

APPENDIX D
Combined Air Quality Tables

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Table A-3. Heavy Equipment Emissions, Underground Segment Construction

Equipment/Phase	Emission Factors														Emissions										
	FUEL	HP	Load Factor	ROG (lb/hr)	CO (lb/hr)	NOX (lb/hr)	SOX (lb/hr)	PM10 (lb/hr)	PM2.5 (lb/hr)	CO2 (lb/hr)	CH4 (lb/hr)	N2O (lb/hr)	No of Equipment	Hrs Per Day	Days in Service	ROG lbs/day	CO lbs/day	NOX lbs/day	SOX lbs/day	PM10 lbs/day	PM2.5 lbs/day	CO2 lbs/day	CH4 lbs/day	N2O lbs/day	
Surveying of Underground Alignment, Trench Marking, and Potholing																									
CAT 416 Rubber Tire Backhoe with Bucket	DIESEL	85	0.54	0.5760	3.8000	3.8740	0.0060	0.2780	0.2780	568.2990	0.0510	0.3680	1	8	140	0.47	3.08	3.14	0.00	0.23	0.23	460.06	0.04	0.30	
Truck, Crew Cab Flatbed, 1 Ton	DIESEL	1	1	0.0047	0.0560	0.0847	0.0002	0.0002	0.0002	16.2507	0.0003	0.0035	1	8	140	0.04	0.45	0.68	0.00	0.00	0.00	130.01	0.00	0.03	
Truck, Mechanics, 1-2 Ton	DIESEL	1	1	0.0047	0.0560	0.0847	0.0002	0.0002	0.0002	16.2507	0.0003	0.0035	1	8	140	0.04	0.45	0.68	0.00	0.00	0.00	130.01	0.00	0.03	
Truck, Pick-up	DIESEL	1	1	0.0047	0.0560	0.0847	0.0002	0.0002	0.0002	16.2507	0.0003	0.0035	1	8	140	0.04	0.45	0.68	0.00	0.00	0.00	130.01	0.00	0.03	
Semi Tractor Truck	DIESEL	1	1	0.0163	0.0920	0.0847	0.0001	0.0002	0.0002	14.9674	0.0008	0.0035	1	8	140	0.13	0.74	0.68	0.00	0.00	0.00	119.74	0.01	0.03	
Subtotal															0.71	5.16	5.85	0.01	0.23	0.23	969.82	0.05	0.41		
Underground Cable and Vault Installation - Saw-Cutting and Pavement Breaking																									
Concrete saws	DIESEL	81	0.73	0.6200	3.6200	4.4320	0.0060	0.3330	0.3330	568.2990	0.0550	0.4210	1	8	280	0.65	3.78	4.62	0.01	0.35	0.35	592.67	0.06	0.44	
Pavement breaking machines	DIESEL	175	0.62	0.3880	3.1270	3.1240	0.0060	0.1550	0.1550	568.2990	0.0350	0.2968	1	8	280	0.74	5.98	5.98	0.01	0.30	0.30	1087.51	0.07	0.57	
CAT 416 Rubber Tire Backhoe with Bucket	DIESEL	85	0.54	0.5760	3.8000	3.8740	0.0060	0.2780	0.2780	568.2990	0.0510	0.3680	1	8	280	0.47	3.08	3.14	0.00	0.23	0.23	460.06	0.04	0.30	
Generator	DIESEL	84	0.74	0.5830	3.4690	4.4100	0.0060	0.3090	0.3090	568.2990	0.0520	0.4190	1	8	280	0.64	3.80	4.83	0.01	0.34	0.34	623.04	0.06	0.46	
Dump/Haul Trucks	DIESEL	1	1	0.0163	0.0920	0.0847	0.0001	0.0002	0.0002	14.9674	0.0008	0.0035	1	8	60	0.13	0.74	0.68	0.00	0.00	0.00	119.74	0.01	0.03	
Subtotal															2.62	17.37	19.25	0.03	1.21	1.21	2883.02	0.23	1.79		
Underground Cable and Vault Installation - Trenching to Install Conduit Bank																									
CAT 416 Rubber Tire Backhoe with Bucket	DIESEL	85	0.54	0.5760	3.8000	3.8740	0.0060	0.2780	0.2780	568.2990	0.0510	0.3680	1	8	280	0.47	3.08	3.14	0.00	0.23	0.23	460.06	0.04	0.30	
Trencher	DIESEL	69	0.75	0.9450	3.9950	5.8260	0.0060	0.4820	0.4820	568.2990	0.0850	0.5535	1	8	280	0.86	3.65	5.32	0.01	0.44	0.44	518.70	0.08	0.51	
Dump/Haul Truck (3 trucks per 40')	DIESEL	1	1	0.0163	0.0920	0.0847	0.0001	0.0002	0.0002	14.9674	0.0008	0.0035	3	8	60	0.39	2.21	2.03	0.00	0.01	0.01	359.22	0.02	0.08	
Subtotal															1.72	8.93	10.49	0.01	0.67	0.67	1337.98	0.14	0.89		
Underground Cable and Vault Installation - Excavation of Maintenance Vaults																									
CAT 416 Rubber Tire Backhoe with Bucket	DIESEL	85	0.54	0.5760	3.8000	3.8740	0.0060	0.2780	0.2780	568.2990	0.0510	0.3680	1	8	280	0.47	3.08	3.14	0.00	0.23	0.23	460.06	0.04	0.30	
Excavator	DIESEL	157	0.57	0.4920	3.3660	3.3230	0.0060	0.1790	0.1790	568.2990	0.0440	0.3157	1	8	280	0.78	5.31	5.24	0.01	0.28	0.28	896.97	0.07	0.50	
Dump/Haul Truck	DIESEL	1	1	0.0163	0.0920	0.0847	0.0001	0.0002	0.0002	14.9674	0.0008	0.0035	1	8	60	0.13	0.74	0.68	0.00	0.00	0.00	119.74	0.01	0.03	
Subtotal															1.37	9.12	9.06	0.02	0.51	0.51	1476.77	0.12	0.82		
Underground Cable and Vault Installation - Install Conduit Bank																									
