

**APPENDIX J:
AIR QUALITY AND GREENHOUSE GASES
SUPPORT INFORMATION**

AIR QUALITY AND GREENHOUSE GASES SUPPORT INFORMATION

AIR QUALITY AND GREENHOUSE GASES EMISSIONS TABLES FOR THE PROPOSED PROJECT AND ALTERNATIVES 1 & 2

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**AIR QUALITY AND GREENHOUSE GASES EMISSIONS TABLES FOR
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2016 Maximum Daily Construction Emissions

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**AIR QUALITY AND GREENHOUSE GASES EMISSIONS TABLES FOR
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2016 Maximum Daily Construction Emissions

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**AIR QUALITY AND GREENHOUSE GASES EMISSIONS TABLES
FOR THE PROPOSED PROJECT AND ALTERNATIVES 1 AND 2**

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Table A-1
 Construction Heavy Equipment Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment A

Table A-1. 2016 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment A

Emission Factors														Emissions										
Equipment/Phase	Source	FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Foundation Excavation																								
Drill Rig	CalEEMod User's Guide, Appendix D, 2016 Bore/Drill Rigs, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	82	0.5	0.0006	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0002	0.0011	1	10	0.23	3.34	4.81	0.01	0.27	0.24	513.69	0.08	0.46
Foundation Concrete																								
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	1	10	0.93	3.34	4.34	0.00	0.37	0.33	463.57	0.04	0.41
On-Road Certified Truck Emissions					ROG (lbs/hr)	CO (lbs/hr)	NOX (lbs/hr)	SOX (lbs/hr)	PM10 (lbs/hr)	PM2.5 (lbs/hr)	CO2 (lbs/hr)	CH4 (lbs/hr)	N2O (lbs/hr)											
Foundation Excavation																								
Dump/Haul Truck	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	1	5	0.07	0.37	0.66	0.00	0.00	0.00	74.97	0.00	0.06
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	10	0.04	0.49	1.62	0.00	0.01	0.01	160.41	0.00	0.15
Subtotal																								
Foundation Rebar																								
Crane Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	10	0.04	0.49	1.62	0.00	0.01	0.01	160.41	0.00	0.15
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	5	0.02	0.24	0.81	0.00	0.00	0.00	80.20	0.00	0.08
Subtotal																								
Foundation Concrete																								
2-ton Flatbed Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Concrete Trucks	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	3	10	0.13	1.47	4.86	0.00	0.02	0.02	481.23	0.01	0.46
Crane Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Flatbed Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Subtotal																1.50	10.04	19.69	0.02	0.68	0.60	2030.72	0.14	1.87
Simultaneous Construction Equipment																1.50	10.04	19.69	0.02	0.68	0.60	2030.72	0.14	1.87

Table A-2
Construction and Operational Truck Trip Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment A

Table A-2. 2016 Maximum Daily Construction Emissions, Construction Truck Trips, Segment A

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10		PM2.5			CO ₂	CH ₄	N ₂ O	Emissions, lbs/day														
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO ₂	CH ₄	N ₂ O
Foundation Excavation																															
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	3	30	20	0.292950056	0.47693085	0.06521049	0.00318614	0.05395477	0.00799996	0.03674982	0.04963839	0.002	0.0157499	247.933018	0.01416764	0.01	0.04	0.06	0.01	0.00	0.01	0.01	0.01	0.05	0.01	0.05	0.01	32.80	0.00	0.00
Dump Truck	Heavy Duty Truck, Diesel	1	30	60	1.111513533	5.1835677	0.30038695	0.01071182	0.06981799	0.03599981	0.06173968	0.06423255	0.009	0.0264599	1807.66928	0.10329565	0.05	0.15	0.69	0.04	0.00	0.02	0.01	0.05	0.01	0.05	0.01	239.11	0.01	0.01	
Water Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.07224465	0.17343261	0.00318614	0.03981854	0.01199994	0.08917953	0.03663306	0.003	0.0382198	504.222339	0.02881278	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.02	0.01	0.02	0.01	33.35	0.00	0.00	
Subtotal																	0.24	0.95	0.06	0.00	0.04	0.03	0.12	0.03	0.12	0.03	305.26	0.02	0.01		
Foundation Rebar/AB																															
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.47693085	0.06521049	0.00318614	0.05395477	0.00799996	0.03674982	0.04963839	0.002	0.0157499	247.933018	0.01416764	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.03	0.01	0.03	0.01	21.86	0.00	0.00	
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	1	30	20	0.292950056	0.47693085	0.06521049	0.00318614	0.05395477	0.00799996	0.03674982	0.04963839	0.002	0.0157499	247.933018	0.01416764	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	10.93	0.00	0.00	
Crane Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.07224465	0.17343261	0.00318614	0.03981854	0.01199994	0.08917953	0.03663306	0.003	0.0382198	504.222339	0.02881278	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	22.23	0.00	0.00	
Dump Truck	Heavy Duty Truck, Diesel	1	30	60	1.111513533	5.1835677	0.30038695	0.01071182	0.06981799	0.03599981	0.06173968	0.06423255	0.009	0.0264599	1807.66928	0.10329565	0.05	0.15	0.69	0.04	0.00	0.02	0.01	0.05	0.01	0.05	0.01	239.11	0.01	0.01	
Line Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.07224465	0.17343261	0.00318614	0.03981854	0.01199994	0.08917953	0.03663306	0.003	0.0382198	504.222339	0.02881278	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	22.23	0.00	0.00	
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.07224465	0.17343261	0.00318614	0.03981854	0.01199994	0.08917953	0.03663306	0.003	0.0382198	504.222339	0.02881278	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.02	0.01	0.02	0.01	33.35	0.00	0.00	
Water Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.07224465	0.17343261	0.00318614	0.03981854	0.01199994	0.08917953	0.03663306	0.003	0.0382198	504.222339	0.02881278	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.02	0.01	0.02	0.01	33.35	0.00	0.00	
Subtotal																	0.37	1.43	0.09	0.00	0.07	0.04	0.18	0.04	0.18	0.04	383.07	0.02	0.01		
Foundation Concrete																															
2-ton Flatbed Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.07224465	0.17343261	0.00318614	0.03981854	0.01199994	0.08917953	0.03663306	0.003	0.0382198	504.222339	0.02881278	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	22.23	0.00	0.00	
Concrete Trucks	Light Heavy Duty Truck, Diesel	3	30	30	0.824603222	3.07224465	0.17343261	0.00318614	0.03981854	0.01199994	0.08917953	0.03663306	0.003	0.0382198	504.222339	0.02881278	0.01	0.16	0.61	0.03	0.00	0.03	0.02	0.07	0.02	0.02	100.05	0.01	0.00		
Crane Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.07224465	0.17343261	0.00318614	0.03981854	0.01199994	0.08917953	0.03663306	0.003	0.0382198	504.222339	0.02881278	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	22.23	0.00	0.00	
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.07224465	0.17343261	0.00318614	0.03981854	0.01199994	0.08917953	0.03663306	0.003	0.0382198	504.222339	0.02881278	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	22.23	0.00	0.00	
Pick-Up Trucks	Light Duty Truck 1, Diesel	4	30	20	0.292950056	0.47693085	0.06521049	0.00318614	0.05395477	0.00799996	0.03674982	0.04963839	0.002	0.0157499	247.933018	0.01416764	0.01	0.05	0.08	0.01	0.00	0.02	0.01	0.06	0.02	0.02	43.73	0.00	0.00		
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	1	30	20	0.292950056	0.47693085	0.06521049	0.00318614	0.05395477	0.00799996	0.03674982	0.04963839	0.002	0.0157499	247.933018	0.01416764	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.02	0.00	0.02	0.00	10.93	0.00	0.00	
Subtotal																	0.34	1.12	0.07	0.00	0.07	0.04	0.20	0.05	0.12	0.05	221.40	0.01	0.01		
Simultaneous Construction Trucks																															
																	0.95	3.50	0.22	0.01	0.18	0.11	0.50	0.12	0.05	909.74	0.05	0.02			

Table A-3
Construction and Operations Worker Commute Emission Calculations
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment A

Table A-3. 2016 Maximum Daily Construction Emissions, Worker Trips, Segment A

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)
Structure Demolition	Light-Duty Truck, catalyst	48	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.005714994	0.00321577	0.02919863	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.022095932	0.01	0.009722282
Wire Demolition	Light-Duty Truck, catalyst	49	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.005714994	0.00321577	0.02919863	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.022095932	0.01	0.009722282

EMFAC2011 emission factors for 2016
Assume startup after 8 hours

Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Structure Demolition	Light-Duty Truck, catalyst	48	35	80	23.31	2.10	2.42	0.04	0.41	0.18	0.70	0.17	2660.33	0.03	0.08
Wire Demolition	Light-Duty Truck, catalyst	49	35	80	23.80	2.14	2.47	0.04	0.42	0.18	0.72	0.18	2715.76	0.03	0.08
Simultaneous Worker Trips		97			47.11	4.24	4.90	0.07	0.83	0.36	1.42	0.35	5376.09	0.06	0.16

Table A-4
Fugitive Dust Emission Calculations
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment A

Table A-4. 2016 Maximum Daily Construction Emissions, Fugitive Dust, Segment A

Demolition

Earthmoving - Material Handling, loading debris into trucks

Amount based on CalEEMod Methodology from MRI reference, assuming 213,969 square feet of material for wire and structure

0.046 tons of material per square foot = 19,685 tons of debris

Days of demolition 33 days

Emission Factor from SCAQMD CEQA Air Quality Handbook, Table A9-9-G

$$E = [0.00112 \times \{ \{G/5\}^{1.3} / \{H/2\}^{1.4} \}] \times [I/J]$$

where

G = Mean wind speed in miles per hour- based on data from the website below, assuming a maximum wind speed of 12 mph

H = Moisture content of surface material, assumed to be 2%

I = Pounds of overburden handled per day

J = lbs/ton, 2000

Assume H = 2.0% moisture - unmitigated

Assume 61% control efficiency for watering 3 times/day

Assume earthmoving occurs over 33 days, maximum per day could be 10 x daily

$$E = [0.00112 \times \{ \{G/5\}^{1.3} / \{H/2\}^{1.4} \}] \times [I/J] =$$

0.003495366

PM10

	Unmitigated	Mitigated	Unit
	20.85054357	8.13171199	lbs/day
	0.034403397	0.013417325	total tons

PM2.5

	Unmitigated	Mitigated	Unit

<https://weatherspark.com/averages/31552/San-Diego-California-United-States>

Table A-5
Construction Heavy Equipment Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment B

Table A-5. 2016 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment B

Equipment/Phase	Source	Emission Factors											Emissions											
		FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Trenching																								
Concrete Saw	CalEEMod User's Guide, Appendix D, 2016 Concrete Saws, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	81	0.73	0.0014	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	2	10	1.62	9.65	12.31	0.02	0.78	0.70	1481.67	0.14	1.17
Rubber Tired Loader	CalEEMod User's Guide, Appendix D, 2016 Rubber Tired Loaders, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.37	0.0016	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	2	10	0.95	4.71	6.01	0.01	0.38	0.34	723.17	0.09	0.57
Backhoe	CalEEMod User's Guide, Appendix D, 2016 Tractor/Loader/Backhoe, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	4	10	1.82	11.71	14.94	0.02	0.95	0.85	1798.65	0.16	1.42
Loader	CalEEMod User's Guide, Appendix D, 2016 Tractor/Loader/Backhoe, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	4	10	1.82	11.71	14.94	0.02	0.95	0.85	1798.65	0.16	1.42
Backfill/Paving																								
Backhoe	CalEEMod User's Guide, Appendix D, 2016 Tractor/Loader/Backhoe, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	2	10	0.91	5.86	7.47	0.01	0.47	0.42	899.33	0.08	0.71
On-Road Certified Truck Emissions																								
Trenching																								
Dump/Haul Truck	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	20	2	0.53	2.94	5.27	0.01	0.01	0.01	599.80	0.02	0.50
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	10	0.04	0.49	1.62	0.00	0.01	0.01	160.41	0.00	0.15
Subtotal																								
Backfill/Paving																								
Flatbed Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Subtotal																								
Simultaneous Construction Equipment																								
															7.70	47.16	62.89	0.08	3.56	3.17	7493.75	0.66	5.97	

Table A-6
 Construction and Operational Truck Trip Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment B

Table A-6. 2016 Maximum Daily Construction Emissions, Construction Truck Trips, Segment B

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10		PM2.5		CO ₂	CH ₄	N ₂ O	Emissions, lbs/day												
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO ₂	CH ₄	N ₂ O
Trenching																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	4	30	20	0.292950056	0.4769309	0.06521049	0.0031861	0.0539548	0.00799996	0.03674982	0.0496384	0.002	0.0157499	247.93302	0.01416764	0.01	0.05	0.08	0.01	0.00	0.02	0.01	0.12	0.03	43.73	0.00	0.00
Dump Truck	Heavy Duty Truck, Diesel	20	30	60	1.111513533	5.1835677	0.30038695	0.0107118	0.069818	0.03599981	0.06173968	0.0642326	0.009	0.0264599	1807.6693	0.10329565	0.05	2.94	13.71	0.79	0.03	0.44	0.26	1.73	0.43	4782.30	0.27	0.12
Water Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.01199994	0.08917953	0.0366331	0.003	0.0382198	504.22234	0.02881278	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.00	0.00	33.35	0.00	0.00
Subtotal																		3.05	14.00	0.82	0.03	0.47	0.28	1.85	0.45	4859.38	0.28	0.12
Backfill/Paving																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.4769309	0.06521049	0.0031861	0.0539548	0.00799996	0.03674982	0.0496384	0.002	0.0157499	247.93302	0.01416764	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.06	0.01	21.86	0.00	0.00
Concrete Trucks	Light Heavy Duty Truck, Diesel	9	30	30	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.01199994	0.08917953	0.0366331	0.003	0.0382198	504.22234	0.02881278	0.01	0.49	1.83	0.10	0.00	0.08	0.05	0.39	0.10	300.14	0.02	0.01
Subtotal																		0.52	1.87	0.11	0.00	0.09	0.05	0.45	0.11	322.00	0.02	0.01
Simultaneous Construction Trucks																		3.56	15.87	0.93	0.03	0.56	0.33	2.30	0.56	5181.38	0.30	0.13

Table A-7
Construction and Operations Worker Commute Emission Calculations
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment B

Table A-7. 2016 Maximum Daily Construction Emissions, Worker Trips, Segment B

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)
Trenching	Light-Duty Truck, catalyst	30	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.00571499	0.00321577	0.0291986	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.02209593	0.01	0.00972228

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Trenching	Light-Duty Truck, catalyst	30	35	80	14.57	1.31	1.51	0.02	0.26	0.11	0.44	0.11	1662.71	0.02	0.05
Simultaneous Worker Trips		30			14.57	1.31	1.51	0.02	0.26	0.11	0.44	0.11	1662.71	0.02	0.05

Table A-8
 Fugitive Dust Emission Calculations
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment B

Table A-8. 2016 Maximum Daily Construction Emissions, Fugitive Dust, Segment B

Trenching

Earthmoving - Material Handling

Emission Factor from SCAQMD CEQA Air Quality Handbook, Table A9-9-G

$$E = [0.00112 \times \{([G/5]^{1.3})/([H/2]^{1.4})\}] \times [I/J]$$

where

G = Mean wind speed in miles per hour- based on data from the website below, assuming a maximum wind speed of 12 mph

H = Moisture content of surface material, assumed to be 2%

I = Pounds of overburden handled per day

J = lbs/ton, 2000

Assume 12 miles per hour daily maximum wind speed

Assume H = 2.0% moisture - unmitigated

Assume 61% control efficiency for watering 3 times/day

I = 16,200 cubic yards x 1600 lbs/cubic yard = 12960 tons of material

Assume earthmoving occurs over 30 days, maximum per day could be 10 x daily average

PM10

Unmitigated	Mitigated	Unit
15.0999804	5.888992358	lbs/day
0.00791025	0.003084999	total tons

$$E = [0.00112 \times \{([G/5]^{1.3})/([H/2]^{1.4})\}] \times [I/J] =$$

PM2.5

Unmitigated	Mitigated	Unit
3.17099589	1.236688395	lbs/day
0.00166115	0.00064785	total tons

NOTE: PM2.5 is assumed to be 21% of PM10 based on SCAQMD's Final –Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds (October 2006)

Table A-9
 Construction Heavy Equipment Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment C

Table A-9. 2016 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment C

Equipment/Phase	Source	Emission Factors													Emissions									
		FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Road/Pad Maintenance																								
Backhoe	CalEEMod User's Guide, Appendix D, 2016 Tractor/Loader/Backhoe, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	1	5	0.23	1.46	1.87	0.00	0.12	0.11	224.83	0.02	0.18
Bulldozer	CalEEMod User's Guide, Appendix D, 2016 Rubber Tired Dozers, 251/500 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	255	0.4	0.0013	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	5	0.67	2.92	4.62	0.01	0.17	0.15	638.97	0.06	0.44
Grader	CalEEMod User's Guide, Appendix D, 2016 Graders, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	174	0.41	0.0012	0.0082	0.0091	0.0000	0.0005	0.000431658	1.3	0.0001	0.0009	1	10	0.88	5.82	6.47	0.01	0.35	0.31	893.81	0.08	0.61
Mower	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 15/25 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	25	0.42	0.0015	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	1	5	0.08	0.47	0.62	0.00	0.05	0.05	65.78	0.01	0.06
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.93	3.02	4.34	0.00	0.24	0.22	463.57	0.04	0.41
On-Road Certified Truck Emissions																								
Road/Pad Maintenance																								
Dump/Haul Truck	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	1	5	0.07	0.37	0.66	0.00	0.00	0.00	74.97	0.00	0.06
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	10	0.04	0.49	1.62	0.00	0.01	0.01	160.41	0.00	0.15
Subtotal																								
Simultaneous Construction Equipment															2.90	14.55	20.20	0.03	0.94	0.84	2522.35	0.21	1.92	

Table A-11
 Construction and Operations Worker Commute Emission Calculations
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment C

Table A-11. 2016 Maximum Daily Construction Emissions, Worker Trips, Segment C

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				CO ₂		CH ₄		N ₂ O		
					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)
Segment C	Light-Duty Truck, catalyst	31	35	80	2.361162	31.42448	0.224936	1.8136819	0.057965	2.39463668	1.6219719	0.707095	0.16038404	0.714647031	0.004128	0.005715	0.003216	0.02919863	0.008	0.03675	0.002961	0.02688417	0.002	0.01575	308.6379	448.548176	0.003278	0.02209593	0.01	0.00972228

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

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO ₂	CH ₄	N ₂ O
Segment C	Light-Duty Truck, catalyst	31	35	80	15.06	1.35	1.57	0.02	0.26	0.12	0.46	0.11	1718.13	0.02	0.05
Simultaneous Worker Trips		31			15.06	1.35	1.57	0.02	0.26	0.12	0.46	0.11	1718.13	0.02	0.05

Table A-12
Fugitive Dust Emission Calculations
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment C

Table A-12. 2016 Maximum Daily Construction Emissions, Fugitive Dust, Segment C

Site Preparation - Road/Pad Maintenance

Grading - Bulldozer Operations

Emission factor from SCAQMD CEQA Air Quality Handbook, Table A9-9-F

$$E = ([0.45 \times \{([G]^{1.5})/([H]^{1.4})\}] \times I) \times J$$

where

G = silt content of material in percent, assumed to be 7.5%

Assume H = 2.0% moisture - unmitigated

Assume 61% control efficiency for watering 3 times/day

I = 2.2046 lb/kg

J = hours of bulldozing operations, based on construction scenario, 8 hrs/day for 25 days

$$E = ([0.45 \times \{([G]^{1.5})/([H]^{1.4})\}] \times I) \times J =$$

PM10

Unmitigated	Mitigated	Unit
61.7706548	24.09055537	lbs/day
0.77213318	0.301131942	total tons

PM2.5

Unmitigated	Mitigated	Unit
12.9718375	5.059016627	lbs/day
0.16214797	0.063237708	total tons

NOTE: PM2.5 is assumed to be 21% of PM10 based on SCAQMD's Final
–Methodology to Calculate Particulate Matter (PM) 2.5
and PM 2.5 Significance Thresholds (October 2006)

Table A-13
 Construction Heavy Equipment Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment D

Table A-13. 2016 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment D

Equipment/Phase	Source	FUEL	HP	Load Factor	Emission Factors									Emissions										
					ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Build Retaining Wall																								
Forklift	CalEEMod User's Guide, Appendix D, 2016 Rough-Terrain Forklift, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	83	0.4	0.0015	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	1	6	0.29	1.62	2.07	0.00	0.13	0.12	249.58	0.03	0.20
On-Road Certified Truck Emissions																								
Build Retaining Wall																								
2-ton Flatbed Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	5	0.04	0.49	1.62	0.00	0.01	0.01	160.41	0.00	0.15
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	10	0.04	0.49	1.62	0.00	0.01	0.01	160.41	0.00	0.15
Subtotal																								
Simultaneous Construction Equipment																0.38	2.60	5.31	0.01	0.14	0.13	570.39	0.03	0.50

Table A-14
 Construction and Operational Truck Trip Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment D

Table A-14. 2016 Maximum Daily Construction Emissions, Construction Truck Trips, Segment D

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10			PM2.5			CO ₂	CH ₄	N ₂ O	Emissions, lbs/day												
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO ₂	CH ₄
Build Retaining Wall																														
2-ton Flatbed Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.08917953	0.036633	0.003	0.0382198	504.2223	0.02881278	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	22.23	0.00	0.00
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	247.933	0.01416764	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.02	0.00	0.01	0.00	21.86	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	1	30	20	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	247.933	0.01416764	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	10.93	0.00	0.00
Water Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.08917953	0.036633	0.003	0.0382198	504.2223	0.02881278	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	33.35	0.00	0.00
Subtotal																		0.13	0.40	0.03	0.00	0.03	0.02	0.04	0.01	0.00	88.38	0.01	0.00	
Simultaneous Construction Trucks																		0.13	0.40	0.03	0.00	0.03	0.02	0.04	0.01	0.00	88.38	0.01	0.00	

Table A-15
 Construction and Operations Worker Commute Emission Calculations
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment D

Table A-15. 2016 Maximum Daily Construction Emissions, Worker Trips, Segment D

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)
Segment D	Light-Duty Truck, catalyst	31	35	80	2.361162	31.42448	0.224936	1.8136819	0.057965	2.3946367	1.6219719	0.707095	0.16038404	0.71464703	0.004128	0.00571499	0.003216	0.0291986	0.008	0.03675	0.002961	0.0268842	0.002	0.01575	308.6379	448.54818	0.003278	0.02209593	0.01	0.00972228

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
 Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Segment D	Light-Duty Truck, catalyst	31	35	80	15.06	1.35	1.57	0.02	0.26	0.12	0.46	0.11	1718.13	0.02	0.05
Simultaneous Worker Trips		31			15.06	1.35	1.57	0.02	0.26	0.12	0.46	0.11	1718.13	0.02	0.05

Table A-16
Fugitive Dust Emission Calculations
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment D

Table A-16. 2016 Maximum Daily Construction Emissions, Fugitive Dust, Segment D

Build Retaining Wall

Earthmoving - Material Handling

Emission Factor from SCAQMD CEQA Air Quality Handbook, Table A9-9-G

$$E = [0.00112 \times \left(\frac{G}{5} \right)^{1.3} / \left(\frac{H}{2} \right)^{1.4}] \times [I/J]$$

where

G = Mean wind speed in miles per hour

H = Moisture content of surface material

I = Pounds of overburden handled per day

J = lbs/ton, 2000

Assume 12 miles per hour daily maximum wind speed

Assume H = 2.0% moisture - unmitigated

Assume 61% control efficiency for watering 3 times/day

I = 15200 cubic yards x 1600 lbs/cubic yard = 12160

Assume earthmoving occurs over 14 days, maximum per day could be 10 x daily average

PM10

Unmitigated	Mitigated	Unit
30.359749	11.8403021	lbs/day
0.00126564	0.0004936	total tons

PM2.5

Unmitigated	Mitigated	Unit
6.37554728	2.48646344	lbs/day
0.00026578	0.000103656	total tons

$$E = [0.00112 \times \left(\frac{G}{5} \right)^{1.3} / \left(\frac{H}{2} \right)^{1.4}] \times [I/J] =$$

NOTE: PM2.5 is assumed to be 21% of PM10 based on SCAQMD's Final –Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds (October 2006)

Table A-17
Construction Heavy Equipment Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment A

