Light Duty Pickup	358	903	903	1,007	1,007	1,007	1,150	1,150	918	247	143	143	143	143
Light Duty Passenger Vehicle	72	141	141	158	158	158	181	181	128	39	23	23	23	23
TOTAL	7,081	7,690	7,690	7,811	7,811	7,811	9,229	9,229	3,182	1,539	1,418	1,418	1,418	1,418

Table A-10. Mobile Equipment Formaldehyde Emissions

MOBILE EQUIPMENT FORMALDEHYDE EMISSIONS PER YEAR														
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Year 11	Year 12	Year 13	Year 14
Scraper	0.06	0.00	0.00	0.00	0.00	0.00	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
Bulldozer	0.02	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Compactor	0.01	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Motor Grader	0.03	0.03	0.03	0.03	0.03	0.03	0.06	0.06	0.04	0.02	0.02	0.02	0.02	0.02
Water Truck (1,500 gal)	0.47	0.44	0.44	0.44	0.44	0.44	0.46	0.46	0.06	0.03	0.03	0.03	0.03	0.03
Fueling Truck	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Heavy Duty Diesel Truck	0.06	0.03	0.03	0.03	0.03	0.03	0.07	0.07	0.06	0.04	0.04	0.04	0.04	0.04
Logging Truck	0.16	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.04	0.00	0.00	0.00	0.00	0.00
Electrical Pole Truck	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00
Truck Mounted Drill Rig, Tier 1	1.38	1.38	1.38	1.38	1.38	1.38	1.38	1.38	0.00	0.00	0.00	0.00	0.00	0.00
Deep Well Drill Rig, Tier 1	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trackhoe	0.08	0.08	0.08	0.08	0.08	0.08	0.11	0.11	0.03	0.03	0.03	0.03	0.03	0.03
Backhoe	0.04	0.04	0.04	0.04	0.04	0.04	0.06	0.06	0.01	0.01	0.01	0.01	0.01	0.01
Loader	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Tractor	0.00	0.01	0.01	0.01	0.01	0.01	0.04	0.04	0.04	0.03	0.03	0.03	0.03	0.03
Resin-hauling Semi Truck	0.00	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.00	0.00	0.00	0.00	0.00
Pump Pulling Truck	0.00	0.19	0.19	0.19	0.19	0.19	0.25	0.25	0.25	0.06	0.06	0.06	0.06	0.06
Product Transport Truck	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00
Crane	0.02	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Forklift	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.07	0.02	0.01	0.01	0.01	0.01	0.01
Manlift	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cementer	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Welding Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HDPE Fusion Equipment	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Light Duty Pickup	0.16	0.41	0.41	0.45	0.45	0.45	0.52	0.52	0.41	0.11	0.06	0.06	0.06	0.06
Light Duty Passenger Vehicle	0.03	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.06	0.02	0.01	0.01	0.01	0.01
TOTAL	2.68	3.04	3.04	3.10	3.10	3.10	3.65	3.65	1.30	0.61	0.55	0.55	0.55	0.55

Table A-11. Fugitive Emissions Summary

SCHEDULE		ON-SITE FUGITIVE EMISSIONS (INCLUDING WIND EROSION)		OFF-SITE FUGITIVE EMISSIONS	
Year	Phases	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
1	CF	346.12	36.17	98.88	9.89
2	CW, O	445.79	46.13	121.24	12.12
3	CW, O	446.19	46.19	121.24	12.12
4	CW, O, R	459.40	47.53	132.27	13.23
5	CW, O, R	459.80	47.59	132.27	13.23
6	CW, O, R	460.14	47.64	132.27	13.23
7	CW, O, R, D	555.60	57.20	181.31	18.13
8	CW, O, R, D	553.80	56.93	181.31	18.13
9	O, R, D	304.46	31.96	133.54	13.35
10	R, D	138.11	15.32	60.07	6.01
11	D	125.23	14.03	49.04	4.90
12	D	125.15	14.02	49.04	4.90
13	D	125.12	14.01	49.04	4.90
14	D	125.11	14.01	49.04	4.90
CF = Construction of Facilities		R = Restoration			
CW = Construction of Wellfields		D = Decommissioning and Reclamation			
O = Operation					