CAT 416 Rubber Tire Backhoe with Bucket	DIESEL	85	0.54	0.5760	3.8000	3.8740	0.0060	0.2780	0.2780	568.2990	0.0510	0.3680	1	8	280	0.47	3.08	3.14	0.00	0.23	0.23	460.06	0.04	0.30	
Compactor	DIESEL	250	0.56	0.3860	1.2850	3.6980	0.0060	0.1230	0.1230	568.2990	0.0340	0.3513	1	8	280	0.95	3.17	9.13	0.01	0.30	0.30	1403.24	0.08	0.87	
Generator	DIESEL	84	0.74	0.5830	3.4690	4.4100	0.0060	0.3090	0.3090	568.2990	0.0520	0.4190	1	8	280	0.64	3.80	4.83	0.01	0.34	0.34	623.04	0.06	0.46	
Concrete Trucks	DIESEL	235	0.57	0.0047	0.0560	0.0847	0.0002	0.0002	0.0002	16.2507	0.0003	0.0035	1	2	280	0.01	0.11	0.17	0.00	0.00	0.00	32.50	0.00	0.01	
Dump/Haul Truck	DIESEL	1	1	0.0163	0.0920	0.0847	0.0001	0.0002	0.0002	14.9674	0.0008	0.0035	1	8	60	0.13	0.74	0.68	0.00	0.00	0.00	119.74	0.01	0.03	
Subtotal															2.20	10.90	17.95	0.03	0.87	0.87	2638.58	0.19	1.66		
Underground Cable and Vault Installation - Maintenance Vault Installation																									
CAT 416 Rubber Tire Backhoe with Bucket	DIESEL	85	0.54	0.5760	3.8000	3.8740	0.0060	0.2780	0.2780	568.2990	0.0510	0.3680	1	8	280	0.47	3.08	3.14	0.00	0.23	0.23	460.06	0.04	0.30	
Crane	DIESEL	399	0.43	0.4180	1.3980	3.3830	0.0050	0.1220	0.1220	568.2990	0.0370	0.3214	1	8	280	1.26	4.23	10.24	0.02	0.37	0.37	1719.67	0.11	0.97	
Generator	DIESEL	84	0.74	0.5830	3.4690	4.4100	0.0060	0.3090	0.3090	568.2990	0.0520	0.4190	1	8	280	0.64	3.80	4.83	0.01	0.34	0.34	623.04	0.06	0.46	
Compactor	DIESEL	250	0.56	0.3860	1.2850	3.6980	0.0060	0.1230	0.1230	568.2990	0.0340	0.3513	1	8	280	0.95	3.17	9.13	0.01	0.30	0.30	1403.24	0.08	0.87	
Truck, Crew Cab Flatbed, 1 Ton	DIESEL	1	1	0.0047	0.0560	0.0847	0.0002	0.0002	0.0002	16.2507	0.0003	0.0035	1	2	280	0.01	0.11	0.17	0.00	0.00	0.00	32.50	0.00	0.01	
Truck, Mechanics, 1-2 Ton	DIESEL	1	1	0.0047	0.0560	0.0847	0.0002	0.0002	0.0002	16.2507	0.0003	0.0035	1	2	280	0.01	0.11	0.17	0.00	0.00	0.00	32.50	0.00	0.01	
Truck, Pick-up	DIESEL	1	1	0.0047	0.0560	0.0847	0.0002	0.0002	0.0002	16.2507	0.0003	0.0035	1	2	280	0.01	0.11	0.17	0.00	0.00	0.00	32.50	0.00	0.01	
Semi Tractor Truck	DIESEL	1	1	0.0163	0.0920	0.0847	0.0001	0.0002	0.0002	14.9674	0.0008	0.0035	1	2	280	0.03	0.18	0.17	0.00	0.00	0.00	29.93	0.00	0.01	
Subtotal															3.38	14.80	28.02	0.04	1.24	1.24	4333.45	0.30	2.63		
Underground Cable and Vault Installation - Concrete and Soil Backfill																									
CAT 416 Rubber Tire Backhoe with Bucket	DIESEL	85	0.54	0.5760	3.8000	3.8740	0.0060	0.2780	0.2780	568.2990	0.0510	0.3680	1	8	280	0.47	3.08	3.14	0.00	0.23	0.23	460.06	0.04	0.30	
Compactor	DIESEL	250	0.56	0.3860	1.2850	3.6980	0.0060	0.1230	0.1230	568.2990	0.0340	0.3513	1	8	280	0.95	3.17	9.13	0.01	0.30	0.30	1403.24	0.08	0.87	
Truck, Crew Cab Flatbed, 1 Ton	DIESEL	1	1	0.0047	0.0560	0.0847	0.0002	0.0002	0.0002	16.2507	0.0003	0.0035	1	2	280	0.01	0.11	0.17	0.00	0.00	0.00	32.50	0.00	0.01	
Truck, Mechanics, 1-2 Ton	DIESEL	1	1	0.0047	0.0560	0.0847	0.0002	0.0002	0.0002	16.2507	0.0003	0.0035	1	2	280	0.01	0.11	0.17	0.00	0.00	0.00	32.50	0.00	0.01	
Truck, Pick-up	DIESEL	1	1	0.0047	0.0560	0.0847	0.0002	0.0002	0.0002	16.2507	0.0003	0.0035	1	2	280	0.01	0.11	0.17	0.00	0.00	0.00	32.50	0.00	0.01	
Semi Tractor Truck	DIESEL	1	1	0.0163	0.0920	0.0847	0.0001	0.0002	0.0002	14.9674	0.0008	0.0035	1	2	280	0.03	0.18	0.17	0.00	0.00	0.00	29.93	0.00	0.01	
Subtotal															1.48	6.77	12.94	0.02	0.53	0.53	1990.74	0.13	1.19		
Underground Cable and Vault Installation - Repaving																									
Generator	DIESEL	84	0.74	0.3860	1.2850	3.6980	0.0060	0.1230	0.1230	568.2990	0.0340	0.3513	1	8	280	0.42	1.41	4.05	0.01	0.13	0.13	623.04	0.04	0.39	
Concrete Trucks	DIESEL	235	0.57	0.0047	0.0560	0.0847	0.0002	0.0002	0.0002	16.2507	0.0003	0.0035	1	2	280	0.01	0.11	0.17	0.00	0.00	0.00	32.50	0.00	0.01	
Compactor	DIESEL	250	0.56	0.3860	1.2850	3.6980	0.0060	0.1230	0.1230	568.2990	0.0340	0.3513	1	8	280	0.95	3.17	9.13	0.01	0.30	0.30	1403.24	0.08	0.87	
Truck, Crew Cab Flatbed, 1 Ton	DIESEL																								