Table A-17. 2017 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment A

Equipment/Phase	Source	Emission Factors											Emissions											
		FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Wire Stringing/Sagging/Clipping																								
Air Compressor	CalEEMod User's Guide, Appendix D, 2016 Air Compressor, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	3	5	0.92	4.58	5.85	0.01	0.37	0.33	703.62	0.08	0.56
Bulldozer	CalEEMod User's Guide, Appendix D, 2016 Rubber Tired Dozers, 251/500 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	255	0.4	0.0013	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	3	5	2.02	8.77	13.87	0.02	0.51	0.45	1916.92	0.18	1.32
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	3	5	0.96	5.64	8.92	0.01	0.33	0.29	1231.72	0.09	0.85
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	3	10	2.80	9.05	13.02	0.01	0.73	0.65	1390.71	0.13	1.24
Wire Puller	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	1.3	0.0001	0.0009	3	5	0.92	8.79	9.77	0.01	0.52	0.47	1349.74	0.08	0.93
Wire Tensioner	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	1.3	0.0001	0.0009	3	5	0.92	8.79	9.77	0.01	0.52	0.47	1349.74	0.08	0.93
On-Road Certified Truck Emissions																								
Wire Stringing/Sagging/Clipping																								
Aerial Bucket Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	9	3	0.12	1.32	4.13	0.00	0.01	0.01	427.86	0.01	0.39
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	3	5	0.06	0.73	2.30	0.00	0.01	0.01	237.70	0.00	0.22
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	3	1	0.01	0.15	0.46	0.00	0.00	0.00	47.54	0.00	0.04
Semi Tractor with Trailer	EMFAC2011 emission factors, HHD idling	DIESEL	400	0.38	0.0135	0.0756	0.1230	0.0001	0.0003	0.000265501	15.0	0.0150	0.0117	6	10	0.81	4.54	7.38	0.01	0.02	0.02	899.69	0.90	0.70
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	6	5	0.13	1.46	4.59	0.00	0.02	0.01	475.40	0.01	0.44
Subtotal																								
Simultaneous Construction Equipment															9.68	53.81	80.06	0.10	3.04	2.71	10030.64	1.56	7.61	

Note: Equipment amounts tripled to account for three crews

Table A-18
 Construction and Operational Truck Trip Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment A

Table A-18. 2017 Maximum Daily Construction Emissions, Construction Truck Trips, Segment A

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10			PM2.5			CO2	CH4	N2O	Emissions, lbs/day										
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Wire Stringing, Sagging, and Clipping																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	12	30	20	0.292950056	0.476931	0.065210487	0.003186	0.053955	0.007999958	0.036749816	0.049638	0.00199999	0.01574992	247.933	0.014167636	0.01	0.16	0.25	0.03	0.00	0.05	0.04	0.18	0.04	131.18	0.01	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	3	30	20	0.292950056	0.476931	0.065210487	0.003186	0.053955	0.007999958	0.036749816	0.049638	0.00199999	0.01574992	247.933	0.014167636	0.01	0.04	0.06	0.01	0.00	0.01	0.01	0.05	0.01	32.80	0.00	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Diesel	9	30	20	0.824603222	3.072245	0.173432606	0.003186	0.039819	0.011999938	0.089179533	0.036633	0.002999985	0.038219796	504.2223	0.028812777	0.01	0.33	1.22	0.07	0.00	0.06	0.03	0.14	0.03	200.09	0.01	0.01
Line Truck	Light Heavy Duty Truck, Diesel	3	30	20	0.824603222	3.072245	0.173432606	0.003186	0.039819	0.011999938	0.089179533	0.036633	0.002999985	0.038219796	504.2223	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.05	0.01	66.70	0.00	0.00
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	3	30	30	0.824603222	3.072245	0.173432606	0.003186	0.039819	0.011999938	0.089179533	0.036633	0.002999985	0.038219796	504.2223	0.028812777	0.01	0.16	0.61	0.03	0.00	0.03	0.02	0.07	0.02	100.05	0.01	0.00
Tool Van	Light Duty Truck 1, Diesel	3	30	20	0.292950056	0.476931	0.065210487	0.003186	0.053955	0.007999958	0.036749816	0.049638	0.00199999	0.01574992	247.933	0.014167636	0.01	0.04	0.06	0.01	0.00	0.01	0.01	0.05	0.01	32.80	0.00	0.00
Semi Tractor with Trailer	Heavy Duty Truck, Diesel	3	30	60	1.111513533	5.183568	0.300386954	0.010712	0.069818	0.035999812	0.061739677	0.064233	0.008999953	0.026459862	1807.669	0.103295646	0.05	0.44	2.06	0.12	0.00	0.07	0.04	0.14	0.03	717.34	0.04	0.02
Water Truck	Light Heavy Duty Truck, Diesel	3	30	30	0.824603222	3.072245	0.173432606	0.003186	0.039819	0.011999938	0.089179533	0.036633	0.002999985	0.038219796	504.2223	0.028812777	0.01	0.16	0.61	0.03	0.00	0.03	0.02	0.07	0.02	100.05	0.01	0.00
Subtotal																		1.44	5.28	0.33	0.01	0.28	0.17	0.73	0.18	1381.00	0.08	0.04
Simultaneous Construction Trucks																												

Truck amounts tripled to account for 3 crews

Table A-19
Construction and Operations Worker Commute Emission Calculations
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment A

Table A-19. 2017 Maximum Daily Construction Emissions, Worker Trips, Segment A

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)
Wire Stringing/Sagging/Clipping	Light-Duty Truck, catalyst	15	35	80	2.153834	31.4244799	0.205224	1.8136819	0.048784	2.3946367	1.6219719	0.707095	0.16038404	0.714647031	0.004128	0.005715	0.003035	0.0291986	0.008	0.03675	0.002803	0.02688417	0.002	0.01575	297.3955	448.548176	0.002832911	0.02209593	0.01	0.00972228

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

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Wire Stringing/Sagging/Clipping	Light-Duty Truck, catalyst	15	35	80	6.74	0.60	0.73	0.01	0.13	0.06	0.22	0.05	801.61	0.01	0.02
Simultaneous Worker Trips		15			6.74	0.60	0.73	0.01	0.13	0.06	0.22	0.05	801.61	0.01	0.02

Table A-20
 Construction Heavy Equipment Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment B

Table A-20. 2017 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment B

Equipment/Phase	Source	Emission Factors											Emissions											
		FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Cable Pulling																								
Pulling Rig	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	1.3	0.0001	0.0009	4	6	1.47	14.06	15.63	0.02	0.84	0.74	2159.58	0.13	1.48
On-Road Certified Truck Emissions																								
Cable Pulling																								
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	4	6	0.10	1.17	3.67	0.00	0.01	0.01	380.32	0.00	0.35
Assist Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	4	6	0.10	1.17	3.67	0.00	0.01	0.01	380.32	0.00	0.35
Splice and Termination																								
Splice Trailer (no emissions)																								
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	4	6	0.10	1.17	3.67	0.00	0.01	0.01	380.32	0.00	0.35
Assist Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	4	6	0.10	1.17	3.67	0.00	0.01	0.01	380.32	0.00	0.35
Simultaneous Construction Equipment															1.88	18.74	30.33	0.04	0.89	0.79	3680.86	0.15	2.88	

Equipment amounts tripled to account for three crews

Table A-21
 Construction and Operational Truck Trip Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment B

Table A-21. 2017 Maximum Daily Construction Emissions, Construction Truck Trips, Segment B

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10		PM2.5			CO ₂	CH ₄	N ₂ O	Emissions, lbs/day											
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO ₂	CH ₄	N ₂ O
Cable Pulling																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	6	30	20	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	247.933	0.01416764	0.01	0.08	0.13	0.02	0.00	0.03	0.02	0.09	0.02	65.59	0.00	0.00
Line Truck	Light Heavy Duty Truck, Diesel	4	30	20	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.08917953	0.036633	0.003	0.0382198	504.2223	0.02881278	0.01	0.15	0.54	0.03	0.00	0.02	0.01	0.06	0.01	88.93	0.01	0.00
Assist Truck	Light Heavy Duty Truck, Diesel	4	30	20	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.08917953	0.036633	0.003	0.0382198	504.2223	0.02881278	0.01	0.15	0.54	0.03	0.00	0.02	0.01	0.06	0.01	88.93	0.01	0.00
Subtotal																	0.37	1.21	0.08	0.00	0.08	0.05	0.21	0.05	243.45	0.01	0.01	
Splice and Termination																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	8	30	20	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	247.933	0.01416764	0.01	0.10	0.17	0.02	0.00	0.03	0.02	0.12	0.03	87.46	0.00	0.00
Line Truck	Light Heavy Duty Truck, Diesel	4	30	20	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.08917953	0.036633	0.003	0.0382198	504.2223	0.02881278	0.01	0.15	0.54	0.03	0.00	0.02	0.01	0.06	0.01	88.93	0.01	0.00
Assist Truck	Light Heavy Duty Truck, Diesel	4	30	20	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.08917953	0.036633	0.003	0.0382198	504.2223	0.02881278	0.01	0.15	0.54	0.03	0.00	0.02	0.01	0.06	0.01	88.93	0.01	0.00
Subtotal																	0.39	1.25	0.08	0.00	0.08	0.05	0.24	0.06	265.32	0.02	0.01	
Simultaneous Construction Trucks																	0.76	2.46	0.16	0.00	0.16	0.10	0.45	0.11	508.77	0.03	0.01	

Truck amounts tripled to account for 3 crews

Table A-22. 2017 Maximum Daily Construction Emissions, Worker Trips, Segment B

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 Exhaust (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)
Cable Pulling	Light-Duty Truck, catalyst	17	35	80	2.153833594	31.42447989	0.20522395	1.813681924	0.048783653	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.004127654	0.005714994	0.003035358	0.029198634	0.007999958	0.036749816	0.002803369	0.026884174	0.001999999	0.01574992	297.39552	448.5481762	0.0028329	0.022095932	0.01	0.009722282
Splice & Termination	Light-Duty Truck, catalyst	13	35	80	2.153833594	31.42447989	0.20522395	1.813681924	0.048783653	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.004127654	0.005714994	0.003035358	0.029198634	0.007999958	0.036749816	0.002803369	0.026884174	0.001999999	0.01574992	297.39552	448.5481762	0.0028329	0.022095932	0.01	0.009722282

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

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Cable Pulling	Light-Duty Truck, catalyst	17	35	80	7.64	0.68	0.83	0.01	0.14	0.06	0.25	0.06	908.49	0.01	0.03
Splice & Termination	Light-Duty Truck, catalyst	13	35	80	5.84	0.52	0.64	0.01	0.11	0.05	0.19	0.05	694.73	0.01	0.02
Simultaneous Worker Trips		17			7.64	0.68	0.83	0.01	0.14	0.06	0.25	0.06	908.49	0.01	0.03

Table A-23
 Construction Heavy Equipment Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment D

Table A-23. 2017 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment D

Equipment/Phase	FUEL	HP	Load Factor	Emission Factors									Emissions											
				ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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	
OFFROAD Equipment																								
Steel Structure Assembly																								
Air Compressor																								
	CalEEMod User's Guide, Appendix D, 2016 Air Compressor, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	1	12	0.74	3.66	4.68	0.01	0.30	0.26	562.90	0.07	0.44
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	2	12	1.54	9.02	14.26	0.02	0.52	0.46	1970.75	0.14	1.36
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	12	1.12	3.62	5.21	0.01	0.29	0.26	556.28	0.05	0.49
On-Road Certified Truck Emissions																								
Steel Hauling																								
Crane Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	2	12	0.10	1.17	3.67	0.00	0.01	0.01	380.32	0.00	0.35
Semi Tractor with Trailer	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0135	0.0756	0.1230	0.0001	0.0003	0.000265501	15.0	0.0150	0.0117	2	12	0.32	1.82	2.95	0.00	0.01	0.01	359.88	0.36	0.28
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	1	6	0.03	0.29	0.92	0.00	0.00	0.00	95.08	0.00	0.09
Steel Structure Assembly																								
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	1	2	0.01	0.10	0.31	0.00	0.00	0.00	31.69	0.00	0.03
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	1	2	0.01	0.10	0.31	0.00	0.00	0.00	31.69	0.00	0.03
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	1	12	0.05	0.59	1.84	0.00	0.01	0.01	190.16	0.00	0.17
Subtotal																								
Simultaneous Construction Equipment																3.91	20.36	34.15	0.04	1.14	1.02	4178.75	0.63	3.24

Equipment amounts tripled to account for three crews

Table A-24
 Construction and Operational Truck Trip Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment D

Table A-24. 2017 Maximum Daily Construction Emissions, Construction Truck Trips, Segment D

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10			PM2.5			CO2	CH4	N2O	Emissions, lbs/day												
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4
Steel Hauling																														
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.4769309	0.06521049	0.0031861	0.0539548	0.008	0.03674982	0.0496384	0.002	0.0157499	247.93302	0.01416764	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.03	0.01	0.03	0.01	21.86	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.4769309	0.06521049	0.0031861	0.0539548	0.008	0.03674982	0.0496384	0.002	0.0157499	247.93302	0.01416764	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.03	0.01	0.03	0.01	21.86	0.00	0.00
Crane Truck	Light Heavy Duty Truck, Diesel	2	30	20	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.0119999	0.08917953	0.0366331	0.003	0.0382198	504.22234	0.02881278	0.01	0.07	0.27	0.02	0.00	0.01	0.01	0.03	0.01	0.03	0.01	44.47	0.00	0.00
Semi Tractor with Trailer	Heavy Duty Truck, Diesel	2	30	60	1.111513533	5.1835677	0.30038695	0.0107118	0.069818	0.0359998	0.06173968	0.0642326	0.009	0.0264599	1807.6693	0.10329565	0.05	0.29	1.37	0.08	0.00	0.04	0.03	0.09	0.02	0.02	478.23	0.03	0.01	
Subtotal																	0.42	1.73	0.11	0.00	0.07	0.05	0.17	0.04	0.04	566.42	0.03	0.01		
Steel Structure Assembly																														
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.4769309	0.06521049	0.0031861	0.0539548	0.008	0.03674982	0.0496384	0.002	0.0157499	247.93302	0.01416764	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.03	0.01	0.03	0.01	21.86	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.4769309	0.06521049	0.0031861	0.0539548	0.008	0.03674982	0.0496384	0.002	0.0157499	247.93302	0.01416764	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.03	0.01	0.03	0.01	21.86	0.00	0.00
Line Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.0119999	0.08917953	0.0366331	0.003	0.0382198	504.22234	0.02881278	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.00	22.23	0.00	0.00
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.0119999	0.08917953	0.0366331	0.003	0.0382198	504.22234	0.02881278	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.02	0.01	0.01	33.35	0.00	0.00	
Water Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.0119999	0.08917953	0.0366331	0.003	0.0382198	504.22234	0.02881278	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.02	0.01	0.01	33.35	0.00	0.00	
Subtotal																	0.20	0.63	0.04	0.00	0.04	0.03	0.12	0.03	0.03	132.66	0.01	0.00		
Simultaneous Construction Trucks																	0.62	2.35	0.15	0.00	0.12	0.07	0.29	0.07	0.07	699.08	0.04	0.02		

Truck amounts tripled to account for 3 crews

Table A-25. 2017 Maximum Daily Construction Emissions, Worker Trips, Segment D

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)
Steel Hauling	Light-Duty Truck, catalyst	9	35	80	2.153834	31.4244799	0.205224	1.8136819	0.048784	2.39463668	1.62197187	0.707094998	0.16038404	0.714647031	0.004128	0.00571499	0.003035	0.02919863	0.008	0.03675	0.002803	0.0268842	0.002	0.01575	297.3955	448.548176	0.002833	0.02209593	0.01	0.009722282

EMFAC2011 emission factors for 2016

Assume startup after 8 hours

Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Steel Hauling	Light-Duty Truck, catalyst	9	35	80	4.04	0.36	0.44	0.01	0.08	0.03	0.13	0.03	480.97	0.00	0.01
Simultaneous Worker Trips		9			4.04	0.36	0.44	0.01	0.08	0.03	0.13	0.03	480.97	0.00	0.01

Table A-26
Helicopter Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-26. Helicopter Emissions

SX-PQ Transmission Project

Helicopter Model	Engine	Assumed Engine	Operating Mode	Fuel Flow, kg/s	Time in Mode, min	Emission Incides, g/kg fuel					Emissions, lbs/mode					Cruise Mode Emission factor, lbs/hour				
						CO	VOC	NOx	Sox	PM	CO	VOC	NOx	SOx	PM	CO	VOC	NOx	SOx	PM
Hughes 500E	Allison 250-C20B/R	250B17B	Taxi Out	0.008154	19	2.199837	23.004097	2.199837	0.4	4.2	0.045081939	0.471430067	0.045081939	0.008197324	0.086071898					
			Takeoff	0.031642	10.4	6.599994	0.402675	6.599994	0.4	4.2	0.287295342	0.017528297	0.287295342	0.017411855	0.182824475					
			Climbout	0.028926	0.09	5.981142	0.408337	5.981142	0.4	4.2	0.002059694	0.000140617	0.002059694	0.000137746	0.001446332	1.373129585	0.093744575	1.373129585	0.091830596	0.964221257
			Approach	0.010516	10.05	2.200637	5.988767	2.200637	0.4	4.2	0.03076471	0.083722432	0.03076471	0.005591965	0.058715628					
			Taxi In	0.008154	7	2.199837	23.004097	2.199837	0.4	4.2	0.016609136	0.173684761	0.016609136	0.003020067	0.031710699					
			Total per LTO																	
SkyKing	Allison 250-C20B/R	250B17B	Taxi Out	0.018353	19	175.63	99.78	1.201	0.4	4.2	8.10115881	4.602480362	0.055397664	0.018450513	0.193730382					
			Takeoff	0.112337	1.5	8.787	2.123	7.088	0.4	4.2	0.195858528	0.047320776	0.157988534	0.008915831	0.093616231					
			Climbout	0.079	1.5	14	1.32	5.58	0.4	4.2	0.219449282	0.020690932	0.087466214	0.006269979	0.065834785	8.777971296	0.827637294	3.498648559	0.25079918	2.633391389
			Approach	0.018	9.719	178.175	101.213	1.207995	0.4	4.2	4.123145244	2.342168652	0.027954196	0.009256395	0.097192143					
			Taxi In	0.018353	7	2.199837	23.004097	2.199837	0.4	4.2	0.037383795	0.390929167	0.037383795	0.006797557	0.071374351					
			Total per LTO																	

* Fuel flow rates and EF's from Federal Aviation Administration, Emission and Dispersion Modeling System (EDMS)

* Time in mode based on default times in EDMS

Therefore

To calculate lbs/day

Component	Emissions (lb/day)				
	CO	HC	NO _x	SO _x	PM
LTO - light helicopter (Hughes 500)	0.382	0.747	0.382	0.034	0.361
LTO - heavy helicopter (SkyKing)	12.677	7.404	0.366	0.050	0.522
Installation/Demolition - light helicopter, 3 hrs cruise	4.119	0.281	4.119	0.275	2.893
Installation/Demolition - heavy helicopter, 3 hrs cruise	26.334	2.483	10.496	0.752	7.900
Total Light Helicopter	4.501	1.028	4.501	0.310	3.253
Total Heavy Helicopter	39.011	9.887	10.862	0.802	8.422
Total	43.512	10.914	15.363	1.112	11.675

* Installation/demolition is assumed to be 3 hours (180 minutes) per event at cruise mode factors, assume 2 heavy helicopters used during construction, 10 months, 25 days per month

* SO_x and PM emissions are negligible

Table A-27
 Unmitigated Construction Emissions Summary
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-27. Maximum Daily Unmitigated Construction Emissions, Summary

2016	Maximum Daily Construction Emissions, lbs/day					
Segment A	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	1.50	10.04	19.69	0.02	0.68	0.60
Construction Truck Trips	0.22	0.95	3.50	0.01	0.68	0.23
Worker Trips	4.90	47.11	4.24	0.07	2.25	0.71
Helicopter	10.91	43.51	15.36	1.11	11.68	11.68
Fugitive Dust (Unmitigated)					25.04	5.26
Total	17.53	101.61	42.79	1.21	40.33	18.48
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	7.70	47.16	62.89	0.08	3.56	3.17
Construction Truck Trips	0.93	3.56	15.87	0.03	2.86	0.90
Worker Trips	1.51	14.57	4.24	0.02	0.70	0.22
Fugitive Dust (Unmitigated)					15.10	3.17
Total	10.14	65.29	83.00	0.13	22.21	7.45
Segment C	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	2.90	14.55	20.20	0.03	0.94	0.84
Construction Truck Trips	0.06	0.24	0.95	0.00	0.12	0.05
Worker Trips	1.57	15.06	4.24	0.02	0.72	0.23
Fugitive Dust (Unmitigated)					61.77	12.97
Total	4.53	29.85	25.39	0.05	63.55	14.08
Segment D	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	0.38	2.60	5.31	0.01	0.14	0.13
Construction Truck Trips	0.03	0.13	0.40	0.00	0.06	0.03
Worker Trips	1.57	15.06	4.24	0.02	0.72	0.23
Fugitive Dust (Unmitigated)					30.36	6.38
Total	1.97	17.79	9.95	0.03	31.29	6.76
Maximum Daily Emissions, 2016	34.17	214.54	161.13	1.42	157.37	46.77
2017	Maximum Daily Construction Emissions, lbs/day					
Segment A	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	9.68	53.81	80.06	0.10	3.04	2.71
Construction Truck Trips	0.33	1.44	5.28	0.01	0.44	0.34
Worker Trips	0.73	6.74	0.60	0.01	0.35	0.11
Helicopter	1.03	4.50	4.50	0.31	3.25	3.25
Total	11.77	66.49	90.44	0.44	7.08	6.41
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	1.88	18.74	30.33	0.04	0.89	0.79
Construction Truck Trips	0.16	0.76	2.46	0.00	0.26	0.21
Worker Trips	0.83	7.64	0.68	0.01	0.39	0.12
Total	2.88	27.14	33.48	0.05	1.54	1.12
Segment D	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	3.91	20.36	34.15	0.04	1.14	1.02
Construction Truck Trips	0.15	0.62	2.35	0.00	0.41	0.14
Worker Trips	0.44	4.04	0.36	0.01	0.21	0.07
Total	4.50	25.02	36.86	0.05	1.76	1.22
Maximum Daily Emissions, 2017	19.15	118.65	160.78	0.55	10.37	8.76

Table A-28
Mitigated Construction Emissions Summary
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-28. Maximum Daily Mitigated Construction Emissions, Summary

2016	Maximum Daily Construction Emissions, lbs/day					
Segment A	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	1.50	10.04	19.69	0.02	0.68	0.60
Construction Truck Trips	0.22	0.95	3.50	0.01	0.68	0.23
Worker Trips	4.90	47.11	4.24	0.07	2.25	0.71
Helicopter	10.91	43.51	15.36	1.11	11.68	11.68
Fugitive Dust (Mitigated)					9.77	2.05
Total	17.53	101.61	42.79	1.21	25.05	15.27
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	7.70	47.16	62.89	0.08	3.56	3.17
Construction Truck Trips	0.93	3.56	15.87	0.03	2.86	0.90
Worker Trips	1.51	14.57	4.24	0.02	0.70	0.22
Fugitive Dust (Mitigated)					5.89	1.24
Total	10.14	65.29	83.00	0.13	13.00	5.52
Segment C	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	2.90	14.55	20.20	0.03	0.94	0.84
Construction Truck Trips	0.06	0.24	0.95	0.00	0.12	0.05
Worker Trips	1.57	15.06	4.24	0.02	0.72	0.23
Fugitive Dust (Mitigated)					24.09	5.06
Total	4.53	29.85	25.39	0.05	25.87	6.17
Segment D	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	0.38	2.60	5.31	0.01	0.14	0.13
Construction Truck Trips	0.03	0.13	0.40	0.00	0.06	0.03
Worker Trips	1.57	15.06	4.24	0.02	0.72	0.23
Fugitive Dust (Mitigated)					11.84	2.49
Total	1.97	17.79	9.95	0.03	12.77	2.87
Maximum Daily Emissions, 2016	34.17	214.54	161.13	1.42	76.68	29.82

2017	Maximum Daily Construction Emissions, lbs/day					
Segment A	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	9.68	53.81	80.06	0.10	3.04	2.71
Construction Truck Trips	0.33	1.44	5.28	0.01	0.44	0.34
Worker Trips	0.73	6.74	0.60	0.01	0.35	0.11
Helicopter	1.03	4.50	4.50	0.31	3.25	3.25
Total	11.77	66.49	90.44	0.44	7.08	6.41
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	1.88	18.74	30.33	0.04	0.89	0.79
Construction Truck Trips	0.16	0.76	2.46	0.00	0.26	0.21
Worker Trips	0.83	7.64	0.68	0.01	0.39	0.12
Total	2.88	27.14	33.48	0.05	1.54	1.12
Segment D	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	3.91	20.36	34.15	0.04	1.14	1.02
Construction Truck Trips	0.15	0.62	2.35	0.00	0.41	0.14
Worker Trips	0.44	4.04	0.36	0.01	0.21	0.07
Total	4.50	25.02	36.86	0.05	1.76	1.22
Maximum Daily Emissions, 2017	19.15	118.65	160.78	0.55	10.37	8.76