Table A-13. Wellfield Construction Fugitive Emissions

Equipment Item	Quantity	Hours	Speed (mph)	Weight (tons)	lb/VMT	VMT	lb/hr	Control Efficiency	PM ₁₀ tons/yr	Emission Factor Reference
Motor Grader	1	347	10		3.06	3,470		50%	2.65	AP-42 Table 11.9-1
Water Truck (1,500 gal)	13	1040	15	16	2.34	202,800		50%	118.43	AP-42 Section 13.2.2
Heavy Duty Diesel Truck	1	133	15	20	2.58	1,995		50%	1.29	AP-42 Section 13.2.2
Logging Truck	4	2080	15	10	1.89	124,800		50%	58.99	AP-42 Section 13.2.2
Electrical Pole Truck	2	1733	15	10	1.89	51,990		50%	24.57	AP-42 Section 13.2.2
Truck Mounted Drill Rig ¹	13	2600	20				0.07	0%	1.10	AP-42 Table 11.9-4
Deep Well Drill Rig ¹	1	75	75				0.02	0%	0.00	AP-42 Table 11.9-4
Trackhoe ³	1	3120					1.66	0%	2.59	AP-42 Table 11.9-4
Backhoe ³	2	2600					1.33	0%	3.46	AP-42 Table 11.9-4
Forklift	4	1820	5	1	0.67	36,400		50%	6.10	AP-42 Section 13.2.2
Light Duty Pickup (on-site use)	13	500	15	3	1.10	97,500		50%	26.81	AP-42 Section 13.2.2
On-site Passenger Vehicle ²	16	4	25	250	0.63	16,000		50%	2.54	AP-42 Section 13.2.2
TOTAL ON-SITE PM10 EMISSIONS (TONS/YEAR)									248.54	
Off-site Passenger Vehicle ²	16	22	40	250	0.80	88,000		0%	35.28	AP-42 Section 13.2.2
Heavy Duty Diesel Truck	1	387	25	20	2.58	9,675		0%	12.49	AP-42 Section 13.2.2
TOTAL OFF-SITE PM10 EMISSIONS (TONS/YEAR)									47.78	
Constants for PM₁₀ Calculations			Notes:							
AP-42 Industrial Unpaved Roads: k	1.5	1. For drill rigs, "Speed" column = average hours per hole								
AP-42 Industrial Unpaved Roads: a	0.9	2. For passenger vehicles, "Hours" column = round-trip miles, "Weight" column = trips/yr								
AP-42 Industrial Unpaved Roads: b	0.45	3. For trackhoe and backhoe, used 1.56 and a 1.25-cy buckets; a specific gravity of 1.6 was assumed								
AP-42 Public Unpaved Roads: k	1.8	4. Where separate factors were not given, PM ₁₀ was assumed to be 30% of TSP (AP-42 Section 13.2.2,								
AP-42 Public Unpaved Roads: a	1	at 12% silt, $K_{PM10}/K_{TSP} = 1.5/4.9 = 0.306$)								
AP-42 Public Unpaved Roads: c	0.2									
AP-42 Public Unpaved Roads: d	0.5									
AP-42 Public Unpaved Roads: C	0.00047									
Average silt content (%): s	8.5									
Average moisture content (%): M	10.4									