Table A-3 CONTINUED. Heavy Equipment Emissions, Underground Segment Construction

Equipment/Phase	Emission, tons (total)								
	ROG tons (total)	CO tons (total)	NOX tons (total)	SOX tons (total)	PM10 tons (total)	PM2.5 tons (total)	CO2 tons (total)	CH4 tons (total)	N2O tons (total)
Surveying of Underground Alignment, Trench Marking, and Potholing									
CAT 416 Rubber Tire Backhoe with Bucket	0.033	0.215	0.220	0.000	0.016	0.016	32.204	0.003	0.021
Truck, Crew Cab Flatbed, 1 Ton	0.003	0.031	0.047	0.000	0.000	0.000	9.100	0.000	0.002
Truck, Mechanics, 1-2 Ton	0.003	0.031	0.047	0.000	0.000	0.000	9.100	0.000	0.002
Truck, Pick-up	0.003	0.031	0.047	0.000	0.000	0.000	9.100	0.000	0.002
Semi Tractor Truck	0.009	0.052	0.047	0.000	0.000	0.000	8.382	0.000	0.002
Subtotal	0.050	0.361	0.409	0.001	0.016	0.016	67.887	0.004	0.029
Underground Cable and Vault Installation - Saw-Cutting and Pavement Breaking									
Concrete saws	0.091	0.529	0.647	0.001	0.049	0.049	82.973	0.008	0.061
Pavement breaking machines	0.104	0.838	0.837	0.002	0.042	0.042	152.251	0.009	0.080
CAT 416 Rubber Tire Backhoe with Bucket	0.065	0.431	0.439	0.001	0.032	0.032	64.409	0.006	0.042
Generator	0.089	0.532	0.677	0.001	0.047	0.047	87.225	0.008	0.064
Dump/Haul Trucks	0.004	0.022	0.020	0.000	0.000	0.000	3.592	0.000	0.001
Subtotal	0.353	2.351	2.620	0.004	0.169	0.169	390.451	0.031	0.248
Underground Cable and Vault Installation - Trenching to Install Conduit Bank									
CAT 416 Rubber Tire Backhoe with Bucket	0.065	0.431	0.439	0.001	0.032	0.032	64.409	0.006	0.042
Trencher	0.121	0.510	0.744	0.001	0.062	0.062	72.618	0.011	0.071
Dump/Haul Truck (3 trucks per 40')	0.012	0.066	0.061	0.000	0.000	0.000	10.777	0.001	0.003
Subtotal	0.198	1.007	1.244	0.002	0.093	0.093	147.803	0.017	0.115
Underground Cable and Vault Installation - Excavation of Maintenance Vaults									
CAT 416 Rubber Tire Backhoe with Bucket	0.065	0.431	0.439	0.001	0.032	0.032	64.409	0.006	0.042
Excavator	0.109	0.744	0.734	0.001	0.040	0.040	125.576	0.010	0.070
Dump/Haul Truck	0.004	0.022	0.020	0.000	0.000	0.000	3.592	0.000	0.001
Subtotal	0.178	1.197	1.194	0.002	0.071	0.071	193.577	0.016	0.112
Underground Cable and Vault Installation - Install Conduit Bank									
CAT 416 Rubber Tire Backhoe with Bucket	0.065	0.431	0.439	0.001	0.032	0.032	64.409	0.006	0.042
Compactor	0.133	0.444	1.278	0.002	0.043	0.043	196.453	0.012	0.121
Generator	0.089	0.532	0.677	0.001	0.047	0.047	87.225	0.008	0.064
Concrete Trucks	0.001	0.016	0.024	0.000	0.000	0.000	4.550	0.000	0.001
Dump/Haul Truck	0.004	0.022	0.020	0.000	0.000	0.000	3.592	0.000	0.001
Subtotal	0.293	1.445	2.438	0.004	0.122	0.122	356.230	0.026	0.229
Underground Cable and Vault Installation - Maintenance Vault Installation									
CAT 416 Rubber Tire Backhoe with Bucket	0.065	0.431	0.439	0.001	0.032	0.032	64.409	0.006	0.042
Crane	0.177	0.592	1.433	0.002	0.052	0.052	240.754	0.016	0.136
Generator	0.089	0.532	0.677	0.001	0.047	0.047	87.225	0.008	0.064
Compactor	0.133	0.444	1.278	0.002	0.043	0.043	196.453	0.012	0.121
Truck, Crew Cab Flatbed, 1 Ton	0.001	0.016	0.024	0.000	0.000	0.000	4.550	0.000	0.001
Truck, Mechanics, 1-2 Ton	0.001	0.016	0.024	0.000	0.000	0.000	4.550	0.000	0.001
Truck, Pick-up	0.001	0.016	0.024	0.000	0.000	0.000	4.550	0.000	0.001
Semi Tractor Truck	0.005	0.026	0.024	0.000	0.000	0.000	4.191	0.000	0.001
Subtotal	0.474	2.072	3.922	0.006	0.173	0.173	606.682	0.042	0.368
Underground Cable and Vault Installation - Concrete and Soil Backfill									
CAT 416 Rubber Tire Backhoe with Bucket	0.065	0.431	0.439	0.001	0.032	0.032	64.409	0.006	0.042
Compactor	0.133	0.444	1.278	0.002	0.043	0.043	196.453	0.012	0.121
Truck, Crew Cab Flatbed, 1 Ton	0.001	0.016	0.024	0.000	0.000	0.000	4.550	0.000	0.001
Truck, Mechanics, 1-2 Ton	0.001	0.016	0.024	0.000	0.000	0.000	4.550	0.000	0.001
Truck, Pick-up	0.001	0.016	0.024	0.000	0.000	0.000	4.550	0.000	0.001
Semi Tractor Truck	0.005	0.026	0.024	0.000	0.000	0.000	4.191	0.000	0.001
Subtotal	0.207	0.948	1.812	0.003	0.074	0.074	278.703	0.018	0.167
Underground Cable and Vault Installation - Repaving									
Generator	0.059	0.197	0.568	0.001	0.019	0.019	87.225	0.005	0.054
Concrete Trucks	0.001	0.016	0.024	0.000	0.000	0.000	4.550	0.000	0.001
Compactor	0.133	0.444	1.278	0.002	0.043	0.043	196.453	0.012	0.121
Truck, Crew Cab Flatbed, 1 Ton	0.001	0.016	0.024	0.000	0.000	0.000	4.550	0.000	0.001
Truck, Mechanics, 1-2 Ton	0.001	0.016	0.024	0.000	0.000	0.000	4.550	0.000	0.001
Truck, Pick-up	0.001	0.016	0.024	0.000	0.000	0.000	4.550	0.000	0.001
Semi Tractor Truck	0.005	0.026	0.024	0.000	0.000	0.000	4.191	0.000	0.001
Subtotal	0.203	0.730	1.964	0.003	0.062	0.062	306.070	0.017	0.180
Underground Cable and Vault Installation - Cable Pulling, Splicing, and Termination									
Generator	0.059	0.197	0.568	0.001	0.019	0.019	87.225	0.005	0.054
Reel Carrier	0.127	0.500	1.069	0.002	0.036	0.036	261.002	0.011	0.102
Semi Tractor Truck	0.005	0.026	0.024	0.000	0.000	0.000	4.191	0.000	0.001
Hydraulic Winch	0.067	0.319	0.404	0.000	0.034	0.034	45.254	0.006	0.038
Subtotal	0.258	1.041	2.064	0.004	0.089	0.089	397.673	0.023	0.195
Underground Cable and Vault Installation - Commissioning and Testing									
Truck, Crew Cab Flatbed, 1 Ton	0.000	0.001	0.001	0.000	0.000	0.000	0.163	0.000	0.000
Truck, Mechanics, 1-2 Ton	0.000	0.001	0.001	0.000	0.000	0.000	0.163	0.000	0.000
Truck, Pick-up	0.000	0.001	0.001	0.000	0.000	0.000	0.163	0.000	0.000
Subtotal	0.000	0.002	0.003	0.000	0.000	0.000	0.488	0.000	0.000
Assume all activities occur within 14 months	2.214	11.155	17.672	0.028	0.869	0.869	2745.564	0.194	1.643