Table A-29
Construction Heavy Equipment Annual
Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-29. Total Annual Emissions, Equipment

Equipment	Emission Factors									Emissions						
	FUEL	HP	Load Factor	ROG (lb/bhp-hr or lbs/hr)	CO (lb/bhp-hr or lbs/hr)	NOX (lb/bhp-hr or lbs/hr)	SOX (lb/bhp-hr or lbs/hr)	PM10 (lb/bhp-hr or lbs/hr)	PM2.5 (lb/bhp-hr or lbs/hr)	Total Use (Hours)	ROG, tons	CO tons	NOX tons	SOX tons	PM10 tons	PM2.5 tons
Total Equipment Use																
2-ton Flatbed Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	659	0.00	0.02	0.05	0.00	0.00	0.00
Aerial Bucket Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	1215	0.00	0.03	0.10	0.00	0.00	0.00
Air Compressor	DIESEL	78	0.48	0.0016	0.0132	0.0117	0.0000	0.0013	0.001177249	1633	0.05	0.40	0.36	0.00	0.04	0.04
Backhoe	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	1049	0.02	0.15	0.20	0.00	0.01	0.01
Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	210	0.00	0.01	0.02	0.00	0.00	0.00
Bulldozer	DIESEL	255	0.4	0.0013	0.0132	0.0117	0.0000	0.0013	0.001177249	833	0.06	0.56	0.50	0.00	0.06	0.05
Concrete Saw	DIESEL	81	0.73	0.0014	0.0082	0.0104	0.0000	0.0007	0.000588624	340	0.01	0.08	0.10	0.00	0.01	0.01
Concrete Trucks	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	1056	0.00	0.03	0.09	0.00	0.00	0.00
Crane Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	1072	0.00	0.03	0.09	0.00	0.00	0.00
Crane	DIESEL	226	0.29	0.0010	0.0057	0.0091	0.0000	0.0003	0.000294312	1537	0.05	0.29	0.46	0.00	0.02	0.01
Drill Rig	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	550	0.01	0.09	0.12	0.00	0.01	0.01
Dump/Haul Truck	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	13868	0.09	0.51	0.91	0.00	0.00	0.00
Flatbed Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	230	0.00	0.01	0.02	0.00	0.00	0.00
Forklift	DIESEL	83	0.4	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	374	0.01	0.08	0.07	0.00	0.01	0.01
Grader	DIESEL	174	0.41	0.0012	0.0132	0.0117	0.0000	0.0013	0.001177249	764	0.03	0.36	0.32	0.00	0.04	0.03
Hydraulic Rock Splitter/Rock Drilling Equipment	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	82	0.00	0.01	0.02	0.00	0.00	0.00
Line Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	791	0.00	0.02	0.06	0.00	0.00	0.00
Loader	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	1000	0.02	0.15	0.19	0.00	0.01	0.01
Mobile Fueling Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	451	0.00	0.01	0.04	0.00	0.00	0.00
Mower	DIESEL	25	0.42	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	606	0.00	0.04	0.04	0.00	0.00	0.00
Paving Rig	DIESEL	82	0.36	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	360	0.01	0.07	0.06	0.00	0.01	0.01
Generator	DIESEL	50	0.74	0.0013	0.0082	0.0117	0.0000	0.0007	0.000588624	4235	0.10	0.64	0.92	0.00	0.05	0.05
Skid-Steer Loader	DIESEL	78	0.37	0.0016	0.0082	0.0104	0.0000	0.0007	0.000588624	500	0.01	0.06	0.08	0.00	0.00	0.00
Wire Puller	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	228	0.01	0.07	0.07	0.00	0.00	0.00
Wire Tensioner	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	362	0.01	0.11	0.12	0.00	0.01	0.01
Tool Van	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	438	0.00	0.01	0.04	0.00	0.00	0.00
Semi Tractor with Trailer	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	1236	0.01	0.05	0.08	0.00	0.00	0.00
Water Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	4490	0.01	0.11	0.36	0.00	0.00	0.00
Total											0.53	3.98	5.47	0.01	0.28	0.25

Equipment	Emission Factors									Emissions						
	FUEL	HP	Load Factor	ROG (lb/bhp-hr or lbs/hr)	CO (lb/bhp-hr or lbs/hr)	NOX (lb/bhp-hr or lbs/hr)	SOX (lb/bhp-hr or lbs/hr)	PM10 (lb/bhp-hr or lbs/hr)	PM2.5 (lb/bhp-hr or lbs/hr)	Total Use (Hours)	ROG, tons	CO tons	NOX tons	SOX tons	PM10 tons	PM2.5 tons
Total Equipment Use																
Construction Inspector																
2-ton Flatbed Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	325	0.00	0.01	0.03	0.00	0.00	0.00
Aerial Bucket Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	1185	0.00	0.03	0.10	0.00	0.00	0.00
Air Compressor	DIESEL	78	0.48	0.0016	0.0132	0.0117	0.0000	0.0013	0.001177249	3927	0.12	0.97	0.86	0.00	0.10	0.09
Backhoe	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	319	0.01	0.05	0.06	0.00	0.00	0.00
Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	210	0.00	0.01	0.02	0.00	0.00	0.00
Bulldozer	DIESEL	255	0.4	0.0013	0.0132	0.0117	0.0000	0.0013	0.001177249	1795	0.12	1.21	1.07	0.00	0.12	0.11
Concrete Saw	DIESEL	81	0.73	0.0014	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Concrete Trucks	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	0	0.00	0.00	0.00	0.00	0.00	0.00
Crane Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	266	0.00	0.01	0.02	0.00	0.00	0.00
Crane	DIESEL	226	0.29	0.0010	0.0057	0.0091	0.0000	0.0003	0.000294312	1243	0.04	0.23	0.37	0.00	0.01	0.01
Drill Rig	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	30	0.00	0.01	0.01	0.00	0.00	0.00
Dump/Haul Truck	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	6237	0.04	0.23	0.41	0.00	0.00	0.00
Flatbed Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	148	0.00	0.00	0.01	0.00	0.00	0.00
Forklift	DIESEL	83	0.4	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	3046	0.07	0.67	0.59	0.00	0.07	0.06
Grader	DIESEL	174	0.41	0.0012	0.0132	0.0117	0.0000	0.0013	0.001177249	715	0.03	0.34	0.30	0.00	0.03	0.03
Hydraulic Rock Splitter/Rock Drilling Equipment	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	30	0.00	0.01	0.01	0.00	0.00	0.00
Line Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	1217	0.00	0.03	0.10	0.00	0.00	0.00
Loader	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Mobile Fueling Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	1617	0.00	0.04	0.13	0.00	0.00	0.00
Mower	DIESEL	25	0.42	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	1327	0.01	0.09	0.08	0.00	0.01	0.01
Paving Rig	DIESEL	82	0.36	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	0	0.00	0.00	0.00	0.00	0.00	0.00
Generator	DIESEL	50	0.74	0.0013	0.0082	0.0117	0.0000	0.0007	0.000588624	8595	0.20	1.30	1.86	0.00	0.11	0.09
Skid-Steer Loader	DIESEL	78	0.37	0.0016	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Wire Puller	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	852	0.03	0.25	0.28	0.00	0.01	0.01
Wire Tensioner	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	718	0.02	0.21	0.23	0.00	0.01	0.01
Tool Van	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	3522	0.01	0.09	0.29	0.00	0.00	0.00
Semi Tractor with Trailer	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	2304	0.02	0.08	0.15	0.00	0.00	0.00
Water Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	4115	0.01	0.10	0.33	0.00	0.00	0.00
Total											0.74	5.95	7.31	0.01	0.48	0.43

Table A-30
Construction Truck Trip Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-30. Total Emissions, Construction Truck Trips

		2016		Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10			PM2.5			Emissions, tons										
Vehicle	Vehicle Class	Number of equipment days used	Running Exhaust (g/mi)							Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5
2-ton Flatbed Truck	Light Heavy Duty Truck, Dese	55	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Aerial Bucket Truck	Light Heavy Duty Truck, Dese	101	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Boom Truck	Light Heavy Duty Truck, Dese	18	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Concrete Trucks	Light Heavy Duty Truck, Dese	88	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Crane Truck	Light Heavy Duty Truck, Dese	89	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Drill Rig/Truck Mounted Auger	Light Heavy Duty Truck, Dese	46	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Dump Truck	Heavy Duty Truck, Diesel	1156	30	35.7	1.111513533	5.183568	0.30038695	0.010712	0.069818	0.03599981	0.06173968	0.064233	0.009	0.0264599	0.05	0.24	0.01	0.00	0.01	0.00	0.02	0.00	0.00			
Flatbed Boom Truck	Light Heavy Duty Truck, Dese	19	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Line Truck	Light Heavy Duty Truck, Dese	66	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Mobile Fueling Truck	Light Heavy Duty Truck, Dese	38	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Pick-Up Trucks	Light Duty Truck 1, Diesel	1244	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	0.01	0.02	0.00	0.00	0.00	0.00	0.02	0.01	0.00			
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	532	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00			
Tool Van	Light Duty Truck 1, Diesel	37	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Semi Tractor with Trailer	Heavy Duty Truck, Diesel	103	30	35.7	1.111513533	5.183568	0.30038695	0.010712	0.069818	0.03599981	0.06173968	0.064233	0.009	0.0264599	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Water Truck	Light Heavy Duty Truck, Dese	374	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.05	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00		
Total														0.02	0.08	0.01	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.00		

		2017		Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10			PM2.5			Emissions, tons										
Vehicle	Vehicle Class	Number of equipment days used	Running Exhaust (g/mi)							Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5
2-ton Flatbed Truck	Light Heavy Duty Truck, Dese	27	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Aerial Bucket Truck	Light Heavy Duty Truck, Dese	99	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Boom Truck	Light Heavy Duty Truck, Dese	18	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Concrete Trucks	Light Heavy Duty Truck, Dese	0	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Crane Truck	Light Heavy Duty Truck, Dese	22	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Drill Rig/Truck Mounted Auger	Light Heavy Duty Truck, Dese	3	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Dump Truck	Heavy Duty Truck, Diesel	520	30	35.7	1.111513533	5.183568	0.30038695	0.010712	0.069818	0.03599981	0.06173968	0.064233	0.009	0.0264599	0.02	0.11	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Flatbed Boom Truck	Light Heavy Duty Truck, Dese	12	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Line Truck	Light Heavy Duty Truck, Dese	101	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Mobile Fueling Truck	Light Heavy Duty Truck, Dese	135	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Pick-Up Trucks	Light Duty Truck 1, Diesel	2869	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	0.03	0.05	0.01	0.00	0.01	0.01	0.03	0.01	0.00			
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	1382	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	0.02	0.03	0.00	0.00	0.00	0.01	0.00	0.01	0.00			
Tool Van	Light Duty Truck 1, Diesel	293	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Semi Tractor with Trailer	Heavy Duty Truck, Diesel	192	30	35.7	1.111513533	5.183568	0.30038695	0.010712	0.069818	0.03599981	0.06173968	0.064233	0.009	0.0264599	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Water Truck	Light Heavy Duty Truck, Dese	343	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Total														0.04	0.11	0.01	0.00	0.01	0.00	0.01	0.01	0.02	0.00	0.01		

Paved Road Fugitive Dust
EPA's AP-42, Section 13.2.1, January 2011
E = k(SL)^{0.61} x (W)^{1.02}
For LDT assume 2 tons/vehicle, LHDT assume 13 tons/vehicle, HDT assume 20 tons/vehicle; therefore, average weight = 10.19 tons for 2016 and 5.52 tons for 2017
Assume silt loading for 10,000 ADT roadways = 0.03 g/m³
Assume k = 0.0022 PM10; 0.00054 PM2.5

Emission Factor
PM10 2016 0.000965919
PM2.5 2016 0.000237089
PM10 2017 0.000516869
PM2.5 2017 0.000126868

Table A-31. 2016 Construction Emissions, Worker Trips

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	CO		NO _x		ROG					SO _x		PM10				PM2.5				
						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)
All	Light-Duty Truck, catalyst	100	152	35	80	2.361162	31.42448	0.224936	1.8136819	0.057965	2.3946367	1.6219719	0.707095	0.16038404	0.71464703	0.004128	0.00571499	0.003216	0.0291986	0.008	0.03675	0.002961	0.0268842	0.002	0.01575

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
 Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	Emissions, tons							
						CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5
All	Light-Duty Truck, catalyst	100	152	35	80	3.69	0.33	0.17	0.01	0.06	0.03	0.11	0.03
Total						3.69	0.33	0.17	0.01	0.06	0.03	0.11	0.03

Table A-32. 2017 Construction Emissions, Worker Trips

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	CO		NO _x		ROG					SO _x		PM10				PM2.5				
						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)
All	Light-Duty Truck, catalyst	100	107	35	80	2.153834	31.4244799	0.205224	1.8136819	0.048784	2.39463668	1.62197187	0.707094998	0.16038404	0.714647031	0.004128	0.00571499	0.003035	0.02919863	0.008	0.03675	0.002803	0.0268842	0.002	0.01575

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
 Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	Emissions, tons							
						CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5
All	Light-Duty Truck, catalyst	100	107	35	80	2.40	0.22	0.11	0.00	0.05	0.02	0.08	0.02
						2.40	0.22	0.11	0.00	0.05	0.02	0.08	0.02

Table A-33
 Unmitigated Construction Emissions Summary
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-33. Annual Unmitigated Construction Emissions, Summary

2016	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	0.53	3.98	5.47	0.01	0.28	0.25
Construction Truck Trips	0.01	0.02	0.08	0.00	0.02	0.01
Worker Trips	0.17	3.69	0.33	0.01	0.18	0.06
Helicopter	1.36	5.44	1.92	0.14	1.46	1.46
Fugitive Dust (Unmitigated)					0.82	0.17
Total	2.07	13.14	7.80	0.15	2.76	1.95

2017	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	0.74	5.95	7.31	0.01	0.48	0.43
Construction Truck Trips	0.01	0.04	0.11	0.00	0.03	0.01
Worker Trips	0.11	2.40	0.22	0.00	0.12	0.04
Helicopter	1.36	5.44	1.92	0.14	1.46	1.46
Total	2.23	13.83	9.56	0.15	2.10	1.94

Table A-34
 Mitigated Construction Emissions Summary
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-34. Annual Mitigated Construction Emissions, Summary

2016	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	0.53	3.98	5.47	0.01	0.28	0.25
Construction Truck Trips	0.01	0.02	0.08	0.00	0.02	0.01
Worker Trips	0.17	3.69	0.33	0.01	0.18	0.06
Helicopter	1.36	5.44	1.92	0.14	1.46	1.46
Fugitive Dust (Unmitigated)					0.31	0.07
Total	2.07	13.14	7.80	0.15	2.25	1.84

2017	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	0.74	5.95	7.31	0.01	0.48	0.43
Construction Truck Trips	0.01	0.04	0.11	0.00	0.03	0.01
Worker Trips	0.11	2.40	0.22	0.00	0.12	0.04
Helicopter	1.36	5.44	1.92	0.14	1.46	1.46
Total	2.23	13.83	9.56	0.15	2.10	1.94

Table A-35
 ARB and USEPA Off-Road Engine Standards
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-35. ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards (NMHC+NOx/CO/PM in g/bhp-hr). When ARB and USEPA standards differ, the standards shown here represent the more stringent of the two.

Maximum horsepower	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015+
<11	See Table 2 footnote (a)					7.8 / 6.0 / 0.75			5.6 / 6.0 / 0.6			5.6 / 6.0 / 0.30 ^a									
11hp<25						7.1 / 4.9 / 0.60			5.6 / 4.9 / 0.60			5.6 / 4.9 / 0.30									
25hp<50	-					7.1 / 4.1 / 0.60			5.6 / 4.1 / 0.45			5.6 / 4.1 / 0.22			3.5 / 4.1 / 0.02						
50hp<75									5.6 / 3.7 / 0.30			3.5 / 3.7 / 0.22 ^c			3.5 / 3.7 / 0.02 ^c						
75hp<100						- / 6.9 / - / - ^b			5.6 / 3.7 / 0.30			3.5 / 3.7 / 0.30			0.14 / 0.30 / 3.7 / 0.015 ^b						
100hp<175									4.9 / 3.7 / 0.22			3.0 / 3.7 / 0.22			0.14 / 2.5 / 3.7 / 0.015 ^{b,d}						
175hp<300										4.9 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^e			0.14 / 1.5 / 2.6 / 0.015 ^{b,d}					
300hp<600	-	1.0 / 6.9 / 8.5 / 0.40 ^b				4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^e			0.14 / 1.5 / 2.6 / 0.015 ^{b,d}			0.14 / 0.30 / 2.2 / 0.015 ^b						
600hp@750										4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^e			0.14 / 0.30 / 2.2 / 0.015 ^b					
Mobile Machines > 750hp										4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^e			0.14 / 2.6 / 2.6 / 0.03 ^b					
750hp<GEN @1200hp	-					1.0 / 6.9 / 8.5 / 0.40 ^b			4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^e			0.14 / 0.50 / 2.6 / 0.02 ^b						
GEN>1200 hp										4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^e			0.14 / 0.50 / 2.6 / 0.02 ^b					

a) The PM standard for hand-start, air cooled, direct injection engines below 11 hp may be delayed until 2010 and be set at 0.45 g/bhp-hr.

b) Standards given are NMHC/NOx/CO/PM in g/bhp-hr.

c) Engine families in this power category may alternately meet Tier 3 PM standards (0.30 g/bhp-hr) from 2008-2011 in exchange for introducing final PM standards in 2012.

d) The implementation schedule shown is the three-year alternate NOx approach. Other schedules are available.

e) Certain manufacturers have agreed to comply with these standards by 2005.

 : Tier 1

 : Tier 2

 : Tier 3

 : Tier 4 Interim / Final

Table A-35
 ARB and USEPA Off-Road Engine Standards
 Sycamore to Peñasquitos 230 kV Transmission Line Project

	TIER 2 Emission Factors					
	NOx		CO		PM	
	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr
Maximum horsepower						
<11	5.32	0.0117284	6	0.0132275	0.6	0.0013228
11@hp<25	5.32	0.0117284	4.9	0.0108025	0.6	0.0013228
25@hp<50	5.32	0.0117284	4.1	0.0090388	0.45	0.0009921
50@hp< 75	5.32	0.0117284	3.7	0.008157	0.3	0.0006614
75@hp<100	5.32	0.0117284	3.7	0.008157	0.3	0.0006614
100@hp<175	4.655	0.0102623	3.7	0.008157	0.22	0.000485
175@hp<300	4.655	0.0102623	2.6	0.0057319	0.15	0.0003307
300@hp<600	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
600@hp@750	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
Mobile Machines > 750hp	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
750hp<GEN @1200hp	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
GEN>1200 hp	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307

TIER 3 Emission Factors					
NOx		CO		PM	
g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr
5.32	0.0117284	6	0.0132275	0.6	0.0013228
5.32	0.0117284	4.9	0.0108025	0.6	0.0013228
5.32	0.0117284	4.1	0.0090388	0.45	0.0009921
5.32	0.0117284	3.7	0.008157	0.3	0.0006614
3.325	0.0073302	3.7	0.008157	0.3	0.0006614
2.85	0.0062831	3.7	0.008157	0.22	0.000485
2.85	0.0062831	2.6	0.0057319	0.15	0.0003307
2.85	0.0062831	2.6	0.0057319	0.15	0.0003307
2.85	0.0062831	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307

Composite Emission Factors - 70% Tier 2, 30% Tier 3		
NOx	CO	PM
lb/bhp-hr	lb/bhp-hr	lb/bhp-hr
0.011728395	0.013227513	0.001323
0.011728395	0.010802469	0.001323
0.011728395	0.009038801	0.000992
0.011728395	0.008156966	0.000661
0.010408951	0.008156966	0.000661
0.009068563	0.008156966	0.000485
0.009068563	0.005731922	0.000331
0.008921958	0.005731922	0.000331
0.008921958	0.005731922	0.000331
0.01005291	0.005731922	0.000331
0.01005291	0.005731922	0.000331
0.01005291	0.005731922	0.000331
0.01005291	0.005731922	0.000331

% reduction from TIER 2 to TIER 3		
NOx	CO	PM
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
37.50%	0.00%	0.00%
38.78%	0.00%	0.00%
38.78%	0.00%	0.00%
37.50%	0.00%	0.00%
37.50%	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%

 : Tier 2

 : Tier 3

Table A-36
Operational Truck Trip Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-36. Operational Truck Trips

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10			PM2.5			CO ₂	CH ₄	N ₂ O	Emissions, lbs/day										
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5
Operations																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	60	0.292950056	0.4769309	0.06521049	0.0031861	0.0539548	0.00799996	0.03674982	0.0496384	0.002	0.0157499	247.93302	0.01416764	0.01	0.08	0.13	0.02	0.00	0.03	0.02	0.01	0.00	65.59	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	2	30	60	0.292950056	0.4769309	0.06521049	0.0031861	0.0539548	0.00799996	0.03674982	0.0496384	0.002	0.0157499	247.93302	0.01416764	0.01	0.08	0.13	0.02	0.00	0.03	0.02	0.01	0.00	65.59	0.00	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Diesel	2	30	60	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.01199994	0.0764396	0.0366331	0.003	0.0327598	504.22234	0.02881278	0.01	0.22	0.81	0.05	0.00	0.03	0.02	0.01	0.00	133.40	0.01	0.00
Subtotal																		0.37	1.07	0.08	0.00	0.09	0.05	0.03	0.01	264.58	0.02	0.01
Simultaneous Construction Trucks																		0.37	1.07	0.08	0.00	0.09	0.05	0.03	0.01	264.58	0.02	0.01

Paved Road Fugitive Dust
EPA's AP-42, Section 13.2.1, January 2011
 $E = k(sL/2)^{0.01} \times (W/3)^{1.02}$
For LDT assume 2 tons/vehicle, LHDT assume 13 tons/vehicle, HDT assume 20 tons/vehicle; therefore, average weight = average of (4 LDT x 2 + 2 LHDT x 13 + 0 HDT x 20) = 5.67 tons
Assume silt loading for 10,000 ADT roadways = 0.03 g/m³
Assume k = 0.0022 PM10; 0.00054 PM2.5

Emission Factor
PM10 9.21843E-05
PM2.5 2.2627E-05

Table A-37. Operational Worker Trips

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle- day)	CO		NO _x		ROG						SO _x		PM ₁₀					PM _{2.5}			CO ₂		CH ₄		N ₂ O	
					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)	Resling 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)
Operations	Light-Duty Truck, catalyst	9	35	80	2.153834	31.42448	0.205224	1.8136819	0.048784	2.39463668	1.62197187	0.707095	0.16038404	0.714647031	0.004128	0.00571499	0.003035	0.02919863	0.008	0.03675	0.002803	0.0268842	0.002	0.01578	297.3955	448.548176	0.002833	0.02205593	0.01	0.00972228

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

#REF! #REF! #REF! #REF! #REF! #REF! #REF! #REF! #REF! #REF!