Table A-14. Operation Fugitive Emissions

Equipment Item	Quantity	Hours	Speed (mph)	Weight (tons)	lb/VMT	VMT	lb/hr	Control Efficiency	PM ₁₀ tons/yr	Emission Factor Reference
Motor Grader	1	416	10		3.06	4,160		50%	3.18	AP-42 Table 11.9-1
Logging Truck	1	2080	15	10	1.89	31,200		50%	14.75	AP-42 Section 13.2.2
Resin-hauling Semi Truck	1	1040	15	20	2.58	15,600		50%	10.07	AP-42 Section 13.2.2
Water Truck (1,500 gal)	1	1040	15	16	2.34	15,600		50%	9.11	AP-42 Section 13.2.2
Heavy Duty Diesel Truck	1	133	15	20	2.58	1,995		50%	1.29	AP-42 Section 13.2.2
Pump Pulling Truck	4	1560	15	10	1.89	93,600		50%	44.24	AP-42 Table 11.9-4
Forklift	1	2132	5	1	0.67	10,660		50%	1.79	AP-42 Section 13.2.2
Manlift	1	208	2	10	1.89	416		50%	0.20	AP-42 Section 13.2.2
Product Transport Truck	1	27	15	40	0.49	405		0%	0.10	AP-42 Section 13.2.2
Light Duty Pickup (on-site use)	12	1561	15	3	1.10	281,040		50%	77.27	AP-42 Section 13.2.2
On-site Passenger Vehicle ¹	27	4	25	250	0.63	27,000		50%	4.28	AP-42 Section 13.2.2
TOTAL ON-SITE PM10 EMISSIONS (TONS/YEAR)									166.27	
Off-site Passenger Vehicle ¹	27	22	40	250	0.80	148,500		0%	59.54	AP-42 Section 13.2.2
Product Transport Truck	1	181	25	40	0.63	4,525		0%	1.43	AP-42 Section 13.2.2
Heavy Duty Diesel Truck	1	387	25	20	2.58	9,675		0%	12.49	AP-42 Section 13.2.2
TOTAL OFF-SITE PM10 EMISSIONS (TONS/YEAR)									73.47	
Constants for PM₁₀ Calculations			Notes:							
AP-42 Industrial Unpaved Roads: k	1.5	1. For passenger vehicles, "Hours" column = round-trip miles, "Weight" column = trips/yr								
AP-42 Industrial Unpaved Roads: a	0.9									
AP-42 Industrial Unpaved Roads: b	0.45									
AP-42 Public Unpaved Roads: k	1.8									
AP-42 Public Unpaved Roads: a	1									
AP-42 Public Unpaved Roads: c	0.2									
AP-42 Public Unpaved Roads: d	0.5									
AP-42 Public Unpaved Roads: C	0.00047									
Average silt content (%): s	8.5									
Average moisture content (%): M	10.4									