Table A-5. Heavy Equipment Emissions, Horizontal Dry Boring

Equipment/Phase	FUEL	HP	Load Factor	Emission Factors										Emissions										
				ROG (lb/hr)	CO (lb/hr)	NOX (lb/hr)	SOX (lb/hr)	PM10 (lb/hr)	PM2.5 (lb/hr)	CO2 (lb/hr)	CH4 (lb/hr)	N2O (lb/hr)	No of Equipment	Hrs Per Day	Days in Service	ROG lbs/day	CO lbs/day	NOX lbs/day	SOX lbs/day	PM10 lbs/day	PM2.5 lbs/day	CO2 lbs/day	CH4 lbs/day	N2O lbs/day
Horizontal Dry Boring - Excavation of Bore Pit at Launching End																								
CAT 416 Rubber Tire Backhoe with Bucket	DIESEL	85	0.54	0.5760	3.8000	3.8740	0.0060	0.2780	0.2780	#####	0.0510	0.3680	1	8	30	0.47	3.08	3.14	0.00	0.23	0.23	460.06	0.04	0.30
Excavator	DIESEL	157	0.57	0.4920	3.3660	3.3230	0.0060	0.1790	0.1790	#####	0.0440	0.3157	1	8	30	0.78	5.31	5.24	0.01	0.28	0.28	896.97	0.07	0.50
Dump/Haul Truck	DIESEL	381	0.57	0.3870	1.2090	2.6130	0.0050	0.0930	0.0930	#####	0.0340	0.2482	1	2	30	0.37	1.16	2.50	0.00	0.09	0.09	544.18	0.03	0.24
Subtotal																1.61	9.55	10.88	0.02	0.60	0.60	#####	0.14	1.03
Horizontal Dry Boring - Trenching at Receiving End																								
CAT 416 Rubber Tire Backhoe with Bucket	DIESEL	85	0.54	0.5760	3.8000	3.8740	0.0060	0.2780	0.2780	#####	0.0510	0.3680	1	8	30	0.47	3.08	3.14	0.00	0.23	0.23	460.06	0.04	0.30
Trencher	DIESEL	69	0.75	0.9450	3.9950	5.8260	0.0060	0.4820	0.4820	#####	0.0850	0.5535	1	8	30	0.86	3.65	5.32	0.01	0.44	0.44	518.70	0.08	0.51
Dump/Haul Truck	DIESEL	1	1	0.0163	0.0920	0.0847	0.0001	0.0002	0.0002	#####	0.0008	0.0035	1	8	60	0.13	0.74	0.68	0.00	0.00	0.00	119.74	0.01	0.03
Subtotal																1.46	7.46	9.13	0.01	0.67	0.67	#####	0.12	0.83
Horizontal Dry Boring - Dry Boring Operation																								
CAT 416 Rubber Tire Backhoe with Bucket	DIESEL	85	0.54	0.5760	3.8000	3.8740	0.0060	0.2780	0.2780	#####	0.0510	0.3680	1	8	30	0.47	3.08	3.14	0.00	0.23	0.23	460.06	0.04	0.30
Drill Rig	DIESEL	300	0.75	0.1880	1.0060	1.1410	0.0050	0.0330	0.0330	#####	0.0170	0.1084	1	8	30	0.75	3.99	4.53	0.02	0.13	0.13	#####	0.07	0.43
Loader	DIESEL	85	0.54	0.5760	3.8000	3.8740	0.0060	0.2780	0.2780	#####	0.0510	0.3680	1	8	30	0.47	3.08	3.14	0.00	0.23	0.23	460.06	0.04	0.30
Dump/Haul Truck	DIESEL	1	1	0.0163	0.0920	0.0847	0.0001	0.0002	0.0002	#####	0.0008	0.0035	1	8	60	0.13	0.74	0.68	0.00	0.00	0.00	119.74	0.01	0.03
Subtotal																1.81	10.88	11.48	0.03	0.58	0.58	#####	0.16	1.05
Maximum Simultaneous Emissions (assume excavation and trenching)																								
																3.07	17.01	20.01	0.03	1.26	1.26	#####	0.27	1.87

Equipment/Phase	Emission, tons (total)									
	ROG tons (total)	CO tons (total)	NOX tons (total)	SOX tons (total)	PM10 tons (total)	PM2.5 tons (total)	CO2 tons (total)	CH4 tons (total)	N2O tons (total)	
Horizontal Dry Boring - Excavation of Bore Pit at Launching End										
CAT 416 Rubber Tire Backhoe with Bucket	0.007	0.046	0.047	0.000	0.003	0.003	6.901	0.001	0.004	
Excavator	0.012	0.080	0.079	0.000	0.004	0.004	13.455	0.001	0.007	
Dump/Haul Truck	0.006	0.017	0.038	0.000	0.001	0.001	8.163	0.000	0.004	
Subtotal	0.024	0.143	0.163	0.000	0.009	0.009	28.518	0.002	0.016	
Horizontal Dry Boring - Trenching at Receiving End										
CAT 416 Rubber Tire Backhoe with Bucket	0.007	0.046	0.047	0.000	0.003	0.003	6.901	0.001	0.004	
Trencher	0.013	0.055	0.080	0.000	0.007	0.007	7.780	0.001	0.008	
Dump/Haul Truck	0.004	0.022	0.020	0.000	0.000	0.000	3.592	0.000	0.001	
Subtotal	0.024	0.123	0.147	0.000	0.010	0.010	18.274	0.002	0.013	
Horizontal Dry Boring - Dry Boring Operation										
CAT 416 Rubber Tire Backhoe with Bucket	0.007	0.046	0.047	0.000	0.003	0.003	6.901	0.001	0.004	
Drill Rig	0.011	0.060	0.068	0.000	0.002	0.002	33.828	0.001	0.006	
Dump/Haul Truck	0.004	0.022	0.020	0.000	0.000	0.000	3.592	0.000	0.001	
Subtotal	0.022	0.128	0.135	0.000	0.005	0.005	44.321	0.002	0.012	
Assume all activities occur within 14 months										
	0.070	0.394	0.446	0.001	0.024	0.024	91.113	0.006	0.040	