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle- day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM ₁₀	PM _{2.5}	Paved Road Fugitive Dust PM ₁₀	Paved Road Fugitive Dust PM _{2.5}	CO ₂	CH ₄	N ₂ O
Operations	Light-Duty Truck, catalyst	9	35	80	4.04	0.36	0.19	0.01	0.08	0.03	0.02	0.01	480.07	0.00	0.01
Simultaneous Worker Trips		9			4.04	0.36	0.19	0.01	0.08	0.03	0.02	0.01	480.07	0.00	0.01

Paved Road Fugitive Dust
EPA's AP-42, Section 13.2.1, January 2011
E = k_sLZ^{0.01} × (W₃)^{1.02}
For LDT assume 2 tons/vehicle
Assume silt loading for 10,000 ADT roadways = 0.03 g/m³
Assume k = 0.0022 PM₁₀; 0.00054 PM_{2.5}

Emission Factor
PM₁₀ 3.18459E-05
PM_{2.5} 7.8167E-06

Table A-38
Operational Emissions Summary
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-38. Maximum Daily Operational Emissions, Summary

Source	Maximum Daily Operational Emissions, lbs/day					
	ROG	CO	NOx	SOx	PM10	PM2.5
Truck Trips	0.08	0.37	1.07	0.00	0.12	0.06
Worker Trips	0.19	4.04	0.36	0.01	0.10	0.04
Total	0.27	4.42	1.43	0.01	0.22	0.10

Table B-1
Construction Heavy Equipment GHG Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-1. Total GHG Emissions, Equipment

Equipment	Emission Factors						Emissions			
	FUEL	HP	Load Factor	CO2 (lb/bhp-hr or lbs/hr)	CH4 (lb/bhp-hr or lbs/hr)	N2O (lb/bhp-hr or lbs/hr)	Total Use (Hours)	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)
Total Equipment Use										
2-ton Flatbed Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	984	7.16	0.00	0.01
Aerial Bucket Truck	DIESEL	175	0.38	16.0	0.0002	0.0009	2400	17.46	0.00	0.00
Air Compressor	DIESEL	78	0.48	1.3	0.0001	0.0010	5560	118.30	0.01	0.09
Backhoe	DIESEL	97	0.37	1.3	0.0001	0.0010	2868	58.50	0.01	0.05
Boom Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	420	3.06	0.00	0.00
Bulldozer	DIESEL	255	0.4	1.3	0.0001	0.0009	2628	152.34	0.01	0.10
Concrete Saw	DIESEL	81	0.73	1.3	0.0001	0.0010	340	11.43	0.00	0.01
Concrete Trucks	DIESEL	175	0.38	16.0	0.0002	0.0154	2406	17.51	0.00	0.02
Crane Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	1338	9.74	0.00	0.01
Crane	DIESEL	226	0.29	1.3	0.0001	0.0009	3030	112.86	0.01	0.08
Drill Rig	DIESEL	82	0.5	1.3	0.0002	0.0010	580	13.51	0.00	0.01
Dump/Haul Truck	DIESEL	400	0.38	15.0	0.0006	0.0125	20105	136.75	0.01	0.11
Flatbed Boom Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	378	2.75	0.00	0.00
Forklift	DIESEL	83	0.4	1.3	0.0001	0.0010	3420	64.53	0.01	0.05
Grader	DIESEL	174	0.41	1.3	0.0001	0.0009	1479	59.96	0.01	0.04
Hydraulic Rock Splitter/Rock Drilling Equipment	DIESEL	82	0.5	1.3	0.0002	0.0010	112	2.61	0.00	0.00
Line Truck	DIESEL	175	0.38	16.0	0.0001	0.0009	4228	30.76	0.00	0.00
Loader	DIESEL	97	0.37	1.3	0.0001	0.0010	1000	20.40	0.00	0.02
Mobile Fueling Truck	DIESEL	175	0.38	16.0	0.0001	0.0009	2068	15.05	0.00	0.00
Mower	DIESEL	25	0.42	1.3	0.0001	0.0011	1933	11.53	0.00	0.01
Paving Rig	DIESEL	82	0.36	1.3	0.0002	0.0010	300	5.03	0.00	0.00
Generator	DIESEL	50	0.74	1.3	0.0001	0.0011	12830	269.78	0.02	0.24
Skid-Steer Loader	DIESEL	78	0.37	1.3	0.0001	0.0010	500	8.20	0.00	0.01
Wire Puller	DIESEL	171	0.42	1.3	0.0001	0.0009	1850	75.51	0.00	0.05
Wire Tensioner	DIESEL	171	0.42	1.3	0.0001	0.0009	1080	44.08	0.00	0.03
Tool Van	DIESEL	175	0.38	16.0	0.0002	0.0154	3960	28.81	0.00	0.03
Semi Tractor with Trailer	DIESEL	400	0.38	15.0	0.0150	0.0125	3450	23.47	0.02	0.02
Water Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	8606	62.62	0.00	0.06
Total								1383.70	0.13	1.06

Table B-2
Construction and Operational Truck Trip GHG Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-2. Total GHG Emissions, Construction Truck Trips

Vehicle	Vehicle Class	Number of days used	Speed (mph)	VMT (mi/vehicle-day)	CO2	CH4	N2O	Emissions, metric tons		
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO2	CH4	N2O
2-ton Flatbed Truck	Light Heavy Duty Truck, Diesel	82	30	20	504.222339	0.02881278	0.01	0.83	0.00	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Diesel	200	30	20	504.222339	0.02881278	0.01	2.02	0.00	0.00
Boom Truck	Light Heavy Duty Truck, Diesel	35	30	20	504.222339	0.02881278	0.01	0.35	0.00	0.00
Concrete Trucks	Light Heavy Duty Truck, Diesel	223	30	30	504.222339	0.02881278	0.01	3.37	0.00	0.00
Crane Truck	Light Heavy Duty Truck, Diesel	111.5	30	20	504.222339	0.02881278	0.01	1.12	0.00	0.00
Drill Rig/Truck Mounted Auger	Light Heavy Duty Truck, Diesel	48.3	30	20	504.222339	0.02881278	0.01	0.49	0.00	0.00
Dump Truck	Heavy Duty Truck, Diesel	1950.4	30	60	1807.66928	0.10329565	0.05	211.54	0.01	0.01
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	31.5	30	20	504.222339	0.02881278	0.01	0.32	0.00	0.00
Line Truck	Light Heavy Duty Truck, Diesel	384.3	30	20	504.222339	0.02881278	0.01	3.88	0.00	0.00
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	172.3	30	30	504.222339	0.02881278	0.01	2.61	0.00	0.00
Pick-Up Trucks	Light Duty Truck 1, Diesel	5091.7	30	20	247.933018	0.01416764	0.01	25.25	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	1914.4	30	20	247.933018	0.01416764	0.01	9.49	0.00	0.00
Tool Van	Light Duty Truck 1, Diesel	330	30	20	247.933018	0.01416764	0.01	1.64	0.00	0.00
Semi Tractor with Trailer	Heavy Duty Truck, Diesel	295	30	60	1807.66928	0.10329565	0.05	32.00	0.00	0.00
Water Truck	Light Heavy Duty Truck, Diesel	717.2	30	30	504.222339	0.02881278	0.01	10.85	0.00	0.00
Total								305.75	0.02	0.01

Table B-3
 Construction and Operations Worker Commute GHG Emission Calculations
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-3. Total GHG Emissions, Worker Trips

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Number of Days	Speed (mph)	VMT (mi/vehicle- day)	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)
All	Light-Duty Truck, catalyst	100	166	35	80	297.39552	448.5481762	0.0028329	0.02209593	0.0085373	0.00972228

EMFAC2011 emission factors for 2016

Assume startup after 8 hours

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Number of Days	Speed (mph)	VMT (mi/vehicle- day)			
						CO2	CH4	N2O
All	Light-Duty Truck, catalyst	100	166	35	80	402.39	0.00	0.01
Total Worker Trips						402.39	0.00	0.01

Table B-4
Helicopter GHG Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-4. Helicopter Emissions

Helicopter Model	Engine	Assumed Engine	Operating Mode	Fuel Flow (kg/s)	Time in Mode (min)	Emission Incides, g/kg fuel					Emissions, lbs/mode				Cruise Mode Emission factor, lbs/hour			
						CO	VOC	NOx	Sox	PM	CO	VOC	NOx	PM	CO	VOC	NOx	PM
Hughes 500E	Allison 250-C20B/R	250B17B	Taxi Out	0.008154	19	2.199837	23.004097	2.199837	1.292	4.2	0.045081939	0.471430067	0.045081939	0.086071898				
			Takeoff	0.031642	10.4	6.599994	0.402675	6.599994	1.292	4.2	0.287295342	0.017528297	0.287295342	0.182824475				
			Climbout	0.028926	0.09	5.981142	0.408337	5.981142	1.292	4.2	0.002059694	0.000140617	0.002059694	0.001446332	1.373129585	0.093744575	1.373129585	0.964221257
			Approach	0.010516	10.05	2.200637	5.988767	2.200637	1.292	4.2	0.03076471	0.083722432	0.03076471	0.058715628				
			Taxi In	0.008154	7	2.199837	23.004097	2.199837	1.292	4.2	0.016609136	0.173684761	0.016609136	0.031710699				
			Total per LTO										0.381810822	0.746506173	0.381810822	0.360769031		
SkyKing	Allison 250-C20B/R	250B17B	Taxi Out	0.018353	19	175.63	99.78	1.201	1.292	4.2	8.10115881	4.602480362	0.055397664	0.193730382				
			Takeoff	0.112337	1.5	8.787	2.123	7.088	1.292	4.2	0.195858528	0.047320776	0.157988534	0.093616231				
			Climbout	0.079	1.5	14	1.32	5.58	1.292	4.2	0.219449282	0.020690932	0.087466214	0.065834785	8.777971296	0.827637294	3.498648559	2.633391389
			Approach	0.018	9.719	178.175	101.213	1.207995	1.292	4.2	4.123145244	2.342168652	0.027954196	0.097192143				
			Taxi In	0.018353	7	2.199837	23.004097	2.199837	1.292	4.2	0.037383795	0.390929167	0.037383795	0.071374351				
			Total per LTO										12.67699566	7.403589889	0.366190403	0.521747891		

* Fuel flow rates and EF's from Federal Aviation Administration, Emission and Dispersion Modeling System (EDMS)

* Time in mode based on default times in EDMS

Therefore

To calculate lbs/day

Component	Emissions (lb/day)			
	CO	HC	NOx	PM
LTO - light helicopter (Hughes 500)	0.382	0.747	0.382	0.361
LTO - heavy helicopter (SkyKing)	12.677	7.404	0.366	0.522
Installation/Demolition - light helicopter, 3 hrs cruise	4.119	0.281	4.119	2.893
Installation/Demolition - heavy helicopter, 3 hrs cruise	26.334	2.483	10.496	7.900
Total Light Helicopter	4.501	1.028	4.501	3.253
Total Heavy Helicopter	39.011	9.887	10.862	8.422
Total	43.512	10.914	15.363	11.675

* Installation/demolition is assumed to be 3 hours (180 minutes) per event at cruise mode factors

* SOx and PM emissions are negligible

Helicopter GHG Emission Estimates

Table of Factors and Constants

Value Units	Description
6.84 lb/gallon	Jet Fuel Density (at 15 degrees C) -- equivalent to 820 kg/m ³
142 lb/hr	Jet Fuel Usage at Idle
20.8 gallon/hr	Calculated Usage at Idle
679 lb/hr	Jet Fuel Usage at Climbout/Approach
99.3 gallon/hr	Calculated Usage at Climbout/Approach
9.57 kg CO ₂ /gallon	CO ₂ emission factor for Jet fuel
0.31 g N ₂ O/gallon	N ₂ O emission factor for Jet fuel
0.27 g CH ₄ /gallon	CH ₄ emission factor for Jet fuel

* Fuel usage rates from EPA AP-42, Table II-1-8, Modal Emission Rates - Military Aircraft Engines

* Fuel density from Air BP Handbook of Products - © Air BP Ltd. 2000

* Emission factors from California Climate Action Registry's General Reporting Protocol 3.1

GHG Emissions

Component	Time in mode (hrs)	Emissions (tonnes/day)				Days of Operation	Emissions (total tonnes)			
		CO ₂	N ₂ O	CH ₄	CO ₂ e		CO ₂	N ₂ O	CH ₄	CO ₂ e
Light Helicopter										
LTO - Idle	0.433	0.086	0.000013	0.000012	0.090	250	21.523	0.0033	0.0003	22.564
LTO - Other	0.342	0.068	0.000011	0.000009	0.071		17.003	0.0026	0.0003	17.826
Installation	3.000	0.596	0.000092	0.000080	0.626		149.007	0.0231	0.0024	156.212
Heavy Helicopter										
LTO - Idle	0.433	0.086	0.000013	0.000012	0.090	250	21.523	0.0033	0.0003	22.564
LTO - Other	0.212	0.042	0.000007	0.000006	0.044		10.529	0.0016	0.0002	11.038
Installation	3.000	0.596	0.000092	0.000080	0.626		149.007	0.0231	0.0024	156.212
Total per Installation	7.421	1.474	0.000228	0.000199	1.549338		368.592	0.0571	0.0060	386.416

* Jet Fuel usage was based on fuel usage time spent in approach, idle, and takeoff for each LTO and 3 hours for installation

Table B-5
 Total GHG Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-5. Total GHG Emissions, metric tons

	Total Construction Emissions, metric tons		
	CO2	CH4	N2O
Construction Equipment	1383.70	0.13	1.06
Construction Truck Trips	305.75	0.02	0.01
Worker Trips	402.39	0.00	0.01
Helicopter	368.59	0.06	0.01
Total	2460.43	0.20	1.08

2800.613

Table B-6
 ARB and USEPA Off-Road Engine Standards
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-6. ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards (NMHC+NOx/CO/PM in g/bhp-hr). When ARB and USEPA standards differ, the standards shown here represent the more stringent of the two.

Maximum horsepower	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015+
<11	See Table 2 footnote (a)					7.8 / 6.0 / 0.75			5.6 / 6.0 / 0.6			5.6 / 6.0 / 0.30 ^a									
11-25						7.1 / 4.9 / 0.60			5.6 / 4.9 / 0.60			5.6 / 4.9 / 0.30									
25-50	-					7.1 / 4.1 / 0.60			5.6 / 4.1 / 0.45			5.6 / 4.1 / 0.22			3.5 / 4.1 / 0.02						
50-75									5.6 / 3.7 / 0.30			3.5 / 3.7 / 0.22 ^c			3.5 / 3.7 / 0.02 ^c						
75-100						- / 6.9 / - / - ^b			5.6 / 3.7 / 0.30			3.5 / 3.7 / 0.30		0.14 / 2.5 / 3.7 / 0.015 ^{b,d}		0.14 / 0.30 / 3.7 / 0.015 ^b					
100-175							4.9 / 3.7 / 0.22			3.0 / 3.7 / 0.22			0.14 / 2.5 / 3.7 / 0.015 ^{b,d}		0.14 / 0.30 / 3.7 / 0.015 ^b						
175-300									4.9 / 2.6 / 0.15		3.0 / 2.6 / 0.15 ^e			0.14 / 1.5 / 2.6 / 0.015 ^{b,d}		0.14 / 0.30 / 2.2 / 0.015 ^b					
300-600	-	1.0 / 6.9 / 8.5 / 0.40 ^b				4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^e			0.14 / 1.5 / 2.6 / 0.015 ^{b,d}		0.14 / 0.30 / 2.2 / 0.015 ^b							
600-750									4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^e			0.14 / 1.5 / 2.6 / 0.015 ^{b,d}		0.14 / 0.30 / 2.2 / 0.015 ^b				
Mobile Machines > 750hp									4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^e			0.30 / 2.6 / 2.6 / 0.07 ^b		0.14 / 2.6 / 2.6 / 0.03 ^b				
750hp<GEN ≤1200hp						1.0 / 6.9 / 8.5 / 0.40 ^b			4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^e			0.30 / 2.6 / 2.6 / 0.07 ^b		0.14 / 0.50 / 2.6 / 0.02 ^b				
GEN>1200 hp						1.0 / 6.9 / 8.5 / 0.40 ^b			4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^e			0.30 / 0.50 / 2.6 / 0.07 ^b		0.14 / 0.50 / 2.6 / 0.02 ^b				

a) The PM standard for hand-start, air cooled, direct injection engines below 11 hp may be delayed until 2010 and be set at 0.45 g/bhp-hr.

b) Standards given are NMHC/NOx/CO/PM in g/bhp-hr.

c) Engine families in this power category may alternately meet Tier 3 PM standards (0.30 g/bhp-hr) from 2008-2011 in exchange for introducing final PM standards in 2012.

d) The implementation schedule shown is the three-year alternate NOx approach. Other schedules are available.

e) Certain manufacturers have agreed to comply with these standards by 2005.



Table B-6
 ARB and USEPA Off-Road Engine Standards
 Sycamore to Peñasquitos 230 kV Transmission Line Project

	TIER 2 Emission Factors						TIER 3 Emission Factors						Composite Emission Factors - 70% Tier 2, 30% Tier 3			% reduction from TIER 2 to TIER 3		
	NOx		CO		PM		NOx		CO		PM		NOx	CO	PM	NOx	CO	PM
	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr	lb/bhp-hr	lb/bhp-hr	lb/bhp-hr			
Maximum horsepower																		
<11	5.32	0.0117284	6	0.0132275	0.6	0.0013228	5.32	0.0117284	6	0.0132275	0.6	0.0013228	0.011728395	0.013227513	0.001323	0.00%	0.00%	0.00%
11@hp<25	5.32	0.0117284	4.9	0.0108025	0.6	0.0013228	5.32	0.0117284	4.9	0.0108025	0.6	0.0013228	0.011728395	0.010802469	0.001323	0.00%	0.00%	0.00%
25@hp<50	5.32	0.0117284	4.1	0.0090388	0.45	0.0009921	5.32	0.0117284	4.1	0.0090388	0.45	0.0009921	0.011728395	0.009038801	0.000992	0.00%	0.00%	0.00%
50@hp<75	5.32	0.0117284	3.7	0.008157	0.3	0.0006614	5.32	0.0117284	3.7	0.008157	0.3	0.0006614	0.011728395	0.008156966	0.000661	0.00%	0.00%	0.00%
75@hp<100	5.32	0.0117284	3.7	0.008157	0.3	0.0006614	3.325	0.0073302	3.7	0.008157	0.3	0.0006614	0.010408951	0.008156966	0.000661	37.50%	0.00%	0.00%
100@hp<175	4.655	0.0102623	3.7	0.008157	0.22	0.000485	2.85	0.0062831	3.7	0.008157	0.22	0.000485	0.009068563	0.008156966	0.000485	38.78%	0.00%	0.00%
175@hp<300	4.655	0.0102623	2.6	0.0057319	0.15	0.0003307	2.85	0.0062831	2.6	0.0057319	0.15	0.0003307	0.009068563	0.005731922	0.000331	38.78%	0.00%	0.00%
300@hp<600	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307	2.85	0.0062831	2.6	0.0057319	0.15	0.0003307	0.008921958	0.005731922	0.000331	37.50%	0.00%	0.00%
600@hp@750	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307	2.85	0.0062831	2.6	0.0057319	0.15	0.0003307	0.008921958	0.005731922	0.000331	37.50%	0.00%	0.00%
Mobile Machines > 750hp	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307	0.01005291	0.005731922	0.000331	0.00%	0.00%	0.00%
750hp<GEN @1200hp	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307	0.01005291	0.005731922	0.000331	0.00%	0.00%	0.00%
GEN>1200 hp	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307	0.01005291	0.005731922	0.000331	0.00%	0.00%	0.00%

 : Tier 2

 : Tier 3

Table 1: Summary Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Age	35.2	12.5	18	65
Gender	0.48	0.50	0	1
Education	12.5	2.1	8	16
Income	45000	15000	20000	80000
Health	0.75	0.25	0	1
Employment	0.85	0.35	0	1
Marital Status	0.65	0.48	0	1
Urban	0.72	0.45	0	1
Region	0.35	0.48	0	1
Year	2015	0.00	2010	2020

Source: Author's calculations based on the data.

Table B-8
Construction and Operations Worker Commute GHG Emission Calculations
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-8. Operational Worker Trips

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle- day)	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)
Operations	Light-Duty Truck, catalyst	9	35	80	297.3955	448.548176	0.002833	0.02209593	0.01	0.00972228

EMFAC2011 emission factors for 2016

Assume startup after 8 hours

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle- day)	Emissions, lbs/day			Total GHG Emissions, metric tons/year		
					CO2	CH4	N2O	CO2	CH4	N2O
Operations	Light-Duty Truck, catalyst	9	35	80	480.97	0.00	0.01	2.62	0.00	0.00
Worker Trips		9	-	-	480.97	0.00	0.01	2.62	0.00	0.00

Assume workers would conduct inspection and maintenance operations monthly for the purpose of estimating total GHG emissions

Table B-9
Operation GHG Emissions Summary
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-9. Operational GHG Emissions, Summary

Source	Operational Emissions, metric tons/year			
	CO2	CH4	N2O	CO2e
Truck Trips	1.44	0.00	0.00	1.45
Worker Trips	2.62	0.00	0.00	2.64
Total	4.06	0.00	0.00	4.10

APPENDIX J
AIR QUALITY & GREENHOUSE GASES
SUPPORT INFORMATION

**AIR QUALITY AND GREENHOUSE GASES EMISSIONS TABLES
FOR ALTERNATIVE 3**

**APPENDIX J
AIR QUALITY & GREENHOUSE GASES
SUPPORT INFORMATION**

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Table A-1-Q3
Construction Heavy Equipment Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment A

Table A-1-Q3. 2016 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment A

Equipment/Phase	Source	Emission Factors											Emissions											
		FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Wire Stringing																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.61	3.05	4.39	0.00	0.25	0.22	469.08	0.06	0.42
Bulldozer	CalEEMod User's Guide, Appendix D, 2016 Rubber Tired Dozers, 251/500 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	255	0.4	0.0013	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	2	5	1.35	5.85	9.25	0.01	0.34	0.30	1277.95	0.12	0.88
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	5	0.32	2.67	2.97	0.00	0.11	0.10	410.57	0.03	0.28
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	1	10	0.93	3.34	4.34	0.00	0.37	0.33	463.57	0.04	0.41
Wire Puller	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0104	0.0000	0.0005	0.000431658	1.3	0.0001	0.0010	1	5	0.31	2.93	3.74	0.00	0.17	0.16	449.91	0.03	0.36
Wire Tensioner	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0104	0.0000	0.0005	0.000431658	1.3	0.0001	0.0010	1	5	0.31	2.93	3.74	0.00	0.17	0.16	449.91	0.03	0.36
On-Road Certified Truck Emissions																								
Wire Stringing																								
Aerial Bucket Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	3	2	0.03	0.29	0.97	0.00	0.00	0.00	96.25	0.00	0.09
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Tool Van	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Tractor/Trailer	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	1	5	0.07	0.37	0.66	0.00	0.00	0.00	74.97	0.00	0.06
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	10	0.09	0.98	3.24	0.00	0.01	0.01	320.82	0.00	0.31
Subtotal																								
															4.03	22.71	34.27	0.04	1.43	1.27	4109.28	0.31	3.26	
Subtotal Simultaneous Construction Equipment																								

Table A-3-Q3. 2016 Maximum Daily Construction Emissions, Worker Trips, Segment A

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)
Wire Stringing	Light-Duty Truck, catalyst	21	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.005714994	0.00321577	0.02919863	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.022095932	0.01	0.009722282

EMFAC2011 emission factors for 2016
 Assume startup after 8 hours

Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day											
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O	
Wire Stringing	Light-Duty Truck, catalyst	21	35	80	10.20	0.92	1.06	0.02	0.18	0.08	0.31	0.08	0.08	1163.90	0.01	0.04
Simultaneous Worker Trips		21			10.20	0.92	1.06	0.02	0.18	0.08	0.31	0.08	0.08	1163.90	0.01	0.04

Table A-4-Q3
Construction Heavy Equipment Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment B

Table A-4-Q3. 2016 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment B

Equipment/Phase	Source	Emission Factors										Emissions												
		FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Excavate and Install Vaults and Trench																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	3	10	1.84	9.16	13.17	0.01	0.74	0.66	1407.25	0.17	1.25
Backhoe	CalEEMod User's Guide, Appendix D, 2016 Tractor/Loader/Backhoe, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	7	10	3.19	20.49	26.15	0.03	1.66	1.48	3147.64	0.28	2.48
Bulldozer	CalEEMod User's Guide, Appendix D, 2016 Rubber Tired Dozers, 251/500 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	255	0.4	0.0013	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	3	5	2.02	8.77	13.87	0.02	0.51	0.45	1916.92	0.18	1.32
Concrete Saw	CalEEMod User's Guide, Appendix D, 2016 Concrete Saws, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	81	0.73	0.0014	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	4	10	3.23	19.29	24.62	0.03	1.56	1.39	2963.34	0.29	2.34
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	2	5	0.64	5.35	5.94	0.01	0.22	0.19	821.15	0.06	0.56
Jackhammer	Note: Jackhammers are powered by the air compressors on the site.												11											
Paver	CalEEMod User's Guide, Appendix D, 2016 Paver, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	89	0.42	0.0021	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0002	0.0010	7	10	5.51	21.34	27.24	0.03	1.73	1.54	3278.32	0.50	2.59
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	1	10	0.93	3.34	4.34	0.00	0.37	0.33	463.57	0.04	0.41
Loader	CalEEMod User's Guide, Appendix D, 2016 Tractor/Loader/Backhoe, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	4	10	1.82	11.71	14.94	0.02	0.95	0.85	1798.65	0.16	1.42
Cleaning and Proving Ducts																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	2	10	1.23	6.11	8.78	0.01	0.50	0.44	938.17	0.11	0.83
Cabling																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	6	10	3.68	18.32	26.35	0.03	1.49	1.32	2814.50	0.33	2.50
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	3	5	0.96	8.02	8.92	0.01	0.33	0.29	1231.72	0.09	0.85
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	3	10	2.80	10.03	13.02	0.01	1.10	0.98	1390.71	0.13	1.24
Pulling Rig	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	1.3	0.0001	0.0009	9	6	3.32	31.64	35.17	0.05	1.88	1.67	4859.06	0.30	3.34
On-Road Certified Truck Emissions																								
Excavate and Install Vaults and Trench																								
Concrete Trucks	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	23	2	0.20	2.25	7.45	0.01	0.03	0.03	737.88	0.01	0.71
Dump/Haul Truck	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	49	2	1.29	7.21	12.91	0.01	0.03	0.03	1469.50	0.06	1.23
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Semi Tractor with Trailer	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0135	0.0756	0.1230	0.0001	0.0003	0.000265501	15.0	0.0150	0.0117	4	2	0.11	0.61	0.98	0.00	0.00	0.00	119.96	0.12	0.09
Vacuum Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	7	2	0.06	0.68	2.27	0.00	0.01	0.01	224.57	0.00	0.22
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	7	10	0.30	3.42	11.34	0.01	0.04	0.04	1122.86	0.01	1.08
Cleaning and Proving Ducts																								
Flatbed Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	3	2	0.03	0.29	0.97	0.00	0.00	0.00	96.25	0.00	0.09
Cabling																								
Aerial Bucket Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	3	2	0.03	0.29	0.92	0.00	0.00	0.00	95.08	0.00	0.09
Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	9	2	0.08	0.88	2.76	0.00	0.01	0.01	285.24	0.00	0.26
Flatbed Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	6	2	0.05	0.59	1.84	0.00	0.01	0.01	190.16	0.00	0.17
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	6	2	0.05	0.59	1.84	0.00	0.01	0.01	190.16	0.00	0.17
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	3	2	0.03	0.29	0.92	0.00	0.00	0.00	95.08	0.00	0.09
Tool Van	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	3	2	0.03	0.29	0.92	0.00	0.00	0.00	95.08	0.00	0.09
Semi Tractor with Trailer	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0135	0.0756	0.1230	0.0001	0.0003	0.000265501	15.0	0.0150	0.0117	9	2	0.24	1.36	2.21	0.00	0.01	0.00	269.91	0.27	0.21
Simultaneous Construction Equipment															33.69	192.52	270.50	0.34	13.19	11.74	32086.86	3.12	25.70	