Table A-16. Decommissioning Fugitive Emissions

Equipment Item	Quantity	Hours	Speed (mph)	Weight (tons)	lb/VMT	VMT	lb/hr	Control Efficiency	PM ₁₀ tons/yr	Emission Factor Reference
Scraper	3	867	15	30	3.10	39,015		50%	30.23	AP-42 Section 13.2.2
Bulldozer	1	867					0.70	0%	0.30	AP-42 Table 11.9-1
Compactor	1	867	5	5	1.38	4,335		50%	1.50	AP-42 Section 13.2.2
Motor Grader	1	867	10		3.06	8,670		50%	6.63	AP-42 Table 11.9-1
Water Truck (1,500 gal)	1	867	15	16	2.34	13,005		50%	7.59	AP-42 Section 13.2.2
Fueling Truck	1	520	15	10	1.89	7,800		50%	3.69	AP-42 Section 13.2.2
Loader	1	650					1.73	0%	0.56	AP-42 Table 11.9-4
Heavy Duty Diesel Truck	4	87	15	20	2.58	5,205		50%	3.36	AP-42 Section 13.2.2
Pump Pulling Truck	1	2130	15	10	1.89	31,950		50%	15.10	AP-42 Table 11.9-4
Trackhoe ²	2	650					1.66	0%	1.08	AP-42 Table 11.9-4
Backhoe ²	2	650					1.33	0%	0.87	AP-42 Table 11.9-4
Forklift	3	693	5	1	0.67	10,395		50%	1.74	AP-42 Section 13.2.2
Manlift	4	693	2	10	1.89	5,544		50%	2.62	AP-42 Section 13.2.2
Tractor	1	650	5	5	1.38	3,250		0%	2.25	AP-42 Section 13.2.2
Light Duty Pickup (on-site use)	2	2000	15	3	1.10	60,000		50%	16.50	AP-42 Section 13.2.2
On-site Passenger Vehicle ¹	7	4	25	250	0.63	7,000		50%	1.11	AP-42 Section 13.2.2
TOTAL ON-SITE PM10 EMISSIONS (TONS/YEAR)									95.14	
Off-site Passenger Vehicle ¹	7	22	40	250	0.80	38,500		0%	15.44	AP-42 Section 13.2.2
Heavy Duty Diesel Truck	4	260	25	20	2.58	26,025		0%	33.61	AP-42 Section 13.2.2
TOTAL OFF-SITE PM10 EMISSIONS (TONS/YEAR)									49.04	
Constants for PM₁₀ Calculations			Notes:							
AP-42 Industrial Unpaved Roads: k	1.5	1. For passenger vehicles, "Hours" column = round-trip miles, "Weight" column = trips/yr								
AP-42 Industrial Unpaved Roads: a	0.9	2. For trackhoe and backhoe, used 1.56 and a 1.25-cy buckets; a specific gravity of 1.6 was assumed								
AP-42 Industrial Unpaved Roads: b	0.45	3. Where separate factors were not given, PM ₁₀ was assumed to be 30% of TSP (AP-42 Section 13.2.2, at 12% silt, $K_{PM10}/K_{TSP} = 1.5/4.9 = 0.306$)								
AP-42 Public Unpaved Roads: k	1.8									
AP-42 Public Unpaved Roads: a	1									
AP-42 Public Unpaved Roads: c	0.2									
AP-42 Public Unpaved Roads: d	0.5									
AP-42 Public Unpaved Roads: C	0.00047									
Average silt content (%): s	8.5									
Average moisture content (%): M	10.4									

Table A-18. Stationary Equipment Emissions

Stationary Equipment Emission Factors					
Pollutant	Heaters (lb/10³ gal)	Fire Suppression Pumps (lb/hp-hr)			
NO _x	13.00	0.03100			
CO	7.50	0.00668			
PM ₁₀ /PM _{2.5}	0.70	0.00220			
SO ₂	0.02	0.00205			
THC	1.00	0.00251			
VOC	0.00	0.00000			
CO ₂	12,500	1.15000			
Stationary Equipment Duty Parameters					
Item	Space Heater	Dryer Thermal Fluid Heater	Emergency Generator	Diesel Pump	
Number of Units	4	1	2	2	
Operating hours/yr	4,368	8,736	13	13	
Average Fuel Use (gal/hr) or hp	6.5	16.0	9.0	100.0	
Stationary Equipment Emissions (tons/yr)					
Pollutant	Space Heater	Dryer Thermal Fluid Heater	Emergency Generator	Pump	Total
NO _x	0.74	0.91	0.00	0.04	1.69
CO	0.43	0.52	0.00	0.01	0.96
PM ₁₀ /PM _{2.5}	0.040	0.049	0.000	0.003	0.092
SO ₂	0.001	0.001	0.000	0.003	0.005
TOC	0.06	0.07	0.00	0.00	0.13
VOC	0.00	0.00	0.00	0.00	0.00
CO ₂	710	874	1	1.50	1,586
Sources: AP-42 Table 1.5-1, Table 3.3-1					

Table A-19. Car-Pooling Requirements

Project Phase	Original Estimate of Commuter Vehicles	Shift workers (no carpool)	Individual vehicles (no carpool)	Day Shift workers (carpool)	Car pool Vehicles*	Total Vehicles per day
Construction – Facilities	57	0	10	47	12	22
Construction – Wellfields	42	0	3	39	13	16
Operation	60	6	10	44	11	27
Aquifer Restoration	6	3	1	2	1	5
Decommissioning	15	3	1	11	3	7
Total	180	12	25	143	40	77
Number Vehicles in Year 7	123					55
Source: John Mays, Powertech, 12/17/12						
*rounded up the number of carpool vehicles required (4 workers per vehicle, wellfield 3 workers per vehicle)						