Table A-6. Construction Truck Emissions, Horizontal Dry Boring

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed	VMT	Emissions, lbs/day										Total Emissions, tons																												
					CO	NOX	ROG	SOx	PM10		PM2.5		CO2	CH4	N2O	CO	NOx	VOCs	SOx	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O																	
Horizontal Dry Boring - Excavation of Bore Pit at Launching End																																											
Dump Truck	Heavy Duty Truck, Diesel	1	35	80	1.0763	4.7642	0.2612	0.0107	0.0712	0.1459	0.1303	0.0655	0.0030	0.0559	1709.6224	0.0121	0.1982	0.19	0.84	0.05	0.00	0.06	0.02	0.01	0.00	301.53	0.00	0.03	30	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.52	0.00	0.00		
Crew Cab Flatbed Truck 1 ton	Light Duty Truck 2, Diesel	1	15	60	0.5481	0.6802	0.0909	0.0032	0.0728	0.0080	0.0367	0.0670	0.0020	0.0157	315.6745	0.0042	0.0283	0.07	0.09	0.01	0.00	0.02	0.01	0.01	0.00	41.76	0.00	0.00	30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00		
Subtotal																	0.26	0.93	0.06	0.00	0.08	0.03	0.01	0.00	343.28	0.00	0.04		0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.15	0.00	0.00
Horizontal Dry Boring - Trenching at Receiving End																																											
Dump Truck	Heavy Duty Truck, Diesel	1	35	80	1.0763	4.7642	0.2612	0.0107	0.0712	0.1459	0.1303	0.0655	0.0030	0.0559	1709.6224	0.0121	0.1982	0.19	0.84	0.05	0.00	0.06	0.02	0.01	0.00	301.53	0.00	0.03	30	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.52	0.00	0.00	
Crew Cab Flatbed Truck 1 ton	Light Duty Truck 2, Diesel	1	15	60	0.5481	0.6802	0.0909	0.0032	0.0728	0.0080	0.0367	0.0670	0.0020	0.0157	315.6745	0.0042	0.0283	0.07	0.09	0.01	0.00	0.02	0.01	0.01	0.00	41.76	0.00	0.00	30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00		
Subtotal																	0.26	0.93	0.06	0.00	0.08	0.03	0.01	0.00	343.28	0.00	0.04		0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.15	0.00	0.00
Horizontal Dry Boring - Dry Boring Operation																																											
Dump Truck	Heavy Duty Truck, Diesel	1	35	80	1.0763	4.7642	0.2612	0.0107	0.0712	0.1459	0.1303	0.0655	0.0030	0.0559	1709.6224	0.0121	0.1982	0.19	0.84	0.05	0.00	0.06	0.02	0.01	0.00	301.53	0.00	0.03	30	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.52	0.00	0.00	
Crew Cab Flatbed Truck 1 ton	Light Duty Truck 2, Diesel	1	15	60	0.5481	0.6802	0.0909	0.0032	0.0728	0.0080	0.0367	0.0670	0.0020	0.0157	315.6745	0.0042	0.0283	0.07	0.09	0.01	0.00	0.02	0.01	0.01	0.00	41.76	0.00	0.00	30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.63	0.00	0.00		
Mechanics Trucks	Light Duty Truck 2, Diesel	1	35	80	0.2208	0.4913	0.0422	0.0032	0.0335	0.0080	0.0367	0.0309	0.0020	0.0157	254.9975	0.0024	0.0204	0.04	0.09	0.01	0.00	0.01	0.01	0.01	0.00	44.97	0.00	0.00	30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.67	0.00	0.00		
Pickup Trucks	Light Duty Truck 1, Diesel	1	35	80	0.2775	0.4990	0.0640	0.0107	0.0532	0.0120	0.1303	0.0489	0.0030	0.0559	250.6986	0.0030	0.0208	0.05	0.09	0.01	0.00	0.03	0.02	0.01	0.00	44.22	0.00	0.00	30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.66	0.00	0.00		
Semi Tractor Trailer Truck	Heavy Duty Truck, Diesel	1	35	80	1.0763	4.7642	0.2612	0.0107	0.0712	0.1459	0.1303	0.0655	0.0030	0.0559	1709.6224	0.0121	0.1982	0.19	0.84	0.05	0.00	0.06	0.02	0.01	0.00	301.53	0.00	0.03	30	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.52	0.00	0.00		
Subtotal																	0.54	1.95	0.12	0.01	0.19	0.08	0.04	0.01	734.00	0.01	0.08		0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.01	0.00	0.00		
Maximum Simultaneous Emissions (assume excavation and trenching)																																											
																	0.52	1.86	0.12	0.00	0.15	0.07	0.03	0.01	686.57	0.01	0.08	Total	0.02	0.06	0.00	0.00	0.01	0									

Table A-9. Heavy Equipment Emissions, Electrode Array Installation

Equipment/Phase	FUEL	HP	Load Factor	Emission Factors										Emissions										
				ROG (lb/hr)	CO (lb/hr)	NOX (lb/hr)	SOX (lb/hr)	PM10 (lb/hr)	PM2.5 (lb/hr)	CO2 (lb/hr)	CH4 (lb/hr)	N2O (lb/hr)	No of Equipment	Hrs Per Day	Days in Service	ROG lbs/day	CO lbs/day	NOX lbs/day	SOX lbs/day	PM10 lbs/day	PM2.5 lbs/day	CO2 lbs/day	CH4 lbs/day	N2O lbs/day
Electrode Array Installation																								
Crane	DIESEL	399	0.43	0.4180	1.3980	3.3830	0.0050	0.1220	0.1220	568.2990	0.0370	0.3214	1	8	180	1.26	4.23	10.24	0.02	0.37	0.37	1719.67	0.11	0.97
Trencher/Plow	DIESEL	300	0.57	0.2770	1.0880	2.3280	0.0050	0.0780	0.078	568.2990	0.0250	0.2212	1	6	180	0.63	2.46	5.27	0.01	0.18	0.18	1285.47	0.06	0.50
Generator	DIESEL	84	0.74	0.3860	1.2850	3.6980	0.0060	0.1230	0.1230	568.2990	0.0340	0.3513	1	8	180	0.42	1.41	4.05	0.01	0.13	0.13	623.04	0.04	0.39
Reel Carrier	DIESEL	300	0.62	0.2770	1.0880	2.3280	0.0050	0.0780	0.078	568.2990	0.0250	0.2212	1	8	180	0.91	3.57	7.64	0.02	0.26	0.26	1864.30	0.08	0.73
Total																3.22	11.67	27.19	0.05	0.94	0.94	5492.48	0.29	2.58

Emission, tons (total)											
Equipment/Phase	FUEL	HP	ROG tons (total)	CO tons (total)	NOX tons (total)	SOX tons (total)	PM10 tons (total)	PM2.5 tons (total)	CO2 tons (total)	CH4 tons (total)	N2O tons (total)
Electrode Array Installation											
Crane			0.114	0.381	0.921	0.001	0.033	0.033	154.770	0.010	0.088
Trencher/Plow			0.056	0.221	0.474	0.001	0.016	0.016	115.692	0.005	0.045
Generator			0.038	0.127	0.365	0.001	0.012	0.012	56.073	0.003	0.035
Reel Carrier			0.082	0.321	0.687	0.001	0.023	0.023	167.787	0.007	0.065
Total			0.29	1.05	2.45	0.00	0.08	0.08	494.32	0.03	0.23

Table A-10. Construction Truck Emissions, Electrode Array Installation

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day															Total Emissions, tons																						
					CO Running Exhaust (g/mi)	NOx Running Exhaust (g/mi)	ROG Running Exhaust (g/mi)	SOx Running Exhaust (g/mi)	PM10 Running Exhaust (g/mi)	PM2.5 Running Exhaust (g/mi)	CO2 Running Exhaust (g/mi)	CH4 Running Exhaust (g/mi)	N2O Running Exhaust (g/mi)	CO	NOx	VOCs	SOx	PM10	PM2.5	CO2	CH4	N2O	Construction Days/Total Deliveries	CO	NOx	VOCs	SOx	PM10	PM2.5	CO2	CH4	N2O										
Electrode Array Installation																																										
Semi Tractor Trailer Truck - 88 deliveries from Fontana	Heavy Duty Truck, Diesel	1	35	130	1.0763	4.7642	0.2612	0.0107	0.0712	0.1459	0.1303	0.0655	0.0030	0.0559	1709.6224	0.0121	0.1982	0.31	1.37	0.07	0.00	0.10	0.04	0.00	0.00	489.98	0.00	0.06	88	0.01	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.56	0.00	0.00	
Crew Cab Flatbed Truck 1 ton	Light Duty Truck 2, Diesel	1	15	60	0.5481	0.6802	0.0909	0.0032	0.0728	0.0080	0.0367	0.0670	0.0020	0.0157	315.6745	0.0042	0.0283	0.07	0.09	0.01	0.00	0.02	0.01	0.00	0.00	41.76	0.00	0.00	180	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.76	0.00	0.00	
Mechanics Trucks	Light Duty Truck 2, Diesel	1	35	80	0.2208	0.4913	0.0422	0.0032	0.0335	0.0080	0.0367	0.0309	0.0020	0.0157	254.9975	0.0024	0.0204	0.04	0.09	0.01	0.00	0.01	0.01	0.00	0.00	44.97	0.00	0.00	180	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.05	0.00	0.00	
Pickup Trucks	Light Duty Truck 1, Diesel	1	35	80	0.2775	0.4990	0.0640	0.0107	0.0532	0.0120	0.1303	0.0489	0.0030	0.0559	250.6986	0.0030	0.0208	0.05	0.09	0.01	0.00	0.03	0.02	0.00	0.00	44.22	0.00	0.00	180	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.98	0.00	0.00	
Subtotal																		0.47	1.63	0.11	0.01	0.16	0.07	0.00	0.00	620.93	0.00	0.07		0.01	0.02	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	11.79	0.00	0.00