Table A-5-Q3
 Construction and Operational Truck Trip Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment B

Table A-5-Q3. 2016 Maximum Daily Construction Emissions, Construction Truck Trips, Segment B

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10		PM2.5			CO2	CH4	N2O	Emissions, lbs/day											
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Excavate and Install Vaults and Trench																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	6	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.08	0.13	0.02	0.00	0.03	0.02	0.17	0.04	65.59	#VALUE!	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	3	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.04	0.06	0.01	0.00	0.01	0.01	0.09	0.02	32.80	0.00	0.00
Concrete Trucks	Light Heavy Duty Truck, Diesel	23	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	1.25	4.67	0.26	0.00	0.21	0.12	1.00	0.24	767.02	0.04	0.02
Dump Truck	Heavy Duty Truck, Diesel	49	30	60	1.111513533	5.1835677	0.300386954	0.0107118	0.069818	0.035999812	0.061739677	0.0642326	0.008999953	0.026459862	1807.6693	0.103295646	0.05	7.20	33.60	1.95	0.07	1.09	0.65	4.24	1.04	11716.63	0.67	0.30
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.00	0.00	33.35	0.00	0.00
Tractor/Trailer Truck	Heavy Duty Truck, Diesel	4	30	60	1.111513533	5.1835677	0.300386954	0.0107118	0.069818	0.035999812	0.061739677	0.0642326	0.008999953	0.026459862	1807.6693	0.103295646	0.05	0.59	2.74	0.16	0.01	0.09	0.05	0.35	0.09	956.46	0.05	0.02
Vacuum Truck	Light Heavy Duty Truck, Diesel	7	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.38	1.42	0.08	0.00	0.07	0.04	0.00	0.00	233.44	0.01	0.01
Water Truck	Light Heavy Duty Truck, Diesel	7	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.38	1.42	0.08	0.00	0.07	0.04	0.00	0.00	233.44	0.01	0.01
Subtotal																	9.98	44.25	2.57	0.08	1.57	0.92	5.85	1.44	14038.73	#VALUE!	0.36	
Cleaning and Proving Ducts																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.06	0.01	21.86	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	1	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.03	0.01	10.93	0.00	0.00
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.00	0.00	22.23	0.00	0.00
Line Trucks	Light Heavy Duty Truck, Diesel	3	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.16	0.61	0.03	0.00	0.03	0.02	0.13	0.03	100.05	0.01	0.00
Subtotal																	0.24	0.81	0.05	0.00	0.05	0.03	0.22	0.05	155.07	0.01	0.00	
Cabling																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	12	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.16	0.25	0.03	0.00	0.05	0.04	0.35	0.09	131.18	0.01	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	9	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.12	0.19	0.03	0.00	0.04	0.03	0.26	0.06	98.39	0.01	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Diesel	3	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.09	0.02	66.70	0.00	0.00
Boom Truck	Light Heavy Duty Truck, Diesel	9	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.33	1.22	0.07	0.00	0.06	0.03	0.26	0.06	200.09	0.01	0.01
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	6	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.22	0.81	0.05	0.00	0.04	0.02	0.17	0.04	133.40	0.01	0.00
Line Truck	Light Heavy Duty Truck, Diesel	6	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.22	0.81	0.05	0.00	0.04	0.02	0.17	0.04	133.40	0.01	0.00
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	3	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.09	0.02	66.70	0.00	0.00
Tool Van	Light Heavy Duty Truck, Diesel	3	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.09	0.02	66.70	0.00	0.00
Tractor/Trailer Truck	Heavy Duty Truck, Diesel	9	30	60	1.111513533	5.1835677	0.300386954	0.0107118	0.069818	0.035999812	0.061739677	0.0642326	0.008999953	0.026459862	1807.6693	0.103295646	0.05	1.32	6.17	0.36	0.01	0.20	0.12	0.78	0.19	2152.03	0.12	0.06
Subtotal																	2.69	10.68	0.65	0.02	0.48	0.28	2.25	0.55	3048.58	0.17	0.08	
Simultaneous Construction Trucks																												
																	12.91	55.74	3.27	0.11	2.09	1.23	8.32	2.04	17242.39	#VALUE!	0.44	

Table A-6-Q3. 2016 Maximum Daily Construction Emissions, Worker Trips, Segment B

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)
Excavate and Install Trench and Ducts	Light-Duty Truck, catalyst	49	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.00571499	0.00321577	0.0291986	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.02209593	0.01	0.00972228
Cleaning and Proving Ducts	Light-Duty Truck, catalyst	21	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.00571499	0.00321577	0.0291986	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.02209593	0.01	0.00972228
Cabling	Light-Duty Truck, catalyst	30	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.00571499	0.00321577	0.0291986	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.02209593	0.01	0.00972228

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
 Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Excavate and Install Trench and Ducts	Light-Duty Truck, catalyst	49	35	80	23.80	2.14	2.47	0.04	0.42	0.18	0.72	0.18	2715.76	0.03	0.08
Cleaning and Proving Ducts	Light-Duty Truck, catalyst	21	35	80	10.20	0.92	1.06	0.02	0.18	0.08	0.31	0.08	1163.90	0.01	0.04
Cabling	Light-Duty Truck, catalyst	30	35	80	14.57	1.31	1.51	0.02	0.26	0.11	0.44	0.11	1662.71	0.02	0.05
Simultaneous Worker Trips					48.57	4.37	5.05	0.07	0.85	0.37	1.47	0.36	5542.36	0.06	0.17

Table A-7-Q3
 Fugitive Dust Emission Calculations
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment B

Table A-7-Q3. 2016 Maximum Daily Construction Emissions, Fugitive Dust, Segment B

Excavation and Install Vaults and Trench

Earthmoving - Material Handling

Emission Factor from SCAQMD CEQA Air Quality Handbook, Table A9-9-G

$$E = [0.00112 \times \{ \{ [G/5]^{1.3} \} / \{ [H/2]^{1.4} \} \}] \times [I/J]$$

where

G = Mean wind speed in miles per hour- based on data from the website below, assuming a maximum wind speed of 12 mph

H = Moisture content of surface material, assumed to be 2%

I = Pounds of overburden handled per day

J = lbs/ton, 2000

Assume 12 miles per hour daily maximum wind speed

Assume H = 2.0% moisture - unmitigated

Assume 61% control efficiency for watering 3 times/day

I = 16,200 cubic yards x 1600 lbs/cubic yard = 12960 tons of material

Assume earthmoving occurs over 30 days, maximum per day could be 10 x daily average

PM10

Unmitigated	Mitigated	Unit
15.0999804	5.888992358	lbs/day
0.00791025	0.003084999	total tons

$$E = [0.00112 \times \{ \{ [G/5]^{1.3} \} / \{ [H/2]^{1.4} \} \}] \times [I/J] =$$

PM2.5

Unmitigated	Mitigated	Unit
3.17099589	1.236688395	lbs/day
0.00166115	0.00064785	total tons

NOTE: PM2.5 is assumed to be 21% of PM10 based on SCAQMD's Final –Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds (October 2006)

Table A-8-Q3
Construction Heavy Equipment Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment C

Table A-8-Q3. 2016 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment C

Equipment/Phase	Source	FUEL	HP	Load Factor	Emission Factors									Emissions										
					ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Foundation Construction																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	3	10	1.84	9.16	13.17	0.01	0.74	0.66	1407.25	0.17	1.25
Drill Rig	CalEEMod User's Guide, Appendix D, 2016 Bore/Drill Rigs, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	82	0.5	0.0006	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0002	0.0011	1	10	0.23	3.34	4.81	0.01	0.27	0.24	513.69	0.08	0.46
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	1	10	0.93	3.34	4.34	0.00	0.37	0.33	463.57	0.04	0.41
On-Road Certified Truck Emissions																								
Foundation Construction																								
2-ton Flatbed Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	1	2	0.01	0.10	0.31	0.00	0.00	0.00	31.69	0.00	0.03
Crane Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Dump/Haul Truck	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	1	2	0.03	0.15	0.26	0.00	0.00	0.00	29.99	0.00	0.03
Flatbed Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	6	10	0.26	2.93	9.72	0.01	0.04	0.03	962.45	0.01	0.92
Simultaneous Construction Equipment																3.33	19.32	33.59	0.04	1.42	1.27	3504.88	0.31	3.19

Table A-9-Q3
 Construction and Operational Truck Trip Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment C

Table A-9-Q3. 2016 Maximum Daily Construction Emissions, Construction Truck Trips, Segment C

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10		PM2.5			CO2	CH4	N2O	Emissions, lbs/day											
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Foundation Construction																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	4	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.00199999	0.01574992	247.93302	0.014167636	0.01	0.05	0.08	0.01	0.00	0.02	0.01	0.12	0.03	43.73	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	7	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.00199999	0.01574992	247.93302	0.014167636	0.01	0.09	0.15	0.02	0.00	0.03	0.02	0.20	0.05	76.52	0.00	0.00
2-ton Flatbed Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.00	0.00	22.23	0.00	0.00
Crane Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.00	0.00	22.23	0.00	0.00
Dump Truck	Heavy Duty Truck, Diesel	1	30	60	1.111513533	5.1835677	0.300386954	0.0107118	0.069818	0.035999812	0.061739677	0.0642326	0.008999953	0.026459862	1807.6693	0.103295646	0.05	0.15	0.69	0.04	0.00	0.02	0.01	0.09	0.02	239.11	0.01	0.01
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.00	0.00	22.23	0.00	0.00
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.00	0.00	33.35	0.00	0.00
Water Truck	Light Heavy Duty Truck, Diesel	6	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.33	1.22	0.07	0.00	0.06	0.03	0.00	0.00	200.09	0.01	0.01
Subtotal																	0.78	2.75	0.17	0.00	0.15	0.09	0.40	0.10	659.51	0.04	0.02	
Simultaneous Construction Trucks																	0.78	2.75	0.17	0.00	0.15	0.09	0.40	0.10	659.51	0.04	0.02	

Table A-10-Q3. 2016 Maximum Daily Construction Emissions, Worker Trips, Segment C

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)
Foundation Construction	Light-Duty Truck, catalyst	10	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.00571499	0.00321577	0.0291986	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.02209593	0.01	0.00972228

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
 Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Foundation Construction	Light-Duty Truck, catalyst	10	35	80	4.86	0.44	0.50	0.01	0.09	0.04	0.15	0.04	554.24	0.01	0.02
Simultaneous Worker Trips					4.86	0.44	0.50	0.01	0.09	0.04	0.15	0.04	554.24	0.01	0.02

Table A-11-Q3
 Construction Heavy Equipment Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment B

Table A-11-Q3. 2017 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment B

Equipment/Phase	Source	FUEL	HP	Load Factor	Emission Factors										Emissions														
					ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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					
OFFROAD Equipment																													
Cabling																													
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	6	10	3.68	18.32	26.35	0.03	1.49	1.32	2814.50	0.33	2.50					
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	3	5	0.96	8.02	8.92	0.01	0.33	0.29	1231.72	0.09	0.85					
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	3	10	2.80	10.03	13.02	0.01	1.10	0.98	1390.71	0.13	1.24					
Pulling Rig	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	1.3	0.0001	0.0009	9	6	3.32	31.64	35.17	0.05	1.88	1.67	4859.06	0.30	3.34					
On-Road Certified Truck Emissions																													
Cable Pulling																													
Aerial Bucket Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	3	6	0.08	0.88	2.76	0.00	0.01	0.01	285.24	0.00	0.26					
Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	9	6	0.23	2.63	8.27	0.01	0.03	0.03	855.72	0.01	0.79					
Flatbed Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	6	6	0.15	1.76	5.51	0.01	0.02	0.02	570.48	0.01	0.52					
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	6	6	0.15	1.76	5.51	0.01	0.02	0.02	570.48	0.01	0.52					
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	3	6	0.08	0.88	2.76	0.00	0.01	0.01	285.24	0.00	0.26					
Tool Van	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	3	6	0.08	0.88	2.76	0.00	0.01	0.01	285.24	0.00	0.26					
Semi Tractor with Trailer	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0135	0.0756	0.1230	0.0001	0.0003	0.000265501	15.0	0.0150	0.0117	9	2	0.24	1.36	2.21	0.00	0.01	0.00	269.91	0.27	0.21					
Simultaneous Construction Equipment																11.78	78.15	113.23	0.14	4.89	4.36	13418.28	1.15	10.76					

Equipment amounts tripled to account for three crews

Table A-13-Q3. 2017 Maximum Daily Construction Emissions, Worker Trips, Segment B

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)
Cabling	Light-Duty Truck, catalyst	30	35	80	2.153833594	31.42447989	0.20522395	1.813681924	0.048783653	2.394636679	1.621971672	0.707094998	0.16038404	0.714647031	0.004127654	0.005714994	0.003035358	0.029198634	0.007999958	0.036749816	0.002803369	0.026884174	0.001999999	0.01574992	297.39552	448.5481762	0.0028329	0.022095932	0.01	0.009722282

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

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Cabling	Light-Duty Truck, catalyst	30	35	80	13.47	1.21	1.47	0.02	0.25	0.11	0.44	0.11	1603.22	0.02	0.05
Simultaneous Worker Trips		30			13.47	1.21	1.47	0.02	0.25	0.11	0.44	0.11	1603.22	0.02	0.05

Table A-14-Q3. 2016 Maximum Daily Construction Emissions, Worker Trips, Segment C

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)
Cleanup and Restoration	Light-Duty Truck, catalyst	12	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.005714994	0.00321577	0.02919863	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.022095932	0.01	0.009722282

EMFAC2011 emission factors for 2016
 Assume startup after 8 hours

Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day											
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O	
Cleanup and Restoration	Light-Duty Truck, catalyst	12	35	80	5.83	0.52	0.61	0.01	0.10	0.04	0.18	0.04	0.04	665.08	0.01	0.02
Simultaneous Worker Trips		12			5.83	0.52	0.61	0.01	0.10	0.04	0.18	0.04	0.04	665.08	0.01	0.02

Table A-15-Q3
 Unmitigated Construction Emissions Summary
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-15-Q3. Maximum Daily Unmitigated Construction Emissions, Summary, Alternative Q3

2016	Maximum Daily Construction Emissions, lbs/day					
Segment A	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	4.03	22.71	34.27	0.04	1.43	1.27
Construction Truck Trips	0.14	0.63	2.23	0.00	0.48	0.16
Worker Trips	1.06	10.20	0.92	0.02	0.49	0.15
Helicopter	1.03	4.50	4.50	0.31	3.25	3.25
Total	6.26	38.03	41.92	0.37	5.65	4.84
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	33.69	192.52	270.50	0.34	13.19	11.74
Construction Truck Trips	3.27	12.91	55.74	0.11	10.41	3.27
Worker Trips	5.05	48.57	0.92	0.07	2.32	0.73
Fugitive Dust (Unmitigated)					15.10	3.17
Total	42.01	254.00	327.15	0.51	41.01	18.92
Segment C	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	3.33	19.32	33.59	0.04	1.42	1.27
Construction Truck Trips	0.17	0.78	2.75	0.00	0.56	0.19
Worker Trips	0.50	4.86	0.44	0.01	0.23	0.07
Total	4.01	24.96	36.77	0.05	2.21	1.53
Maximum Daily Emissions, 2016	52.28	316.99	405.84	0.94	48.88	25.29
2017	Maximum Daily Construction Emissions, lbs/day					
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	11.78	78.15	113.23	0.14	4.89	4.36
Construction Truck Trips	0.65	2.69	10.68	0.02	1.33	0.47
Worker Trips	1.47	13.47	1.21	0.02	0.70	0.22
Total	13.89	94.31	125.11	0.18	6.92	5.05
Segment C	ROG	CO	NOx	SOx	PM10	PM2.5
Worker Trips	0.61	5.83	0.52	0.01	0.28	0.09
Total	0.61	5.83	0.52	0.01	0.28	0.09
Maximum Daily Emissions, 2017	14.50	100.14	125.63	0.19	7.20	5.13

Table A-16-Q3
 Mitigated Construction Emissions Summary
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-16-Q3. Maximum Daily Mitigated Construction Emissions, Summary, Alternative Q3

2016	Maximum Daily Construction Emissions, lbs/day					
Segment A	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	4.03	22.71	34.27	0.04	1.43	1.27
Construction Truck Trips	0.14	0.63	2.23	0.00	0.48	0.16
Worker Trips	1.06	10.20	0.92	0.02	0.49	0.15
Helicopter	1.03	4.50	4.50	0.31	3.25	3.25
Total	6.26	38.03	41.92	0.37	5.65	4.84
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	33.69	192.52	270.50	0.34	13.19	11.74
Construction Truck Trips	3.27	12.91	55.74	0.11	10.41	3.27
Worker Trips	5.05	48.57	0.92	0.07	2.32	0.73
Fugitive Dust (Mitigated)					5.89	1.24
Total	42.01	254.00	327.15	0.51	31.80	16.98
Segment C	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	3.33	19.32	33.59	0.04	1.42	1.27
Construction Truck Trips	0.17	0.78	2.75	0.00	0.56	0.19
Worker Trips	0.50	4.86	0.44	0.01	0.23	0.07
Total	4.01	24.96	36.77	0.05	2.21	1.53
Maximum Daily Emissions, 2016	52.28	316.99	405.84	0.94	39.66	23.36
2017	Maximum Daily Construction Emissions, lbs/day					
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	11.78	78.15	113.23	0.14	4.89	4.36
Construction Truck Trips	0.65	2.69	10.68	0.02	1.33	0.47
Worker Trips	1.47	13.47	1.21	0.02	0.70	0.22
Total	13.89	94.31	125.11	0.18	6.92	5.05
Segment C	ROG	CO	NOx	SOx	PM10	PM2.5
Worker Trips	0.61	5.83	0.52	0.01	0.28	0.09
Total	0.61	5.83	0.52	0.01	0.28	0.09
Maximum Daily Emissions, 2017	14.50	100.14	125.63	0.19	7.20	5.13

Table A-17-Q3. Helicopter Emissions

SX-PQ Transmission Project

Helicopter Model	Engine	Assumed Engine	Operating Mode	Fuel Flow, kg/s	Time in Mode, min	Emission Incides, g/kg fuel					Emissions, lbs/mode					Cruise Mode Emission factor, lbs/hour				
						CO	VOC	NOx	Sox	PM	CO	VOC	NOx	SOx	PM	CO	VOC	NOx	SOx	PM
Hughes 500E	Allison 250-C20B/R	250B17B	Taxi Out	0.008154	19	2.199837	23.004097	2.199837	0.4	4.2	0.045081939	0.471430067	0.045081939	0.008197324	0.086071898					
			Takeoff	0.031642	10.4	6.599994	0.402675	6.599994	0.4	4.2	0.287295342	0.017528297	0.287295342	0.017411855	0.182824475					
			Climbout	0.028926	0.09	5.981142	0.408337	5.981142	0.4	4.2	0.002059694	0.000140617	0.002059694	0.000137746	0.001446332	1.373129585	0.093744575	1.373129585	0.091830596	0.964221257
			Approach	0.010516	10.05	2.200637	5.988767	2.200637	0.4	4.2	0.03076471	0.083722432	0.03076471	0.005591965	0.058715628					
			Taxi In	0.008154	7	2.199837	23.004097	2.199837	0.4	4.2	0.016609136	0.173684761	0.016609136	0.003020067	0.031710699					
											Total per LTO	0.381810822	0.746506173	0.381810822	0.034358955	0.360769031				

* Fuel flow rates and EF's from Federal Aviation Administration, Emission and Dispersion Modeling System (EDMS)

* Time in mode based on default times in EDMS

Therefore

To calculate lbs/day

Component	Emissions (lb/day)				
	CO	HC	NO _x	SO _x	PM
LTO - light helicopter (Hughes 500)	0.382	0.747	0.382	0.034	0.361
Installation/Demolition - light helicopter, 3 hrs cruise	4.119	0.281	4.119	0.275	2.893
Total Light Helicopter	4.501	1.028	4.501	0.310	3.253
Total	4.501	1.028	4.501	0.310	3.253

Table A-18-Q3
Construction Heavy Equipment Annual
Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-18-Q3. Total Annual Emissions, Equipment

2016				Emission Factors						Emissions						
Equipment	FUEL	HP	Load Factor	ROG (lb/bhp-hr or lbs/hr)	CO (lb/bhp-hr or lbs/hr)	NOX (lb/bhp-hr or lbs/hr)	SOX (lb/bhp-hr or lbs/hr)	PM10 (lb/bhp-hr or lbs/hr)	PM2.5 (lb/bhp-hr or lbs/hr)	Total Use (Hours)	ROG, tons	CO tons	NOX tons	SOX tons	PM10 tons	PM2.5 tons
Total Equipment Use																
2-ton Flatbed Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	528	0.00	0.01	0.04	0.00	0.00	0.00
Aerial Bucket Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	968	0.00	0.02	0.08	0.00	0.00	0.00
Air Compressor	DIESEL	78	0.48	0.0016	0.0132	0.0117	0.0000	0.0013	0.001177249	7700	0.24	1.91	1.69	0.00	0.19	0.17
Backhoe	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	5060	0.12	0.74	0.95	0.00	0.06	0.05
Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	1012	0.00	0.02	0.08	0.00	0.00	0.00
Bulldozer	DIESEL	255	0.4	0.0013	0.0132	0.0117	0.0000	0.0013	0.001177249	2090	0.14	1.41	1.25	0.00	0.14	0.13
Concrete Saw	DIESEL	81	0.73	0.0014	0.0082	0.0104	0.0000	0.0007	0.000588624	3080	0.12	0.74	0.95	0.00	0.06	0.05
Concrete Trucks	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	4312	0.01	0.11	0.35	0.00	0.00	0.00
Crane Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	220	0.00	0.01	0.02	0.00	0.00	0.00
Crane	DIESEL	226	0.29	0.0010	0.0057	0.0091	0.0000	0.0003	0.000294312	3080	0.10	0.58	0.92	0.00	0.03	0.03
Drill Rig	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	1760	0.02	0.29	0.38	0.00	0.02	0.02
Dump/Haul Truck	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	9328	0.06	0.34	0.61	0.00	0.00	0.00
Flatbed Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	1056	0.00	0.03	0.09	0.00	0.00	0.00
Forklift	DIESEL	83	0.4	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	1980	0.05	0.43	0.39	0.00	0.04	0.04
Grader	DIESEL	174	0.41	0.0012	0.0132	0.0117	0.0000	0.0013	0.001177249	1100	0.05	0.52	0.46	0.00	0.05	0.05
Hydraulic Rock Splitter/Rock Drilling Equipment	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	440	0.01	0.07	0.09	0.00	0.01	0.01
Line Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	1232	0.00	0.03	0.10	0.00	0.00	0.00
Loader	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Mobile Fueling Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	968	0.00	0.02	0.08	0.00	0.00	0.00
Mower	DIESEL	25	0.42	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	1540	0.01	0.11	0.09	0.00	0.01	0.01
Paving Rig	DIESEL	82	0.36	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	3520	0.08	0.69	0.61	0.00	0.07	0.06
Generator	DIESEL	50	0.74	0.0013	0.0082	0.0117	0.0000	0.0007	0.000588624	6380	0.15	0.96	1.38	0.00	0.08	0.07
Skid-Steer Loader	DIESEL	78	0.37	0.0016	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Wire Puller	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	4400	0.14	1.29	1.43	0.00	0.08	0.07
Wire Tensioner	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	1100	0.03	0.32	0.36	0.00	0.02	0.02
Tool Van	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	484	0.00	0.01	0.04	0.00	0.00	0.00
Semi Tractor with Trailer	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	1672	0.01	0.06	0.11	0.00	0.00	0.00
Vacuum Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	704	0.00	0.02	0.06	0.00	0.00	0.00
Water Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	4884	0.01	0.12	0.40	0.00	0.00	0.00
Total											1.36	10.87	12.99	0.02	0.87	0.78