2012 Emission Factors from EMFAC2007, average temp 60F; SCAB

Paved Road Fugitive Dust
 EPA's AP-42, Section 13.2.1, November 2006
 $E = k(sL/2)^{0.65} \times (W/3)^{1.5} \times C$
 For LDT assume 2 tons/vehicle, MDT assume 13 tons/vehicle, HDT assume 20 tons/vehicle
 Assume silt loading for 10,000 ADT roadways = 0.03 g/m3

Assume k = 0.016 PM10
 Assume 6 miles in addition for track-out for PM10

Emission Factors
 PM10, LDT 9.81231E-05
 PM10, MDT 0.008944829

Table A-11. Worker Trip Emissions

Construction Phase	Vehicle Class	No. of Daily Workers per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	CO		NO _x		ROG						SO _x		PM10				PM2.5				CO2		CH4		N2O	
					Running Exhaust (g/mi)	Start-Up (g/vehicle-day)	Running Exhaust (g/mi)	Start-Up (g/vehicle-day)	Running Exhaust (g/mi)	Start-Up (g/vehicle-day)	Hot-Soak (g/vehicle-day)	Resting Loss (g/vehicle-day)	Running Evaporative (g/mi)	Diurnal Evaporative (g/vehicle-day)	Running Exhaust (g/mi)	Start-Up (g/vehicle-day)	Running Exhaust (g/mi)	Start-Up (g/vehicle-day)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Start-Up (g/vehicle-day)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Start-Up (g/vehicle-day)	Running Exhaust (g/mi)	Start-Up (g/vehicle-day)	Running Exhaust (g/mi)	Start-Up (g/vehicle-day)
Kenter Canyon Terminal Tower Connection	Light-Duty Truck, catalyst	15	35	80	4.557267391	31.80119575	0.39559022	1.833385029	0.198107822	2.452331859	1.929422662	0.809750687	0.198413075	1.099251458	0.004163789	0.005689456	0.01108731	0.031335238	0.007999958	0.036749816	0.01021767	0.028861295	0.001999999	0.01574992	622.6310726	447.2201157	0.010781498	0.106878926	0.02	0.08
Underground Cables and Vaults	Light-Duty Truck, catalyst	30	35	80	4.557267391	31.80119575	0.39559022	1.833385029	0.198107822	2.452331859	1.929422662	0.809750687	0.198413075	1.099251458	0.004163789	0.005689456	0.01108731	0.031335238	0.007999958	0.036749816	0.01021767	0.028861295	0.001999999	0.01574992	622.6310726	447.2201157	0.010781498	0.106878926	0.02	0.08
Horizontal Dry Boring	Light-Duty Truck, catalyst	6	35	80	4.557267391	31.80119575	0.39559022	1.833385029	0.198107822	2.452331859	1.929422662	0.809750687	0.198413075	1.099251458	0.004163789	0.005689456	0.01108731	0.031335238	0.007999958	0.036749816	0.01021767	0.028861295	0.001999999	0.01574992	622.6310726	447.2201157	0.010781498	0.106878926	0.02	0.08
Marine Cables - Directional Drilling	Light-Duty Truck, catalyst	20	35	80	4.557267391	31.80119575	0.39559022	1.833385029	0.198107822	2.452331859	1.929422662	0.809750687	0.198413075	1.099251458	0.004163789	0.005689456	0.01108731	0.031335238	0.007999958	0.036749816	0.01021767	0.028861295	0.001999999	0.01574992	622.6310726	447.2201157	0.010781498	0.106878926	0.02	0.08
Marine Cables - Plowing	Light-Duty Truck, catalyst	20	35	80	4.557267391	31.80119575	0.39559022	1.833385029	0.198107822	2.452331859	1.929422662	0.809750687	0.198413075	1.099251458	0.004163789	0.005689456	0.01108731	0.031335238	0.007999958	0.036749816	0.01021767	0.028861295	0.001999999	0.01574992	622.6310726	447.2201157	0.010781498	0.106878926	0.02	0.08
Electrode Array Installation	Light-Duty Truck, catalyst	20	35	80	4.557267391	31.80119575	0.39559022	1.833385029	0.198107822	2.452331859	1.929422662	0.809750687	0.198413075	1.099251458	0.004163789	0.005689456	0.01108731	0.031335238	0.007999958	0.036749816	0.01021767	0.028861295	0.001999999	0.01574992	622.6310726	447.2201157	0.010781498	0.106878926	0.02	0.08
Abandonment/Recovery of Existing Underground Facilities	Light-Duty Truck, catalyst	15	35	80	4.557267391	31.80119575	0.39559022	1.833385029	0.198107822	2.452331859	1.929422662	0.809750687	0.198413075	1.099251458	0.004163789	0.005689456	0.01108731	0.031335238	0.007999958	0.036749816	0.01021767	0.028861295	0.001999999	0.01574992	622.6310726	447.2201157	0.010781498	0.106878926	0.02	0.08
Abandonment/Recovery of Existing Marine Facilities	Light-Duty Truck, catalyst	15	35	80	4.557267391	31.80119575	0.39559022	1.833385029	0.198107822	2.452331859	1.929422662	0.809750687	0.198413075	1.099251458	0.004163789	0.005689456	0.01108731	0.031335238	0.007999958	0.036749816	0.01021767	0.028861295	0.001999999	0.01574992	622.6310726	447.2201157	0.010781498	0.106878926	0.02	0.08

EMFAC2011 emission factors for 2016
 Assume startup after 8 hours
 Assume 45 minutes run time total

0.010781498 0.106878926

Construction Phase	Vehicle Class	No. of Daily Workers per construction phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day													Total Emissions, tons									
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O	Construction Days	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Kenter Canyon Terminal Tower Connection	Light-Duty Truck, catalyst	15	35	80	13.11	1.11	0.74	0.01	0.15	0.07	0.13	0.05	1662.00	0.03	0.05	60	0.20	0.02	0.01108	1.68E-04	0.00223	0.00112	0.00190	0.00078	25	0.00048	0.00069
Underground Cables and Vaults	Light-Duty Truck, catalyst	30	35	80	26.22	2.21	1.48	0.02	0.30	0.15	0.25	0.10	3324.00	0.06	0.09	280	1.84	0.16	0.10342	1.57E-03	0.02083	0.01049	0.01772	0.00727	233	0.00449	0.00645
Horizontal Dry Boring	Light-Duty Truck, catalyst	6	35	80	5.24	0.44	0.30	0.00	0.06	0.03	0.05	0.02	664.80	0.01	0.02	280	0.37	0.03	0.02068	3.14E-04	0.00417	0.00210	0.00354	0.00145	47	0.00090	0.00129
Marine Cables - Directional Drilling	Light-Duty Truck, catalyst	20	35	80	17.48	1.48	0.98	0.01	0.20	0.10	0.17	0.07	2216.00	0.04	0.06	80	0.35	0.03	0.01970	2.99E-04	0.00397	0.00200	0.00338	0.00138	44	0.00085	0.00123
Marine Cables - Plowing	Light-Duty Truck, catalyst	20	35	80	17.48	1.48	0.98	0.01	0.20	0.10	0.17	0.07	2216.00	0.04	0.06	10	0.04	0.00	0.00246	3.73E-05	0.00050	0.00025	0.00042	0.00017	6	0.00011	0.00015
Electrode Array Installation	Light-Duty Truck, catalyst	20	35	80	17.48	1.48	0.98	0.01	0.20	0.10	0.17	0.07	2216.00	0.04	0.06	180	0.79	0.07	0.04432	6.72E-04	0.00893	0.00450	0.00759	0.00311	100	0.00192	0.00276
Abandonment/Recovery of Existing Underground Facilities	Light-Duty Truck, catalyst	15	35	80	13.11	1.11	0.74	0.01	0.15	0.07	0.13	0.05	1662.00	0.03	0.05	25	0.08	0.01	0.00462	7.00E-05	0.00093	0.00047	0.00079	0.00032	10	0.00020	0.00029
Abandonment/Recovery of Existing Marine Facilities	Light-Duty Truck, catalyst	15	35	80	13.11	1.11	0.74	0.01	0.15	0.07	0.13	0.05	1662.00	0.03	0.05	5	0.02	0.00	0.00092	1.40E-05	0.00019	0.00009	0.00016	0.00006	2	0.00004	0.00006

Operations	Vehicle Class	No. of Daily Workers per construction phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day													Total Emissions, tons									
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O	Work Days	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Inspection and Maintenance	Light-Duty Truck, cat	10	35	40	4.72	16.52	0.32	2.23	0.05	0.03	0.05	0.02	558.93	0.01	0.02	250	0.29	1.03	0.01986	1.39E-01	0.00312	0.00158	0.00282	0.00116	35	0.00074	0.00101

Table A-12. Fugitive Dust Emissions

- Emission Types
 A) Trenching
 B) Maintenance Vault Installation
 C) Horizontal Dry Boring

A) Trenching

Trenching		
Bulldozing emissions used (AP42, p. 11.9-5)	60,000	cubic yards
Trenching hours/day	8	hours/day
Emission Factor: $E = F \times 1.0 \times (s)^{-1.5} / (M)^{1.4}$	s =	6.9
F PM10 = 0.75; F PM2.5 = 0.105	M =	7.9
	PM10	PM2.5
Emission Factor, lbs/hour	0.752760759	0.105386506
Uncontrolled Emissions, lbs/day	6.022086075	0.84309205
Control Fraction - watering 3x daily	0.61	0.61
Controlled Emissions, lbs/day	2.348613569	0.3288059
Controlled Emissions, total tons	0.3288059	0.046032826

Trenching		
Material handling		Max Day
Material Loading/Handling emissions (AP-42, p. 13.2.4-3)		
Emission Factor: $E = (k)(0.0032)[(U/5)^{-3}][((M/2)^{-1.4})]$		
E = lb/ton		
k = Particle Size Constant (0.35 for PM10 and 0.11 for PM2.5)		
U = average wind speed = 25.3 MPH worst day, 5.12 MPH	U =	25.3
M = moisture content = 10% (mitigated)	M =	12
Three separate drops are assumed - unloading, loading truck, unloading at disposal		
Assume 1.6 tons/cubic yard		
Material handling amount	60,000	cubic yards
Max daily (assuming 5% of total)	3000	cubic yards
	PM10	PM2.5
Emission factor, lbs/ton	0.000750243	0.000235791
Emissions, lbs/day	3.601166334	1.131795133
Emissions, total tons	0.03601	0.01132

B) Maintenance Vault Installation

Excavation		
Bulldozing emissions used (AP42, p. 11.9-5)	8,200	cubic yards
Excavation hours/day	8	hours/day
Emission Factor: $E = F \times 1.0 \times (s)^{-1.5} / (M)^{1.4}$	s =	6.9
F PM10 = 0.75; F PM2.5 = 0.105	M =	7.9
	PM10	PM2.5
Emission Factor, lbs/hour	0.752760759	0.105386506
Uncontrolled Emissions, lbs/day	6.022086075	0.84309205
Control Fraction - watering 3x daily	0.61	0.61
Controlled Emissions, lbs/day	2.348613569	0.3288059
Controlled Emissions, total tons	0.3288059	0.046032826

Excavation		
Material handling		Max Day
Material Loading/Handling emissions (AP-42, p. 13.2.4-3)		
Emission Factor: $E = (k)(0.0032)[(U/5)^{-3}][((M/2)^{-1.4})]$		
E = lb/ton		
k = Particle Size Constant (0.35 for PM10 and 0.11 for PM2.5)		
U = average wind speed = 25.3 MPH worst day, 5.12 MPH	U =	25.3
M = moisture content = 10% (mitigated)	M =	12
Three separate drops are assumed - unloading, loading truck, unloading at disposal		
Assume 1.6 tons/cubic yard		
Material handling amount	8,200	cubic yards
Max daily (assuming 5% of total)	410	cubic yards
	PM10	PM2.5
Emission factor, lbs/ton	0.000750243	0.000235791
Emissions, lbs/day	0.492159399	0.154678668
Emissions, total tons	0.00492	0.00155

C) Horizontal Dry Boring

Excavation		
Bulldozing emissions used (AP42, p. 11.9-5)	1,000	cubic yards
Emission Factor: $E = F \times 1.0 \times (s)^{-1.5} / (M)^{1.4}$	s =	6.9
F PM10 = 0.75; F PM2.5 = 0.105	M =	7.9
	PM10	PM2.5
Emission Factor, lbs/hour	0.752760759	0.105386506
Uncontrolled Emissions, lbs/day	6.022086075	0.84309205
Control Fraction - watering 3x daily	0.61	0.61
Controlled Emissions, lbs/day	2.348613569	0.3288059
Controlled Emissions, total tons	0.035229204	0.004932088
Excavation		
Material handling		Max Day
Material Loading/Handling emissions (AP-42, p. 13.2.4-3)		
Emission Factor: $E = (k)(0.0032)[(U/5)^{-3}][((M/2)^{-1.4})]$		
E = lb/ton		
k = Particle Size Constant (0.35 for PM10 and 0.11 for PM2.5)		
U = average wind speed = 25.3 MPH worst day, 5.12 MPH avg	U =	25.3
M = moisture content = 10% (mitigated)	M =	12
Three separate drops are assumed - unloading, loading truck, unloading at disposal		
Assume 1.6 tons/cubic yard		
Material handling amount	1,000	cubic yards
Max daily (assuming 5% of total)	50	cubic yards
	PM10	PM2.5
Emission factor, lbs/ton	0.000750243	0.000235791
Emissions, lbs/day	0.060019439	0.018863252
Emissions, total tons	0.00060	0.00019
Emissions, total tons	0.00240	0.00075