2017				Emission Factors						Emissions						
Equipment	FUEL	HP	Load Factor	ROG (lb/bhp-hr or lbs/hr)	CO (lb/bhp-hr or lbs/hr)	NOX (lb/bhp-hr or lbs/hr)	SOX (lb/bhp-hr or lbs/hr)	PM10 (lb/bhp-hr or lbs/hr)	PM2.5 (lb/bhp-hr or lbs/hr)	Total Use (Hours)	ROG, tons	CO tons	NOX tons	SOX tons	PM10 tons	PM2.5 tons
Total Equipment Use																
Construction Inspector																
2-ton Flatbed Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	0	0.00	0.00	0.00	0.00	0.00	0.00
Aerial Bucket Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	264	0.00	0.01	0.02	0.00	0.00	0.00
Air Compressor	DIESEL	78	0.48	0.0016	0.0132	0.0117	0.0000	0.0013	0.001177249	1100	0.03	0.27	0.24	0.00	0.03	0.02
Backhoe	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	660	0.00	0.02	0.05	0.00	0.00	0.00
Bulldozer	DIESEL	255	0.4	0.0013	0.0132	0.0117	0.0000	0.0013	0.001177249	0	0.00	0.00	0.00	0.00	0.00	0.00
Concrete Saw	DIESEL	81	0.73	0.0014	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Concrete Trucks	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	0	0.00	0.00	0.00	0.00	0.00	0.00
Crane Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	0	0.00	0.00	0.00	0.00	0.00	0.00
Crane	DIESEL	226	0.29	0.0010	0.0057	0.0091	0.0000	0.0003	0.000294312	550	0.02	0.10	0.16	0.00	0.01	0.01
Drill Rig	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Dump/Haul Truck	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	0	0.00	0.00	0.00	0.00	0.00	0.00
Flatbed Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	484	0.00	0.01	0.04	0.00	0.00	0.00
Forklift	DIESEL	83	0.4	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	1100	0.03	0.24	0.21	0.00	0.02	0.02
Grader	DIESEL	174	0.41	0.0012	0.0132	0.0117	0.0000	0.0013	0.001177249	0	0.00	0.00	0.00	0.00	0.00	0.00
Hydraulic Rock Splitter/Rock Drilling Equipment	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Line Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	484	0.00	0.01	0.04	0.00	0.00	0.00
Loader	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Mobile Fueling Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	220	0.00	0.01	0.02	0.00	0.00	0.00
Mower	DIESEL	25	0.42	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	0	0.00	0.00	0.00	0.00	0.00	0.00
Paving Rig	DIESEL	82	0.36	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	0	0.00	0.00	0.00	0.00	0.00	0.00
Generator	DIESEL	50	0.74	0.0013	0.0082	0.0117	0.0000	0.0007	0.000588624	1320	0.03	0.20	0.29	0.00	0.02	0.01
Skid-Steer Loader	DIESEL	78	0.37	0.0016	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Wire Puller	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	3300	0.10	0.97	1.07	0.00	0.06	0.05
Wire Tensioner	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	0	0.00	0.00	0.00	0.00	0.00	0.00
Tool Van	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	220	0.00	0.01	0.02	0.00	0.00	0.00
Semi Tractor with Trailer	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	704	0.00	0.03	0.05	0.00	0.00	0.00
Water Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	220	0.00	0.01	0.02	0.00	0.00	0.00
Total											1.59	1.87	2.23	0.00	0.13	0.12

Table A-19-Q3
Construction Truck Trip Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-19-Q3. Total Emissions, Construction Truck Trips

		2016		Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10				PM2.5			Emissions, tons																	
Vehicle	Vehicle Class	Number of equipment days used	Running Exhaust (g/mi)							Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5								
																											CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5
2-ton Flatbed Truck	Light Heavy Duty Truck, Dese	264	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.03	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	0.00	0.00	0.00	
Aerial Bucket Truck	Light Heavy Duty Truck, Dese	484	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.02	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	0.00	0.00	0.00	0.00	
Boom Truck	Light Heavy Duty Truck, Dese	506	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.02	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	0.00	0.00	0.00	0.00	0.00
Concrete Trucks	Light Heavy Duty Truck, Dese	2156	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.07	0.26	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	0.00	0.00	0.00	0.00
Crane Truck	Light Heavy Duty Truck, Dese	110	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	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	0.00	0.00	0.00	0.00	0.00
Drill Rig/Truck Mounted Auger	Light Heavy Duty Truck, Dese	440	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.05	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	0.00	0.00	0.00	0.00
Dump Truck	Heavy Duty Truck, Diesel	4664	30	35.7	1.111513533	5.183568	0.30038695	0.010712	0.069818	0.03599981	0.06173968	0.064233	0.009	0.0264599	0.20	0.95	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	0.00	0.00	0.00	
Flatbed Boom Truck	Light Heavy Duty Truck, Dese	528	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.02	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	0.00	0.00	0.00	0.00	0.00
Line Truck	Light Heavy Duty Truck, Dese	616	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.02	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	0.00	0.00	0.00	0.00	0.00
Mobile Fueling Truck	Light Heavy Duty Truck, Dese	484	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.02	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	0.00	0.00	0.00	0.00	0.00
Pick-Up Trucks	Light Duty Truck 1, Diesel	9108	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	0.11	0.17	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	0.00	0.00	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	4884	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	0.06	0.09	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	0.00	0.00	0.00	0.00
Tool Van	Light Duty Truck 1, Diesel	242	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	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	0.00	0.00	0.00	0.00	0.00	0.00
Semi Tractor with Trailer	Heavy Duty Truck, Diesel	836	30	35.7	1.111513533	5.183568	0.30038695	0.010712	0.069818	0.03599981	0.06173968	0.064233	0.009	0.0264599	0.04	0.17	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	0.00	0.00	0.00	0.00
Vacuum Truck	Light Heavy Duty Truck, Dese	352	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.04	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	0.00	0.00	0.00	0.00
Water Truck	Light Heavy Duty Truck, Dese	2442	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.08	0.30	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	0.00	0.00	0.00	
Total															0.68	2.40	0.03	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	0.00		

		2017		Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10				PM2.5			Emissions, tons																	
Vehicle	Vehicle Class	Number of equipment days used	Running Exhaust (g/mi)							Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5								
																											CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5
2-ton Flatbed Truck	Light Heavy Duty Truck, Dese	0	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	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	0.00	0.00	0.00	0.00	0.00	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Dese	132	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	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	0.00	0.00	0.00	0.00	0.00
Boom Truck	Light Heavy Duty Truck, Dese	330	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.04	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	0.00	0.00	0.00	0.00
Concrete Trucks	Light Heavy Duty Truck, Dese	0	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	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	0.00	0.00	0.00	0.00	0.00	0.00
Crane Truck	Light Heavy Duty Truck, Dese	0	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	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	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig/Truck Mounted Auger	Light Heavy Duty Truck, Dese	0	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	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	0.00	0.00	0.00	0.00	0.00	0.00
Dump Truck	Heavy Duty Truck, Diesel	0	30	35.7	1.111513533	5.183568	0.30038695	0.010712	0.069818	0.03599981	0.06173968	0.064233	0.009	0.0264599	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	0.00	0.00	0.00	0.00	0.00	0.00
Flatbed Boom Truck	Light Heavy Duty Truck, Dese	242	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.03	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	0.00	0.00	0.00	0.00
Line Truck	Light Heavy Duty Truck, Dese	242	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.03	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	0.00	0.00	0.00	0.00
Mobile Fueling Truck	Light Heavy Duty Truck, Dese	110	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	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	0.00	0.00	0.00	0.00	0.00
Pick-Up Trucks	Light Duty Truck 1, Diesel	6072	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	0.07	0.11	0.02	0.00	0.00	0.00	0.0													

Table A-20-Q3. 2016 Construction Emissions, Worker Trips

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	CO		NO _x		ROG					SO _x		PM10				PM2.5				
						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)
All	Light-Duty Truck, catalyst	199	152	35	80	2.361162	31.42448	0.224936	1.8136819	0.057965	2.3946367	1.6219719	0.707095	0.16038404	0.71464703	0.004128	0.00571499	0.003216	0.0291986	0.008	0.03675	0.002961	0.0268842	0.002	0.01575

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
 Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	Emissions, tons							
						CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5
All	Light-Duty Truck, catalyst	199	152	35	80	7.35	0.66	0.34	0.01	0.13	0.06	0.22	0.05
Total						7.35	0.66	0.34	0.01	0.13	0.06	0.22	0.05

Table A-21-Q3. 2017 Construction Emissions, Worker Trips

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	CO		NO _x		ROG					SO _x		PM10				PM2.5				
						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)
All	Light-Duty Truck, catalyst	18	107	35	80	2.153834	31.4244799	0.205224	1.8136819	0.048784	2.39463668	1.62197187	0.707094998	0.16038404	0.714647031	0.004128	0.00571499	0.003035	0.02919863	0.008	0.03675	0.002803	0.0268842	0.002	0.01575

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	Emissions, tons								Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5
						CO	NO _x	VOCs	SO _x	PM10	PM2.5				
All	Light-Duty Truck, catalyst	18	107	35	80	0.43	0.04	0.02	0.00	0.01	0.00	0.01	0.00	0.01	0.00
						0.43	0.04	0.02	0.00	0.01	0.00	0.01	0.00	0.01	0.00

Table A-22-Q3
 Fugitive Dust Emission Calculations
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment A

Table A-22-Q3. 2016 Fugitive Dust, Segment A

Cleanup and Restoration

Grading - Bulldozer Operations

Emission factor from SCAQMD CEQA Air Quality Handbook, Table A9-9-F

$$E = ([0.45 \times \{([G]^{1.5})/([H]^{1.4})\}] \times I) \times J$$

where

G = silt content of material in percent, assumed to be 7.5%

Assume H = 2.0% moisture - unmitigated

Assume 61% control efficiency for watering 3 times/day

I = 2.2046 lb/kg

J = hours of bulldozing operations, based on construction scenario, 8 hrs/day for 25 days

$$E = ([0.45 \times \{([G]^{1.5})/([H]^{1.4})\}] \times I) \times J =$$

PM10

Unmitigated	Mitigated	Unit
61.77065479	24.09055537	lbs/day
0.772133185	0.301131942	total tons

PM2.5

Unmitigated	Mitigated	Unit
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Table A-23-Q3
 Unmitigated Construction Emissions Summary
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-23-Q3. Annual Unmitigated Construction Emissions, Summary

2016	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	1.36	10.87	12.99	0.02	0.87	0.78
Construction Truck Trips	0.16	0.68	2.40	0.01	0.64	0.21
Worker Trips	0.34	7.35	0.66	0.01	0.35	0.11
Helicopter	0.03	0.15	0.15	0.01	0.11	0.11
Fugitive Dust (Unmitigated)					61.77	12.97
Total	1.89	19.04	16.21	0.04	63.74	14.17

2017	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	1.59	1.87	2.23	0.00	0.13	0.12
Construction Truck Trips	0.03	0.14	0.30	0.00	0.14	0.05
Worker Trips	0.02	0.43	0.04	0.00	0.02	0.01
Total	1.64	2.45	2.58	0.00	0.30	0.18

Table A-24-Q3
 Mitigated Construction Emissions Summary
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-24-Q3. Annual Mitigated Construction Emissions, Summary

2016	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	1.36	10.87	12.99	0.02	0.87	0.78
Construction Truck Trips	0.16	0.68	2.40	0.01	0.64	0.21
Worker Trips	0.34	7.35	0.66	0.01	0.35	0.11
Helicopter	0.03	0.15	0.15	0.01	0.11	0.11
Fugitive Dust (Mitigated)					24.09	5.06
Total	1.89	19.04	16.21	0.04	26.06	6.26

2017	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	1.59	1.87	2.23	0.00	0.13	0.12
Construction Truck Trips	0.03	0.14	0.30	0.00	0.14	0.05
Worker Trips	0.02	0.43	0.04	0.00	0.02	0.01
Total	1.64	2.45	2.58	0.00	0.30	0.18

Table A-25-Q3
ARB and USEPA Off-Road Engine Standards
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-25-Q3. ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards (NMHC+NOx/CO/PM in g/bhp-hr). When ARB and USEPA standards differ, the standards shown here represent the more stringent of the two.

Maximum horsepower	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015+
<11	See Table 2 footnote (a)					7.8 / 6.0 / 0.75			5.6 / 6.0 / 0.6			5.6 / 6.0 / 0.30 ^a									
11hp<25						7.1 / 4.9 / 0.60			5.6 / 4.9 / 0.60			5.6 / 4.9 / 0.30									
25hp<50	-					7.1 / 4.1 / 0.60			5.6 / 4.1 / 0.45			5.6 / 4.1 / 0.22			3.5 / 4.1 / 0.02						
50hp<75									5.6 / 3.7 / 0.30			3.5 / 3.7 / 0.22 ^c			3.5 / 3.7 / 0.02 ^c						
75hp<100						- / 6.9 / - / - ^b						3.5 / 3.7 / 0.30			0.14 / 2.5 / 3.7 / 0.015 ^{b,d}		0.14 / 0.30 / 3.7 / 0.015 ^b				
100hp<175									4.9 / 3.7 / 0.22			3.0 / 3.7 / 0.22									
175hp<300									4.9 / 2.6 / 0.15						0.14 / 1.5 / 2.6 / 0.015 ^{b,d}		0.14 / 0.30 / 2.2 / 0.015 ^b				
300hp<600	-	1.0 / 6.9 / 8.5 / 0.40 ^b							4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^e									
600hp@750																					
Mobile Machines > 750hp															0.30 / 2.6 / 2.6 / 0.07 ^b		0.14 / 2.6 / 2.6 / 0.03 ^b				
750hp<GEN @1200hp						1.0 / 6.9 / 8.5 / 0.40 ^b						4.8 / 2.6 / 0.15					0.14 / 0.50 / 2.6 / 0.02 ^b				
GEN>1200 hp															0.30 / 0.50 / 2.6 / 0.07 ^b						

- a) The PM standard for hand-start, air cooled, direct injection engines below 11 hp may be delayed until 2010 and be set at 0.45 g/bhp-hr.
- b) Standards given are NMHC/NOx/CO/PM in g/bhp-hr.
- c) Engine families in this power category may alternately meet Tier 3 PM standards (0.30 g/bhp-hr) from 2008-2011 in exchange for introducing final PM standards in 2012.
- d) The implementation schedule shown is the three-year alternate NOx approach. Other schedules are available.
- e) Certain manufacturers have agreed to comply with these standards by 2005.

: Tier 1
 : Tier 2
 : Tier 3
 : Tier 4 Interim / Final

Table A-25-Q3
 ARB and USEPA Off-Road Engine Standards
 Sycamore to Peñasquitos 230 kV Transmission Line Project

	TIER 2 Emission Factors					
	NOx		CO		PM	
	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr
Maximum horsepower						
<11	5.32	0.0117284	6	0.0132275	0.6	0.0013228
11@hp<25	5.32	0.0117284	4.9	0.0108025	0.6	0.0013228
25@hp<50	5.32	0.0117284	4.1	0.0090388	0.45	0.0009921
50@hp<75	5.32	0.0117284	3.7	0.008157	0.3	0.0006614
75@hp<100	5.32	0.0117284	3.7	0.008157	0.3	0.0006614
100@hp<175	4.655	0.0102623	3.7	0.008157	0.22	0.000485
175@hp<300	4.655	0.0102623	2.6	0.0057319	0.15	0.0003307
300@hp<600	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
600@hp@750	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
Mobile Machines > 750hp	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
750hp<GEN @1200hp	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
GEN>1200 hp	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307

TIER 3 Emission Factors					
NOx		CO		PM	
g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr
5.32	0.0117284	6	0.0132275	0.6	0.0013228
5.32	0.0117284	4.9	0.0108025	0.6	0.0013228
5.32	0.0117284	4.1	0.0090388	0.45	0.0009921
5.32	0.0117284	3.7	0.008157	0.3	0.0006614
3.325	0.0073302	3.7	0.008157	0.3	0.0006614
2.85	0.0062831	3.7	0.008157	0.22	0.000485
2.85	0.0062831	2.6	0.0057319	0.15	0.0003307
2.85	0.0062831	2.6	0.0057319	0.15	0.0003307
2.85	0.0062831	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307

Composite Emission Factors - 70% Tier 2, 30% Tier 3		
NOx	CO	PM
lb/bhp-hr	lb/bhp-hr	lb/bhp-hr
0.011728395	0.013227513	0.001323
0.011728395	0.010802469	0.001323
0.011728395	0.009038801	0.000992
0.011728395	0.008156966	0.000661
0.010408951	0.008156966	0.000661
0.009068563	0.008156966	0.000485
0.009068563	0.005731922	0.000331
0.008921958	0.005731922	0.000331
0.008921958	0.005731922	0.000331
0.01005291	0.005731922	0.000331
0.01005291	0.005731922	0.000331
0.01005291	0.005731922	0.000331
0.01005291	0.005731922	0.000331

% reduction from TIER 2 to TIER 3		
NOx	CO	PM
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
37.50%	0.00%	0.00%
38.78%	0.00%	0.00%
38.78%	0.00%	0.00%
37.50%	0.00%	0.00%
37.50%	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%

 : Tier 2

 : Tier 3

Table B-1-Q3
Construction Heavy Equipment GHG Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-1-Q3. Total GHG Emissions, Equipment

Equipment	Emission Factors						Emissions			
	FUEL	HP	Load Factor	CO2 (lb/bhp-hr or lbs/hr)	CH4 (lb/bhp-hr or lbs/hr)	N2O (lb/bhp-hr or lbs/hr)	Total Use (Hours)	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)
Total Equipment Use										
2-ton Flatbed Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	528	3.84	0.00	0.00
Aerial Bucket Truck	DIESEL	175	0.38	16.0	0.0002	0.0009	1232	8.96	0.00	0.00
Air Compressor	DIESEL	78	0.48	1.3	0.0001	0.0010	8800	187.24	0.02	0.15
Backhoe	DIESEL	97	0.37	1.3	0.0001	0.0010	5060	103.21	0.01	0.08
Boom Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	1672	12.17	0.00	0.01
Bulldozer	DIESEL	255	0.4	1.3	0.0001	0.0009	2090	121.15	0.01	0.08
Concrete Saw	DIESEL	81	0.73	1.3	0.0001	0.0010	3080	103.50	0.01	0.08
Concrete Trucks	DIESEL	175	0.38	16.0	0.0002	0.0154	4312	31.37	0.00	0.03
Crane Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	220	1.60	0.00	0.00
Crane	DIESEL	226	0.29	1.3	0.0001	0.0009	3630	135.21	0.01	0.09
Drill Rig	DIESEL	82	0.5	1.3	0.0002	0.0010	1760	41.01	0.01	0.03
Dump/Haul Truck	DIESEL	400	0.38	15.0	0.0006	0.0125	9328	63.45	0.00	0.05
Flatbed Boom Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	1540	11.21	0.00	0.01
Forklift	DIESEL	83	0.4	1.3	0.0001	0.0010	3080	58.11	0.01	0.05
Grader	DIESEL	174	0.41	1.3	0.0001	0.0009	1100	44.60	0.00	0.03
Hydraulic Rock Splitter/Rock Drilling Equipment	DIESEL	82	0.5	1.3	0.0002	0.0010	440	10.25	0.00	0.01
Line Truck	DIESEL	175	0.38	16.0	0.0001	0.0009	1716	12.49	0.00	0.00
Loader	DIESEL	97	0.37	1.3	0.0001	0.0010	0	0.00	0.00	0.00
Mobile Fueling Truck	DIESEL	175	0.38	16.0	0.0001	0.0009	1188	8.64	0.00	0.00
Mower	DIESEL	25	0.42	1.3	0.0001	0.0011	1540	9.19	0.00	0.01
Paving Rig	DIESEL	82	0.36	1.3	0.0002	0.0010	3520	59.05	0.01	0.05
Generator	DIESEL	50	0.74	1.3	0.0001	0.0011	7700	161.91	0.01	0.14
Skid-Steer Loader	DIESEL	78	0.37	1.3	0.0001	0.0010	0	0.00	0.00	0.00
Wire Puller	DIESEL	171	0.42	1.3	0.0001	0.0009	7700	314.28	0.02	0.22
Wire Tensioner	DIESEL	171	0.42	1.3	0.0001	0.0009	1100	44.90	0.00	0.03
Tool Van	DIESEL	175	0.38	16.0	0.0002	0.0154	704	5.12	0.00	0.00
Semi Tractor with Trailer	DIESEL	400	0.38	15.0	0.0150	0.0125	2376	16.16	0.02	0.01
Water Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	924	6.72	0.00	0.01
Total								1575.34	0.15	1.19

Table B-2-Q3
 Construction and Operational Truck Trip GHG Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-2-Q3. Total GHG Emissions, Construction Truck Trips

Vehicle	Vehicle Class	Number of days used	Speed (mph)	VMT (mi/vehicle-day)	CO2	CH4	N2O	Emissions, metric tons		
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO2	CH4	N2O
2-ton Flatbed Truck	Light Heavy Duty Truck, Diesel	264	30	20	504.222339	0.02881278	0.01	2.66	0.00	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Diesel	616	30	20	504.222339	0.02881278	0.01	6.21	0.00	0.00
Boom Truck	Light Heavy Duty Truck, Diesel	836	30	20	504.222339	0.02881278	0.01	8.43	0.00	0.00
Concrete Trucks	Light Heavy Duty Truck, Diesel	2156	30	30	504.222339	0.02881278	0.01	32.61	0.00	0.00
Crane Truck	Light Heavy Duty Truck, Diesel	110	30	20	504.222339	0.02881278	0.01	1.11	0.00	0.00
Drill Rig/Truck Mounted Auger	Light Heavy Duty Truck, Diesel	440	30	20	504.222339	0.02881278	0.01	4.44	0.00	0.00
Dump Truck	Heavy Duty Truck, Diesel	4664	30	60	1807.66928	0.10329565	0.05	505.87	0.03	0.01
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	770	30	20	504.222339	0.02881278	0.01	7.77	0.00	0.00
Line Truck	Light Heavy Duty Truck, Diesel	858	30	20	504.222339	0.02881278	0.01	8.65	0.00	0.00
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	594	30	30	504.222339	0.02881278	0.01	8.99	0.00	0.00
Pick-Up Trucks	Light Duty Truck 1, Diesel	15180	30	20	247.933018	0.01416764	0.01	75.27	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	8140	30	20	247.933018	0.01416764	0.01	40.36	0.00	0.00
Tool Van	Light Duty Truck 1, Diesel	352	30	20	247.933018	0.01416764	0.01	1.75	0.00	0.00
Semi Tractor with Trailer	Heavy Duty Truck, Diesel	836	30	60	1807.66928	0.10329565	0.05	90.67	0.01	0.00
Water Truck	Light Heavy Duty Truck, Diesel	352	30	30	504.222339	0.02881278	0.01	5.32	0.00	0.00
Total								800.12	0.05	0.02

Table B-3-Q3
 Construction and Operations Worker Commute GHG Emission Calculations
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-3-Q3. Total GHG Emissions, Worker Trips

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Number of Days	Speed (mph)	VMT (mi/vehicle-day)	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)
All	Light-Duty Truck, catalyst	217	166	35	80	297.39552	448.5481762	0.0028329	0.02209593	0.0085373	0.00972228

EMFAC2011 emission factors for 2016

Assume startup after 8 hours

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Number of Days	Speed (mph)	VMT (mi/vehicle-day)			
						CO2	CH4	N2O
All	Light-Duty Truck, catalyst	217	166	35	80	873.19	0.01	0.02
Total Worker Trips						873.19	0.01	0.02