Table A-20. Maximum Daily Emissions, lbs/day

Kenter Canyon Terminal Tower Connection										
Emission Source	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	
Heavy Construction Equipment	3.61	16.32	30.23	0.05	1.17	1.17	5303.38	0.31	2.69	
Construction Trucks	0.19	0.80	3.00	0.01	0.37	0.15	1150.42	0.01	0.12	
Worker Vehicles	0.74	13.11	1.11	0.01	0.28	0.13	1662.00	0.03	0.05	
Total	4.53	30.23	34.34	0.07	1.81	1.45	8115.80	0.35	2.86	
Underground Cable and Vault Installation										
Emission Source	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	
Heavy Construction Equipment	8.21	43.08	65.21	0.10	3.32	3.32	9855.04	0.71	6.08	
Construction Trucks	0.27	1.14	4.53	0.01	0.45	0.17	1672.31	0.01	0.19	
Worker Vehicles	1.48	26.22	2.21	0.02	0.55	0.25	3324.00	0.06	0.09	
Fugitive Dust					8.79	1.94				
Total	9.95	70.43	71.96	0.14	13.11	5.68	14851.35	0.79	6.36	
Horizontal Dry Boring										
Emission Source	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	
Heavy Construction Equipment	3.07	17.01	20.01	0.03	1.26	1.26	2999.71	0.27	1.87	
Construction Trucks	0.12	0.52	1.86	0.00	0.18	0.07	686.57	0.01	0.08	
Worker Vehicles	0.30	5.24	0.44	0.00	0.11	0.05	664.80	0.01	0.02	
Fugitive Dust					2.41	0.35				
Total	3.48	22.77	22.32	0.04	3.96	1.73	4351.08	0.29	1.96	
Marine Cable Installation: Directional Drilling										
Emission Source	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	
Heavy Construction Equipment	2.01	8.22	14.76	0.03	0.50	0.50	3974.87	0.18	1.40	
Construction Trucks	0.12	0.54	1.95	0.01	0.19	0.08	734.00	0.01	0.08	
Worker Vehicles	0.98	17.48	1.48	0.01	0.37	0.17	2216.00	0.04	0.06	
Total	3.12	26.24	18.19	0.06	1.05	0.75	6924.87	0.23	1.54	
Marine Cable Installation: Marine Plowing										
Emission Source	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	
Heavy Construction Equipment	1.96	7.44	16.96	0.03	0.57	0.57	3772.81	0.18	1.61	
Construction Trucks	0.12	0.54	1.95	0.01	0.19	0.08	734.00	0.01	0.08	
Worker Vehicles	0.98	17.48	1.48	0.01	0.37	0.17	2216.00	0.04	0.06	
Marine Vessels	17.29	46.49	159.49	0.17	8.53	7.68	13678.85	1.91	0.21	
Total	20.36	71.95	179.87	0.22	9.66	8.50	20401.66	2.14	1.96	
Electrode Array Installation										
Emission Source	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	
Heavy Construction Equipment	3.22	11.67	27.19	0.05	0.94	0.94	5492.48	0.29	2.58	
Construction Trucks	0.11	0.47	1.63	0.01	0.16	0.07	620.93	0.00	0.07	
Worker Vehicles	0.98	17.48	1.48	0.01	0.37	0.17	2216.00	0.04	0.06	
Marine Vessels	7.38	19.68	66.19	0.07	3.72	3.35	5715.08	0.80	0.09	
Total	11.69	49.29	96.49	0.14	5.19	4.53	14044.48	1.14	2.80	
Maximum Daily Emissions	33.79	165.16	274.15	0.40	26.72	15.92	39604.09	3.21	10.28	

Table A-21. Total Emissions, tons

Kenter Canyon Terminal Tower Connection										
Emission Source	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	
Heavy Construction Equipment	0.11	0.49	0.91	0.00	0.04	0.04	144.34	0.01	0.07	
Construction Trucks	0.01	0.02	0.09	0.00	0.01	0.00	31.31	0.00	0.00	
Worker Vehicles	0.01	0.20	0.02	0.00	0.00	0.00	22.62	0.00	0.00	
Total	0.12	0.71	1.01	0.00	0.05	0.04	198.26	0.01	0.08	
Underground Cable and Vault Installation										
Emission Source	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	
Heavy Construction Equipment	2.21	11.15	17.67	0.03	0.87	0.87	2490.76	0.18	1.49	
Construction Trucks	0.37	1.55	6.59	0.02	0.58	0.21	2114.31	0.02	0.23	
Worker Vehicles	0.10	1.84	0.16	0.00	0.04	0.02	211.09	0.00	0.01	
Fugitive Dust					0.70	0.10				
Total	2.68	14.54	24.42	0.05	2.18	1.20	4816.16	0.20	1.73	
Horizontal Dry Boring										
Emission Source	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	
Heavy Construction Equipment	0.07	0.39	0.45	0.00	0.02	0.02	82.66	0.01	0.04	
Construction Trucks	0.00	0.02	0.06	0.00	0.01	0.00	19.33	0.00	0.00	
Worker Vehicles	0.02	0.37	0.03	0.00	0.01	0.00	42.22	0.00	0.00	
Fugitive Dust					0.04	0.01				
Total	0.09	0.78	0.53	0.00	0.07	0.04	144.21	0.01	0.04	
Marine Cable Installation: Directional Drilling										
Emission Source	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	
Heavy Construction Equipment	0.08	0.33	0.59	0.00	0.02	0.02	144.88	0.01	0.05	
Construction Trucks	0.00	0.00	0.01	0.00	0.00	0.00	3.27	0.00	0.00	
Worker Vehicles	0.02	0.35	0.03	0.00	0.01	0.00	40.21	0.00	0.00	
Total	0.10	0.68	0.63	0.00	0.03	0.02	188.36	0.01	0.05	
Marine Cable Installation: Marine Plowing										
Emission Source	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	
Heavy Construction Equipment	0.01	0.04	0.08	0.00	0.00	0.00	17.11	0.00	0.01	
Construction Trucks	0.00	0.00	0.01	0.00	0.00	0.00	3.33	0.00	0.00	
Worker Vehicles	0.00	0.04	0.00	0.00	0.00	0.00	5.03	0.00	0.00	
Marine Vessels	0.10	0.26	0.88	0.00	0.05	0.04	69.17	0.01	0.00	
Total	0.11	0.34	0.98	0.00	0.05	0.05	94.64	0.01	0.01	
Electrode Array Installation										
Emission Source	ROG	CO	NOx	SOx	PM10	PM2.5	CO2	CH4	N2O	
Heavy Construction Equipment	0.29	1.05	2.45	0.00	0.08	0.08	448.45	0.02	0.21	
Construction Trucks	0.00	0.01	0.02	0.00	0.01	0.00	10.69	0.00	0.00	
Worker Vehicles	0.04	0.79	0.07	0.00	0.02	0.01	90.47	0.00	0.00	
Marine Vessels	0.04	0.12	0.41	0.00	0.02	0.02	32.26	0.00	0.00	
Total	0.38	1.97	2.95	0.01	0.13	0.12	581.87	0.03	0.21	
Total Emissions	3.50	19.02	30.53	0.06	2.52	1.46	6023.49	0.26	2.12	