Table B-4-Q3. Helicopter Emissions

Helicopter Model	Engine	Assumed Engine	Operating Mode	Fuel Flow (kg/s)	Time in Mode (min)	Emission Incides, g/kg fuel					Emissions, lbs/mode				Cruise Mode Emission factor, lbs/hour			
						CO	VOC	NOx	Sox	PM	CO	VOC	NOx	PM	CO	VOC	NOx	PM
Hughes 500E	Allison 250-C20B/R	250B17B	Taxi Out	0.008154	19	2.199837	23.004097	2.199837	1.292	4.2	0.045081939	0.471430067	0.045081939	0.086071898				
			Takeoff	0.031642	10.4	6.599994	0.402675	6.599994	1.292	4.2	0.287295342	0.017528297	0.287295342	0.182824475				
			Climbout	0.028926	0.09	5.981142	0.408337	5.981142	1.292	4.2	0.002059694	0.000140617	0.002059694	0.001446332	1.373129585	0.093744575	1.373129585	0.964221257
			Approach	0.010516	10.05	2.200637	5.988767	2.200637	1.292	4.2	0.03076471	0.083722432	0.03076471	0.058715628				
			Taxi In	0.008154	7	2.199837	23.004097	2.199837	1.292	4.2	0.016609136	0.173684761	0.016609136	0.031710699				
			Total per LTO								0.381810822	0.746506173	0.381810822	0.360769031				

* Fuel flow rates and EF's from Federal Aviation Administration, Emission and Dispersion Modeling System (EDMS)
* Time in mode based on default times in EDMS

Therefore

To calculate lbs/day

Component	Emissions (lb/day)			
	CO	HC	NO _x	PM
LTO - light helicopter (Hughes 500)	0.382	0.747	0.382	0.361
Installation/Demolition - light helicopter, 3 hrs cruise	4.119	0.281	4.119	2.893
Total Light Helicopter	4.501	1.028	4.501	3.253
Total	4.501	1.028	4.501	3.253

* Installation/demolition is assumed to be 3 hours (180 minutes) per event at cruise mode factors
* SO_x and PM emissions are negligible

Helicopter GHG Emission Estimates

Table of Factors and Constants

Value Units	Description
6.84 lb/gallon	Jet Fuel Density (at 15 degrees C) -- equivalent to 820 kg/m ³
142 lb/hr	Jet Fuel Usage at Idle
20.8 gallon/hr	Calculated Usage at Idle
679 lb/hr	Jet Fuel Usage at Climbout/Approach
99.3 gallon/hr	Calculated Usage at Climbout/Approach
9.57 kg CO ₂ /gallon	CO ₂ emission factor for Jet fuel
0.31 g N ₂ O/gallon	N ₂ O emission factor for Jet fuel
0.27 g CH ₄ /gallon	CH ₄ emission factor for Jet fuel

* Fuel usage rates from EPA AP-42, Table II-1-8, Modal Emission Rates - Military Aircraft Engines
* Fuel density from air BP Handbook of Products - © Air BP Ltd. 2000
* Emission factors from California Climate Action Registry's General Reporting Protocol 3.1

GHG Emissions

Component	Time in mode (hrs)	Emissions (tonnes/day)				Days of Operation	Emissions (total tonnes)			
		CO ₂	N ₂ O	CH ₄	CO ₂ e		CO ₂	N ₂ O	CH ₄	CO ₂ e
Light Helicopter										
LTO - Idle	0.433	0.086	0.000013	0.000012	0.090	66	5.682	0.0009	0.0003	5.962
LTO - Other	0.342	0.068	0.000011	0.000009	0.071		4.489	0.0007	0.0003	4.710
Installation	3.000	0.596	0.000092	0.000080	0.626		39.338	0.0061	0.0024	41.277
Total per Installation	3.776	0.750	0.000116	0.000101	0.788276		49.509	0.0077	0.0030	51.950

* Jet Fuel usage was based on fuel usage time spent in approach, idle, and takeoff for each LTO and 3 hours for installation

Table B-5-Q3
 Total GHG Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-5-Q3. Total GHG Emissions, metric tons

	Total Construction Emissions, metric tons		
	CO2	CH4	N2O
Construction Equipment	1575.34	0.15	1.19
Construction Truck Trips	800.12	0.05	0.02
Worker Trips	873.19	0.01	0.02
Helicopter	49.51	0.01	0.00
Total	3298.16	0.21	1.24

3685.592

APPENDIX J
AIR QUALITY & GREENHOUSE GASES
SUPPORT INFORMATION

**AIR QUALITY AND GREENHOUSE GASES EMISSIONS TABLES
FOR ALTERNATIVE 4**

**APPENDIX J
AIR QUALITY & GREENHOUSE GASES
SUPPORT INFORMATION**

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Table A-1-Q7
 Construction Heavy Equipment Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment A

Table A-1-Q7. 2016 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment A

Equipment/Phase	Source	Emission Factors												Emissions										
		FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Wire and Structure Removals																								
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	1	10	0.93	3.34	4.34	0.00	0.37	0.33	463.57	0.04	0.41
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.61	3.05	4.39	0.00	0.25	0.22	469.08	0.06	0.42
Backhoe	CalEEMod User's Guide, Appendix D, 2016 Tractor/Loader/Backhoe, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	97	0.37	0.0013	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.46	2.93	4.21	0.00	0.24	0.21	449.66	0.04	0.40
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	2	5	0.64	5.35	5.94	0.01	0.22	0.19	821.15	0.06	0.56
Mower	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 15/25 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	25	0.42	0.0015	0.0108	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	1	5	0.08	0.57	0.62	0.00	0.05	0.05	65.78	0.01	0.06
Wire Puller	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0104	0.0000	0.0005	0.000431658	1.3	0.0001	0.0010	3	5	0.92	8.79	11.21	0.01	0.52	0.47	1349.74	0.08	1.07
Wire Tensioner	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0104	0.0000	0.0005	0.000431658	1.3	0.0001	0.0010	3	5	0.92	8.79	11.21	0.01	0.52	0.47	1349.74	0.08	1.07
Foundation Construction																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.61	3.05	4.39	0.00	0.25	0.22	469.08	0.06	0.42
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	5	0.32	2.67	2.97	0.00	0.11	0.10	410.57	0.03	0.28
Drill Rig	CalEEMod User's Guide, Appendix D, 2016 Bore/Drill Rigs, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	82	0.5	0.0006	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0002	0.0011	2	10	0.46	6.69	9.62	0.01	0.54	0.48	1027.37	0.17	0.91
Hydraulic Rock Splitting/Rock Drilling	CalEEMod User's Guide, Appendix D, 2016 Bore/Drill Rigs, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	82	0.5	0.0006	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0002	0.0011	1	10	0.23	3.34	4.81	0.01	0.27	0.24	513.69	0.08	0.46
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	2	10	1.87	6.69	8.68	0.01	0.73	0.65	927.14	0.08	0.82
On-Road Certified Truck Emissions																								
Wire and Structure Removals																								
Flatbed Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	2	0.02	0.20	0.65	0.00	0.00	0.00	64.16	0.00	0.06
Aerial Bucket Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	3	2	0.03	0.29	0.97	0.00	0.00	0.00	96.25	0.00	0.09
Dump/Haul Truck	EMFAC2011 emission factors, HHD idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	2	5	0.13	0.74	1.32	0.00	0.00	0.00	149.95	0.01	0.13
Flatbed Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	2	0.02	0.20	0.65	0.00	0.00	0.00	64.16	0.00	0.06
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	2	0.02	0.20	0.65	0.00	0.00	0.00	64.16	0.00	0.06
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	10	0.09	0.98	3.24	0.00	0.01	0.01	320.82	0.00	0.31
Subtotal																								
Foundation Construction																								
2-ton Flatbed Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Concrete Trucks	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	3	2	0.03	0.29	0.97	0.00	0.00	0.00	96.25	0.00	0.09
Crane Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Dump/Haul Truck	EMFAC2011 emission factors, HHD idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	2	5	0.13	0.74	1.32	0.00	0.00	0.00	149.95	0.01	0.13
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	10	0.09	0.98	3.24	0.00	0.01	0.01	320.82	0.00	0.31
Flatbed Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Total															8.65	60.35	87.02	0.10	4.12	3.67	9803.49	0.81	8.27	

Table A-2-Q7
 Construction and Operational Truck Trip Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment A

Table A-2-Q7. 2016 Maximum Daily Construction Emissions, Construction Truck Trips, Segment A

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10			PM2.5			CO2	CH4	N2O	Emissions, lbs/day												
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4
Wire and Structure Removals																														
Pick-Up Trucks	Light Duty Truck 1, Diesel	5	30	20	0.292950056	0.47693085	0.065210487	0.00318614	0.05395477	0.007999958	0.036749816	0.04963839	0.002	0.01574992	247.933018	0.014167636	0.01	0.06	0.11	0.01	0.00	0.02	0.01	0.08	0.02	0.01	0.03	54.66	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.47693085	0.065210487	0.00318614	0.05395477	0.007999958	0.036749816	0.04963839	0.002	0.01574992	247.933018	0.014167636	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.03	0.01	0.01	21.86	0.00	0.00	
2-ton Flatbed Truck	Light Heavy Duty Truck, Diesel	2	30	20	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.07	0.27	0.02	0.00	0.01	0.01	0.03	0.01	0.01	44.47	0.00	0.00	
Aerial Bucket Truck	Light Heavy Duty Truck, Diesel	3	30	20	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.05	0.01	0.01	66.70	0.00	0.00	
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	2	30	20	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.07	0.27	0.02	0.00	0.01	0.01	0.03	0.01	0.01	44.47	0.00	0.00	
Line Truck	Light Heavy Duty Truck, Diesel	3	30	20	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.05	0.01	0.01	66.70	0.00	0.00	
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.02	0.01	0.01	33.35	0.00	0.00	
Water Truck	Light Heavy Duty Truck, Diesel	2	30	30	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.05	0.01	0.01	66.70	0.00	0.00	
Subtotal																		0.62	2.11	0.13	0.00	0.12	0.07	0.35	0.08	398.90	0.02	0.01		
Foundation Construction																														
2-ton Flatbed Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.02	0.00	22.23	0.00	0.00		
Concrete Trucks	Light Heavy Duty Truck, Diesel	3	30	30	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.16	0.61	0.03	0.00	0.03	0.02	0.07	0.02	100.05	0.01	0.00		
Crane Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.02	0.00	22.23	0.00	0.00		
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.02	0.00	22.23	0.00	0.00		
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.02	0.01	0.01	33.35	0.00	0.00	
Pick-Up Trucks	Light Duty Truck 1, Diesel	6	30	20	0.292950056	0.47693085	0.065210487	0.00318614	0.05395477	0.007999958	0.036749816	0.04963839	0.002	0.01574992	247.933018	0.014167636	0.01	0.08	0.13	0.02	0.00	0.03	0.02	0.10	0.02	65.59	0.00	0.00		
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.47693085	0.065210487	0.00318614	0.05395477	0.007999958	0.036749816	0.04963839	0.002	0.01574992	247.933018	0.014167636	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.03	0.01	0.01	21.86	0.00	0.00	
Water Truck	Light Heavy Duty Truck, Diesel	2	30	30	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.05	0.01	0.01	66.70	0.00	0.00	
Subtotal																		0.54	1.79	0.11	0.00	0.11	0.06	0.32	0.08	354.25	0.02	0.01		
Simultaneous Construction Trucks																														
																		1.16	3.91	0.25	0.01	0.23	0.14	0.67	0.16	753.14	0.04	0.02		

Table A-3-Q7. 2016 Maximum Daily Construction Emissions, Worker Trips, Segment A

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)
Wire and Structure Removals	Light-Duty Truck, catalyst	13	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.005714994	0.00321577	0.02919863	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.022095932	0.01	0.009722282
Foundation Construction	Light-Duty Truck, catalyst	15	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.005714994	0.00321577	0.02919863	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.022095932	0.01	0.009722282

EMFAC2011 emission factors for 2016
 Assume startup after 8 hours

Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Wire and Structure Removals	Light-Duty Truck, catalyst	13	35	80	6.31	0.57	0.66	0.01	0.11	0.05	0.19	0.05	720.51	0.01	0.02
Foundation Construction	Light-Duty Truck, catalyst	15	35	80	7.29	0.66	0.76	0.01	0.13	0.06	0.22	0.05	831.35	0.01	0.03
Simultaneous Worker Trips		28			13.60	1.22	1.41	0.02	0.24	0.10	0.41	0.10	1551.86	0.02	0.05

Table A-4-Q7
Construction Heavy Equipment Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment B

Table A-4-Q7. 2016 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment B

Emission Factors															Emissions									
Equipment/Phase	Source	FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Excavate and Install Vaults and Trench																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.61	3.05	4.39	0.00	0.25	0.22	469.08	0.06	0.42
Backhoe	CalEEMod User's Guide, Appendix D, 2016 Tractor/Loader/Backhoe, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	2	10	0.91	5.86	7.47	0.01	0.47	0.42	899.33	0.08	0.71
Bulldozer	CalEEMod User's Guide, Appendix D, 2016 Rubber Tired Dozers, 251/500 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	255	0.4	0.0013	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	2	5	1.35	5.85	9.25	0.01	0.34	0.30	1277.95	0.12	0.88
Concrete Saw	CalEEMod User's Guide, Appendix D, 2016 Concrete Saws, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	81	0.73	0.0014	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	2	10	1.62	9.65	12.31	0.02	0.78	0.70	1481.67	0.14	1.17
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	5	0.32	2.67	2.97	0.00	0.11	0.10	410.57	0.03	0.28
Paver	CalEEMod User's Guide, Appendix D, 2016 Paver, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	89	0.42	0.0021	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0002	0.0010	2	10	1.57	6.10	7.78	0.01	0.49	0.44	936.66	0.14	0.74
Ducts Through Bridge																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.61	3.05	4.39	0.00	0.25	0.22	469.08	0.06	0.42
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	5	0.32	2.67	2.97	0.00	0.11	0.10	410.57	0.03	0.28
On-Road Certified Truck Emissions																								
Excavate and Install Vaults and Trench																								
Concrete Trucks	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	9	2	0.08	0.88	2.92	0.00	0.01	0.01	288.74	0.00	0.28
Dump/Haul Truck	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	26	2	0.69	3.83	6.85	0.01	0.02	0.02	779.73	0.03	0.65
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Vacuum Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	2	0.02	0.20	0.65	0.00	0.00	0.00	64.16	0.00	0.06
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	10	0.09	0.98	3.24	0.00	0.01	0.01	320.82	0.00	0.31
Subtotal																								
Ducts Through Bridge																								
Aerial Bucket Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	2	0.02	0.20	0.65	0.00	0.00	0.00	64.16	0.00	0.06
Boom truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Subtotal																								
Simultaneous Construction Equipment																8.22	45.17	66.49	0.08	2.85	2.54	7936.69	0.70	6.32

Table A-5-Q7
 Construction and Operational Truck Trip Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment B

Table A-5-Q7. 2016 Maximum Daily Construction Emissions, Construction Truck Trips, Segment B

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10			PM2.5			CO2	CH4	N2O	Emissions, lbs/day										
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5
Excavate and Install Vaults and Trench																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	6	30	20	0.292950056	0.4769309	0.06521049	0.0031861	0.0539548	0.00799996	0.03674982	0.0496384	0.002	0.0157499	247.93302	0.01416764	0.01	0.08	0.13	0.02	0.00	0.03	0.02	0.17	0.04	65.59	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	5	30	20	0.292950056	0.4769309	0.06521049	0.0031861	0.0539548	0.00799996	0.03674982	0.0496384	0.002	0.0157499	247.93302	0.01416764	0.01	0.06	0.11	0.01	0.00	0.02	0.01	0.14	0.04	54.66	0.00	0.00
Concrete Trucks	Light Heavy Duty Truck, Diesel	9	30	30	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.01199994	0.08917953	0.0366331	0.003	0.0382198	504.22234	0.02881278	0.01	0.49	1.83	0.10	0.00	0.08	0.05	0.39	0.10	300.14	0.02	0.01
Dump Truck	Heavy Duty Truck, Diesel	26	30	60	1.111513533	5.1835677	0.30038695	0.0107118	0.069818	0.03599981	0.06173968	0.0642326	0.009	0.0264599	1807.6693	0.10329565	0.05	3.82	17.83	1.03	0.04	0.58	0.34	2.25	0.55	6216.99	0.36	0.16
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.01199994	0.08917953	0.0366331	0.003	0.0382198	504.22234	0.02881278	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.00	0.00	33.35	0.00	0.00
Vacuum Truck	Light Heavy Duty Truck, Diesel	2	30	30	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.01199994	0.08917953	0.0366331	0.003	0.0382198	504.22234	0.02881278	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.00	0.00	66.70	0.00	0.00
Water Truck	Light Heavy Duty Truck, Diesel	2	30	30	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.01199994	0.08917953	0.0366331	0.003	0.0382198	504.22234	0.02881278	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.00	0.00	66.70	0.00	0.00
Subtotal																		4.73	20.90	1.23	0.04	0.75	0.45	2.96	0.73	6804.12	0.39	0.17
Cleaning and Proving Ducts																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.4769309	0.06521049	0.0031861	0.0539548	0.00799996	0.03674982	0.0496384	0.002	0.0157499	247.93302	0.01416764	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.06	0.01	21.86	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	1	30	20	0.292950056	0.4769309	0.06521049	0.0031861	0.0539548	0.00799996	0.03674982	0.0496384	0.002	0.0157499	247.93302	0.01416764	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.03	0.01	10.93	0.00	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Diesel	2	30	20	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.01199994	0.08917953	0.0366331	0.003	0.0382198	504.22234	0.02881278	0.01	0.07	0.27	0.02	0.00	0.01	0.01	0.00	0.00	44.47	0.00	0.00
Boom Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.01199994	0.08917953	0.0366331	0.003	0.0382198	504.22234	0.02881278	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.04	0.01	33.35	0.00	0.00
Subtotal																		0.17	0.54	0.04	0.00	0.03	0.02	0.13	0.03	110.61	0.01	0.00
Simultaneous Construction Trucks																		4.89	21.44	1.26	0.04	0.79	0.47	3.09	0.76	6914.73	0.40	0.18

Table A-6-Q7. 2016 Maximum Daily Construction Emissions, Worker Trips, Segment B

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)
Excavate and Install Trench and Ducts	Light-Duty Truck, catalyst	27	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.00571499	0.00321577	0.0291986	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.02209593	0.01	0.00972228
Ducts through Bridge	Light-Duty Truck, catalyst	12	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.00571499	0.00321577	0.0291986	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.02209593	0.01	0.00972228

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
 Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Excavate and Install Trench and Ducts	Light-Duty Truck, catalyst	27	35	80	13.11	1.18	1.36	0.02	0.23	0.10	0.40	0.10	1496.44	0.02	0.05
Ducts through Bridge	Light-Duty Truck, catalyst	12	35	80	5.83	0.52	0.61	0.01	0.10	0.04	0.18	0.04	665.08	0.01	0.02
Simultaneous Worker Trips		27			18.94	1.70	1.97	0.03	0.33	0.14	0.57	0.14	2161.52	0.02	0.07

Table A-7-Q7
 Fugitive Dust Emission Calculations
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment B

Table A-7-Q4. 2016 Maximum Daily Construction Emissions, Fugitive Dust, Segment B

Excavation and Install Vaults and Trench

Earthmoving - Material Handling

Emission Factor from SCAQMD CEQA Air Quality Handbook, Table A9-9-G

$$E = [0.00112 \times \{ \{ [G/5]^{1.3} \} / \{ [H/2]^{1.4} \} \}] \times [I/J]$$

where

G = Mean wind speed in miles per hour- based on data from the website below, assuming a maximum wind speed of 12 mph

H = Moisture content of surface material, assumed to be 2%

I = Pounds of overburden handled per day

J = lbs/ton, 2000

Assume 12 miles per hour daily maximum wind speed

Assume H = 2.0% moisture - unmitigated

Assume 61% control efficiency for watering 3 times/day

I = 16,200 cubic yards x 1600 lbs/cubic yard = 12960 tons of material

Assume earthmoving occurs over 30 days, maximum per day could be 10 x daily average

PM10

Unmitigated	Mitigated	Unit
15.0999804	5.888992358	lbs/day
0.00791025	0.003084999	total tons

$$E = [0.00112 \times \{ \{ [G/5]^{1.3} \} / \{ [H/2]^{1.4} \} \}] \times [I/J] =$$

PM2.5

Unmitigated	Mitigated	Unit
3.17099589	1.236688395	lbs/day
0.00166115	0.00064785	total tons

NOTE: PM2.5 is assumed to be 21% of PM10 based on SCAQMD's Final –Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds (October 2006)

Table A-8-Q7
Construction Heavy Equipment Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment C

Table A-8-Q7. 2016 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment C

Emission Factors														Emissions																
Equipment/Phase	Source	FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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						
OFFROAD Equipment																														
Site Preparation and Road Construction																														
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.61	3.05	4.39	0.00	0.25	0.22	469.08	0.06	0.42						
Backhoe	CalEEMod User's Guide, Appendix D, 2016 Tractor/Loader/Backhoe, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	97	0.37	0.0013	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.46	2.93	4.21	0.00	0.24	0.21	449.66	0.04	0.40						
Bulldozer	CalEEMod User's Guide, Appendix D, 2016 Rubber Tired Dozers, 251/500 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	255	0.4	0.0013	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	5	0.67	2.92	4.62	0.01	0.17	0.15	638.97	0.06	0.44						
Grader	CalEEMod User's Guide, Appendix D, 2016 Graders, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	174	0.41	0.0012	0.0082	0.0104	0.0000	0.0005	0.000431658	1.3	0.0001	0.0010	1	10	0.88	5.82	7.43	0.01	0.35	0.31	893.81	0.08	0.71						
Mower	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 15/25 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	25	0.42	0.0015	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	1	5	0.08	0.47	0.62	0.00	0.05	0.05	65.78	0.01	0.06						
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	1	10	0.93	3.34	4.34	0.00	0.37	0.33	463.57	0.04	0.41						
					ROG (lbs/hr)	CO (lbs/hr)	NOX (lbs/hr)	SOX (lbs/hr)	PM10 (lbs/hr)	PM2.5 (lbs/hr)	CO2 (lbs/hr)	CH4 (lbs/hr)	N2O (lbs/hr)																	
On-Road Certified Truck Emissions																														
Site Preparation and Road Construction																														
Dump/Haul Truck	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	1	5	0.07	0.37	0.66	0.00	0.00	0.00	74.97	0.00	0.06						
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	10	0.09	0.98	3.24	0.00	0.01	0.01	320.82	0.00	0.31						
Subtotal																														
Total																3.79	19.89	29.51	0.04	1.43	1.28	3376.67	0.29	2.80						

Table A-9-Q7
 Construction and Operational Truck Trip Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment C

Table A-9-Q7. 2016 Maximum Daily Construction Emissions, Construction Truck Trips, Segment C

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10			PM2.5			CO2	CH4	N2O	Emissions, lbs/day												
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4
Site Preparation and Road Construction																														
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.47693085	0.065210487	0.00318614	0.05395477	0.007999958	0.036749816	0.04963839	0.002	0.01574992	247.933018	0.014167636	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.03	0.01	0.03	0.01	21.86	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.47693085	0.065210487	0.00318614	0.05395477	0.007999958	0.036749816	0.04963839	0.002	0.01574992	247.933018	0.014167636	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.03	0.01	0.03	0.01	21.86	0.00	0.00
Dump Truck	Heavy Duty Truck, Diesel	1	30	60	1.111513533	5.1835677	0.300386954	0.01071182	0.06981799	0.035999812	0.061739677	0.06423255	0.009	0.026459862	1807.66928	0.103295646	0.05	0.15	0.69	0.04	0.00	0.02	0.01	0.05	0.01	239.11	0.01	0.01		
Water Truck	Light Heavy Duty Truck, Diesel	2	30	30	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.05	0.01	66.70	0.00	0.00		
Subtotal																		0.31	1.18	0.07	0.00	0.06	0.04	0.16	0.04	349.54	0.02	0.01		
Simultaneous Construction Trucks																														
																		0.31	1.18	0.07	0.00	0.06	0.04	0.16	0.04	349.54	0.02	0.01		

Table A-10-Q7. 2016 Maximum Daily Construction Emissions, Worker Trips, Segment C

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)
Site Preparation and Road Construction	Light-Duty Truck, catalyst	12	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.005714994	0.00321577	0.02919863	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.022095932	0.01	0.009722282

EMFAC2011 emission factors for 2016
 Assume startup after 8 hours

Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day											
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O	
Site Preparation and Road Construction	Light-Duty Truck, catalyst	12	35	80	5.83	0.52	0.61	0.01	0.10	0.04	0.18	0.04	0.04	665.08	0.01	0.02
Simultaneous Worker Trips		12			5.83	0.52	0.61	0.01	0.10	0.04	0.18	0.04	0.04	665.08	0.01	0.02

Table A-11-Q7
 Fugitive Dust Emission Calculations
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment C

Table A-11-Q7. 2016 Maximum Daily Construction Emissions, Fugitive Dust, Segment C

Site Preparation and Road Construction

Grading - Bulldozer Operations

Emission factor from SCAQMD CEQA Air Quality Handbook, Table A9-9-F

$$E = ([0.45 \times \{([G]^{1.5})/([H]^{1.4})\}] \times I) \times J$$

where

G = silt content of material in percent, assumed to be 7.5%

Assume H = 2.0% moisture - unmitigated

Assume 61% control efficiency for watering 3 times/day

I = 2.2046 lb/kg

J = hours of bulldozing operations, based on construction scenario, 8 hrs/day for 25 days

$$E = ([0.45 \times \{([G]^{1.5})/([H]^{1.4})\}] \times I) \times J =$$

PM10

Unmitigated	Mitigated	Unit
61.77065479	24.09055537	lbs/day
0.772133185	0.301131942	total tons

PM2.5

Unmitigated	Mitigated	Unit
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Table A-12-Q7
 Construction Heavy Equipment Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment E

Table A-12-Q7. 2016 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment E

Emission Factors																Emissions								
Equipment/Phase	Source	FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Excavate and Install Vaults and Trench																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.61	3.05	4.39	0.00	0.25	0.22	469.08	0.06	0.42
Backhoe	CalEEMod User's Guide, Appendix D, 2016 Tractor/Loader/Backhoe, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	2	10	0.91	5.86	7.47	0.01	0.47	0.42	899.33	0.08	0.71
Bulldozer	CalEEMod User's Guide, Appendix D, 2016 Rubber Tired Dozers, 251/500 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	255	0.4	0.0013	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	5	0.67	2.92	4.62	0.01	0.17	0.15	638.97	0.06	0.44
Concrete Saw	CalEEMod User's Guide, Appendix D, 2016 Concrete Saws, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	81	0.73	0.0014	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	2	10	1.62	9.65	12.31	0.02	0.78	0.70	1481.67	0.14	1.17
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	5	0.32	2.67	2.97	0.00	0.11	0.10	410.57	0.03	0.28
Jackhammer	Note: Jackhammers are powered by the air compressors on the site.												3											
Paver	CalEEMod User's Guide, Appendix D, 2016 Paver, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	89	0.42	0.0021	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0002	0.0010	2	10	1.57	6.10	7.78	0.01	0.49	0.44	936.66	0.14	0.74
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.00082937	1.3	0.0001	0.0011	1	10	0.93	3.34	4.34	0.00	0.37	0.33	463.57	0.04	0.41
On-Road Certified Truck Emissions																								
Excavate and Install Vaults and Trench																								
Concrete Trucks	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	12	2	0.10	1.17	3.89	0.00	0.01	0.01	384.98	0.00	0.37
Dump/Haul Truck	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	26	2	0.69	3.83	6.85	0.01	0.02	0.02	779.73	0.03	0.65
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Tractor/Trailer	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	2	2	0.05	0.29	0.53	0.00	0.00	0.00	59.98	0.00	0.05
Vacuum Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	2	0.02	0.20	0.65	0.00	0.00	0.00	64.16	0.00	0.06
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	10	0.09	0.98	3.24	0.00	0.01	0.01	320.82	0.00	0.31
Subtotal																								
Simultaneous Construction Equipment																7.60	40.16	59.37	0.07	2.69	2.40	6941.61	0.60	5.64

Table A-13-Q7
 Construction and Operational Truck Trip Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment E

Table A-13-Q7. 2016 Maximum Daily Construction Emissions, Construction Truck Trips, Segment E

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10		PM2.5		CO ₂	CH ₄	N ₂ O	Emissions, lbs/day												
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO ₂	CH ₄	N ₂ O
Excavate and Install Vaults and Trench																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	5	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.06	0.11	0.01	0.00	0.02	0.01	0.14	0.04	54.66	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.06	0.01	21.86	0.00	0.00
Concrete Trucks	Light Heavy Duty Truck, Diesel	12	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999998	0.0382198	504.22234	0.028812777	0.01	0.65	2.44	0.14	0.00	0.11	0.06	0.52	0.13	400.19	0.02	0.01
Dump Truck	Heavy Duty Truck, Diesel	26	30	60	1.111513533	5.1835677	0.300386954	0.0107118	0.069818	0.035999812	0.061739677	0.0642326	0.008999995	0.02645986	1807.6693	0.103295646	0.05	3.82	17.83	1.03	0.04	0.58	0.34	2.25	0.55	6216.99	0.36	0.16
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999998	0.0382198	504.22234	0.028812777	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.00	0.00	33.35	0.00	0.00
Tractor/Trailer	Heavy Duty Truck, Diesel	2	30	60	1.111513533	5.1835677	0.300386954	0.0107118	0.069818	0.035999812	0.061739677	0.0642326	0.008999995	0.02645986	1807.6693	0.103295646	0.05	0.29	1.37	0.08	0.00	0.04	0.03	0.17	0.04	478.23	0.03	0.01
Vacuum Truck	Light Heavy Duty Truck, Diesel	2	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999998	0.0382198	504.22234	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.00	0.00	66.70	0.00	0.00
Water Truck	Light Heavy Duty Truck, Diesel	2	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999998	0.0382198	504.22234	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.00	0.00	66.70	0.00	0.00
Subtotal																	5.13	22.80	1.33	0.04	0.81	0.48	3.15	0.77	7338.67	0.42	0.19	
Simultaneous Construction Trucks																	5.13	22.80	1.33	0.04	0.81	0.48	3.15	0.77	7338.67	0.42	0.19	

Table A-14-Q7. 2016 Maximum Daily Construction Emissions, Worker Trips, Segment E

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)
Excavate and Install Trench and Ducts	Light-Duty Truck, catalyst	27	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.00571499	0.00321577	0.0291986	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.02209593	0.01	0.00972228

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
 Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Excavate and Install Trench and Ducts	Light-Duty Truck, catalyst	27	35	80	13.11	1.18	1.36	0.02	0.23	0.10	0.40	0.10	1496.44	0.02	0.05
Simultaneous Worker Trips		27			13.11	1.18	1.36	0.02	0.23	0.10	0.40	0.10	1496.44	0.02	0.05

Table A-15-Q7
Fugitive Dust Emission Calculations
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment E

Table A-15-Q7. 2016 Maximum Daily Construction Emissions, Fugitive Dust, Segment E

Excavation and Install Vaults and Trench

Earthmoving - Material Handling

Emission Factor from SCAQMD CEQA Air Quality Handbook, Table A9-9-G

$$E = [0.00112 \times \left(\frac{G}{5} \right)^{1.3} / \left(\frac{H}{2} \right)^{1.4}] \times [I/J]$$

where

G = Mean wind speed in miles per hour- based on data from the website below, assuming a maximum wind speed of 12 mph

H = Moisture content of surface material, assumed to be 2%

I = Pounds of overburden handled per day

J = lbs/ton, 2000

Assume 12 miles per hour daily maximum wind speed

Assume H = 2.0% moisture - unmitigated

Assume 61% control efficiency for watering 3 times/day

I = 16,200 cubic yards x 1600 lbs/cubic yard = 12960 tons of material

Assume earthmoving occurs over 30 days, maximum per day could be 10 x daily average

PM10

Unmitigated	Mitigated	Unit
15.0999804	5.888992358	lbs/day
0.00791025	0.003084999	total tons

$$E = [0.00112 \times \left(\frac{G}{5} \right)^{1.3} / \left(\frac{H}{2} \right)^{1.4}] \times [I/J] =$$

PM2.5

Unmitigated	Mitigated	Unit
3.17099589	1.236688395	lbs/day
0.00166115	0.00064785	total tons

NOTE: PM2.5 is assumed to be 21% of PM10 based on SCAQMD's Final –Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds (October 2006)

Table A-16-Q7
 Construction Heavy Equipment Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment A

Table A-16-Q7. 2017 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment A

Equipment/Phase	Source	Emission Factors											Emissions											
		FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Wire Stringing																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.61	3.05	4.39	0.00	0.25	0.22	469.08	0.06	0.42
Bulldozer	CalEEMod User's Guide, Appendix D, 2016 Rubber Tired Dozers, 251/500 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	255	0.4	0.0013	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	2	5	1.35	5.85	9.25	0.01	0.34	0.30	1277.95	0.12	0.88
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	5	0.32	2.67	2.97	0.00	0.11	0.10	410.57	0.03	0.28
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	1	10	0.93	3.34	4.34	0.00	0.37	0.33	463.57	0.04	0.41
Wire Puller	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0104	0.0000	0.0005	0.000431658	1.3	0.0001	0.0010	1	5	0.31	2.93	3.74	0.00	0.17	0.16	449.91	0.03	0.36
Wire Tensioner	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0104	0.0000	0.0005	0.000431658	1.3	0.0001	0.0010	1	5	0.31	2.93	3.74	0.00	0.17	0.16	449.91	0.03	0.36
On-Road Certified Truck Emissions																								
Wire Stringing																								
Aerial Bucket Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	3	2	0.03	0.29	0.97	0.00	0.00	0.00	96.25	0.00	0.09
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Tool Van	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Tractor/Trailer	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	1	5	0.07	0.37	0.66	0.00	0.00	0.00	74.97	0.00	0.06
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	10	0.09	0.98	3.24	0.00	0.01	0.01	320.82	0.00	0.31
Subtotal																								
Subtotal															4.03	22.71	34.27	0.04	1.43	1.27	4109.28	0.31	3.26	
Simultaneous Construction Equipment																								

Table A-18-Q7. 2017 Maximum Daily Construction Emissions, Worker Trips, Segment A

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)
Wire Stringing	Light-Duty Truck, catalyst	21	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.005714994	0.00321577	0.02919863	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.022095932	0.01	0.009722282

EMFAC2011 emission factors for 2016
 Assume startup after 8 hours

Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day											
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O	
Wire Stringing	Light-Duty Truck, catalyst	21	35	80	10.20	0.92	1.06	0.02	0.18	0.08	0.31	0.08	0.08	1163.90	0.01	0.04
Simultaneous Worker Trips		21			10.20	0.92	1.06	0.02	0.18	0.08	0.31	0.08	0.08	1163.90	0.01	0.04

Table A-19-Q7
 Construction Heavy Equipment Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment B

Table A-19-Q7. 2017 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment B

Equipment/Phase	Source	Emission Factors												Emissions										
		FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Cabling																								
Pulling Rig	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	1.3	0.0001	0.0009	1	6	0.37	3.52	3.91	0.01	0.21	0.19	539.90	0.03	0.37
Wire Tensioner	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0104	0.0000	0.0005	0.000431658	1.3	0.0001	0.0010	1	5	0.31	2.93	3.74	0.00	0.17	0.16	449.91	0.03	0.36
On-Road Certified Truck Emissions																								
Cable Pulling																								
Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	1	2	0.01	0.10	0.31	0.00	0.00	0.00	31.69	0.00	0.03
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	1	2	0.01	0.10	0.31	0.00	0.00	0.00	31.69	0.00	0.03
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	1	2	0.01	0.10	0.31	0.00	0.00	0.00	31.69	0.00	0.03
Tool Van	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	1	2	0.01	0.10	0.31	0.00	0.00	0.00	31.69	0.00	0.03
Semi Tractor with Trailer	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0135	0.0756	0.1230	0.0001	0.0003	0.000265501	15.0	0.0150	0.0117	2	2	0.05	0.30	0.49	0.00	0.00	0.00	59.98	0.06	0.05
Simultaneous Construction Equipment															0.76	7.14	9.36	0.01	0.39	0.35	1176.56	0.12	0.89	

Table A-21-Q7. 2017 Maximum Daily Construction Emissions, Worker Trips, Segment B

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)
Cabling	Light-Duty Truck, catalyst	20	35	80	2.153833594	31.42447989	0.20522395	1.813681924	0.048783653	2.394636679	1.621971672	0.707094998	0.16038404	0.714647031	0.004127654	0.005714994	0.003035358	0.029198634	0.007999958	0.036749816	0.002803369	0.026884174	0.00199999	0.01574992	297.39552	448.5481762	0.0028329	0.022095932	0.01	0.009722282

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

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Cabling	Light-Duty Truck, catalyst	20	35	80	8.98	0.80	0.98	0.01	0.17	0.07	0.29	0.07	1068.81	0.01	0.03
Simultaneous Worker Trips		20			8.98	0.80	0.98	0.01	0.17	0.07	0.29	0.07	1068.81	0.01	0.03

Table A-22-Q7
 Construction Heavy Equipment Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment D F

Table A-22-Q7. 2017 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment D & F

Equipment/Phase	Source	Emission Factors											Emissions											
		FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Wire Stringing																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.61	3.05	4.39	0.00	0.25	0.22	469.08	0.06	0.42
Bulldozer	CalEEMod User's Guide, Appendix D, 2016 Rubber Tired Dozers, 251/500 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	255	0.4	0.0013	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	2	5	1.35	5.85	9.25	0.01	0.34	0.30	1277.95	0.12	0.88
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	5	0.32	2.67	2.97	0.00	0.11	0.10	410.57	0.03	0.28
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	1	10	0.93	3.34	4.34	0.00	0.37	0.33	463.57	0.04	0.41
Wire Puller	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0104	0.0000	0.0005	0.000431658	1.3	0.0001	0.0010	1	5	0.31	2.93	3.74	0.00	0.17	0.16	449.91	0.03	0.36
Wire Tensioner	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0104	0.0000	0.0005	0.000431658	1.3	0.0001	0.0010	1	5	0.31	2.93	3.74	0.00	0.17	0.16	449.91	0.03	0.36
On-Road Certified Truck Emissions																								
Wire Stringing																								
Aerial Bucket Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	3	2	0.03	0.29	0.97	0.00	0.00	0.00	96.25	0.00	0.09
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Tool Van	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Tractor/Trailer	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	1	5	0.07	0.37	0.66	0.00	0.00	0.00	74.97	0.00	0.06
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	10	0.09	0.98	3.24	0.00	0.01	0.01	320.82	0.00	0.31
Subtotal																								
															4.03	22.71	34.27	0.04	1.43	1.27	4109.28	0.31	3.26	
Subtotal Simultaneous Construction Equipment																								

Table A-24-Q7. 2017 Maximum Daily Construction Emissions, Worker Trips, Segment D & F

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)
Wire Stringing	Light-Duty Truck, catalyst	21	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.005714994	0.00321577	0.02919863	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.022095932	0.01	0.009722282

EMFAC2011 emission factors for 2016
 Assume startup after 8 hours

Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day											
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O	
Wire Stringing	Light-Duty Truck, catalyst	21	35	80	10.20	0.92	1.06	0.02	0.18	0.08	0.31	0.08	0.08	1163.90	0.01	0.04
Simultaneous Worker Trips		21			10.20	0.92	1.06	0.02	0.18	0.08	0.31	0.08	0.08	1163.90	0.01	0.04

Table A-25-Q7
 Construction Heavy Equipment Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment E

Table A-25-Q7. 2017 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment E

Emission Factors														Emissions											
Equipment/Phase	Source	FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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	
OFFROAD Equipment																									
Cleaning and Proving Ducts																									
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.61	3.05	4.39	0.00	0.25	0.22	469.08	0.06	0.42	
Cabling																									
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	2	10	1.23	6.11	8.78	0.01	0.50	0.44	938.17	0.11	0.83	
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	2	5	0.64	5.35	5.94	0.01	0.22	0.19	821.15	0.06	0.56	
Forklift	CalEEMod User's Guide, Appendix D, 2016 Rough-Terrain Forklift, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	83	0.4	0.0015	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	2	6	0.58	3.25	4.15	0.01	0.26	0.23	499.15	0.05	0.39	
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	2	10	1.87	6.69	8.68	0.01	0.73	0.65	927.14	0.08	0.82	
Pulling Rig	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	1.3	0.0001	0.0009	4	6	1.47	14.06	15.63	0.02	0.84	0.74	2159.58	0.13	1.48	
On-Road Certified Truck Emissions																									
Cleaning and Proving Ducts																									
Flatbed Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03	
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03	
Cabling																									
Aerial Bucket Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	2	2	0.02	0.20	0.61	0.00	0.00	0.00	63.39	0.00	0.06	
Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	4	2	0.03	0.39	1.22	0.00	0.00	0.00	126.77	0.00	0.12	
Flatbed Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	4	2	0.03	0.39	1.22	0.00	0.00	0.00	126.77	0.00	0.12	
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	2	2	0.02	0.20	0.61	0.00	0.00	0.00	63.39	0.00	0.06	
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	2	2	0.02	0.20	0.61	0.00	0.00	0.00	63.39	0.00	0.06	
Tool Van	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	2	2	0.02	0.20	0.61	0.00	0.00	0.00	63.39	0.00	0.06	
Semi Tractor with Trailer	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0135	0.0756	0.1230	0.0001	0.0003	0.000265501	15.0	0.0150	0.0117	4	2	0.11	0.61	0.98	0.00	0.00	0.00	119.96	0.12	0.09	
Simultaneous Construction Equipment																6.67	40.87	54.11	0.07	2.81	2.51	6505.48	0.62	5.14	

Table A-26-Q7
 Construction and Operational Truck Trip Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment E

Table A-26-Q7. 2017 Maximum Daily Construction Emissions, Construction Truck Trips, Segment E

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10		PM2.5			CO2	CH4	N2O	Emissions, lbs/day											
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Cleaning and Proving Ducts																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.06	0.01	21.86	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	1	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.01	0.02	0.00	0.00	0.00	0.03	0.01	10.93	0.00	0.00	
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.04	0.14	0.01	0.00	0.00	0.00	0.00	22.23	0.00	0.00	
Line Trucks	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.04	0.01	33.35	0.00	0.00
Subtotal																		0.13	0.40	0.03	0.00	0.03	0.02	0.13	0.03	88.38	0.01	0.00
Cabling																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	8	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.10	0.17	0.02	0.00	0.03	0.02	0.23	0.06	87.46	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	4	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.05	0.08	0.01	0.00	0.02	0.01	0.12	0.03	43.73	0.00	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Diesel	2	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999938	0.089179533	0.0366331	0.002999985	0.038219796	504.22234	0.028812777	0.01	0.07	0.27	0.02	0.00	0.01	0.01	0.06	0.01	44.47	0.00	0.00
Boom Truck	Light Heavy Duty Truck, Diesel	4	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999938	0.089179533	0.0366331	0.002999985	0.038219796	504.22234	0.028812777	0.01	0.15	0.54	0.03	0.00	0.02	0.01	0.12	0.03	88.93	0.01	0.00
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	4	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999938	0.089179533	0.0366331	0.002999985	0.038219796	504.22234	0.028812777	0.01	0.15	0.54	0.03	0.00	0.02	0.01	0.12	0.03	88.93	0.01	0.00
Line Truck	Light Heavy Duty Truck, Diesel	2	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999938	0.089179533	0.0366331	0.002999985	0.038219796	504.22234	0.028812777	0.01	0.07	0.27	0.02	0.00	0.01	0.01	0.06	0.01	44.47	0.00	0.00
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	2	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999938	0.089179533	0.0366331	0.002999985	0.038219796	504.22234	0.028812777	0.01	0.07	0.27	0.02	0.00	0.01	0.01	0.06	0.01	44.47	0.00	0.00
Tool Van	Light Heavy Duty Truck, Diesel	2	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999938	0.089179533	0.0366331	0.002999985	0.038219796	504.22234	0.028812777	0.01	0.07	0.27	0.02	0.00	0.01	0.01	0.06	0.01	44.47	0.00	0.00
Tractor/Trailer Truck	Heavy Duty Truck, Diesel	4	30	60	1.111513533	5.1835677	0.300386954	0.0107118	0.069818	0.035999812	0.061739677	0.0642326	0.008999953	0.026459862	1807.6693	0.103295646	0.05	0.59	2.74	0.16	0.01	0.09	0.05	0.35	0.09	956.46	0.05	0.02
Subtotal																		1.32	5.16	0.32	0.01	0.24	0.14	1.15	0.28	1443.36	0.08	0.04
Simultaneous Construction Trucks																												
																		1.45	5.56	0.34	0.01	0.27	0.16	1.28	0.32	1531.74	0.09	0.04

Table A-27-Q7. 2017 Maximum Daily Construction Emissions, Worker Trips, Segment E

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)
Cleaning and Proving Ducts	Light-Duty Truck, catalyst	11	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.00571499	0.00321577	0.0291986	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.02209593	0.01	0.00972228
Cabling	Light-Duty Truck, catalyst	40	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.00571499	0.00321577	0.0291986	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.02209593	0.01	0.00972228

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
 Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Cleaning and Proving Ducts	Light-Duty Truck, catalyst	11	35	80	5.34	0.48	0.56	0.01	0.09	0.04	0.16	0.04	609.66	0.01	0.02
Cabling	Light-Duty Truck, catalyst	40	35	80	19.43	1.75	2.02	0.03	0.34	0.15	0.59	0.14	2216.94	0.03	0.07
Simultaneous Worker Trips					24.77	2.23	2.58	0.04	0.43	0.19	0.75	0.18	2826.60	0.03	0.09

Table A-28-Q7
 Unmitigated Construction Emissions Summary
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-28-Q7. Maximum Daily Unmitigated Construction Emissions, Summary, Alternative Q7

2016	Maximum Daily Construction Emissions, lbs/day					
Segment A	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	8.65	60.35	87.02	0.10	4.12	3.67
Construction Truck Trips	0.25	1.16	3.91	0.01	0.90	0.30
Worker Trips	1.41	13.60	1.22	0.02	0.65	0.20
Total	10.31	75.11	92.15	0.13	5.67	4.17
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	8.22	45.17	66.49	0.08	2.85	2.54
Construction Truck Trips	1.26	4.89	21.44	0.04	3.88	1.23
Worker Trips	1.97	18.94	1.22	0.03	0.90	0.29
Fugitive Dust (Unmitigated)					15.10	3.17
Total	11.45	69.00	89.16	0.15	22.73	7.22
Segment C	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	3.79	19.89	29.51	0.04	1.43	1.28
Construction Truck Trips	0.07	0.31	1.18	0.00	0.22	0.07
Worker Trips	0.61	5.83	0.52	0.01	0.28	0.09
Fugitive Dust (Unmitigated)					61.77	12.97
Total	4.47	26.02	31.21	0.05	63.70	14.41
Segment E	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	7.60	40.16	59.37	0.07	2.69	2.40
Construction Truck Trips	1.33	5.13	22.80	0.04	3.96	1.25
Worker Trips	1.36	13.11	1.18	0.02	0.63	0.20
Fugitive Dust (Unmitigated)					15.10	3.17
Total	10.29	58.40	83.35	0.14	22.38	7.02
Maximum Daily Emissions, 2016	36.52	228.54	295.87	0.47	114.48	32.82
2017	Maximum Daily Construction Emissions, lbs/day					
Segment A	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	4.03	22.71	34.27	0.04	1.43	1.27
Construction Truck Trips	0.14	0.63	2.23	0.00	0.48	0.16
Worker Trips	1.06	10.20	0.92	0.02	0.49	0.15
Helicopter	1.03	4.50	4.50	0.31	3.25	3.25
Total	6.26	38.03	41.92	0.37	5.65	4.84
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	0.76	7.14	9.36	0.01	0.39	0.35
Construction Truck Trips	0.14	0.58	2.14	0.00	0.36	0.13
Worker Trips	0.98	8.98	0.80	0.01	0.46	0.15
Total	1.88	16.70	12.31	0.03	1.21	0.62
Segment D & F	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	4.03	22.71	34.27	0.04	1.43	1.27
Construction Truck Trips	0.14	0.63	2.23	0.00	0.48	0.16
Worker Trips	1.06	10.20	0.92	0.02	0.49	0.15
Helicopter	1.03	4.50	4.50	0.31	3.25	3.25
Total	6.26	38.03	41.92	0.37	5.65	4.84
Segment E	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	6.67	40.87	54.11	0.07	2.81	2.51
Construction Truck Trips	0.34	1.45	5.56	0.01	0.43	1.45
Worker Trips	2.58	24.77	2.23	0.04	1.18	0.37
Total	9.59	67.09	61.90	0.12	4.43	4.32

Table A-28-Q7
Unmitigated Construction Emissions Summary
Sycamore to Peñasquitos 230 kV Transmission Line Project

Maximum Daily Emissions, 2017	24.00	159.87	158.05	0.89	16.94	14.63
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Table A-29-Q7
Mitigated Construction Emissions Summary
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-29-Q7. Maximum Daily Mitigated Construction Emissions, Summary, Alternative Q7

2016	Maximum Daily Construction Emissions, lbs/day					
Segment A	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	8.65	60.35	87.02	0.10	4.12	3.67
Construction Truck Trips	0.25	1.16	3.91	0.01	0.90	0.30
Worker Trips	1.41	13.60	1.22	0.02	0.65	0.20
Total	10.31	75.11	92.15	0.13	5.67	4.17
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	8.22	45.17	66.49	0.08	2.85	2.54
Construction Truck Trips	1.26	4.89	21.44	0.04	3.88	1.23
Worker Trips	1.97	18.94	1.22	0.03	0.90	0.29
Fugitive Dust (Mitigated)					5.89	1.24
Total	11.45	69.00	89.16	0.15	13.52	5.29
Segment C	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	3.79	19.89	29.51	0.04	1.43	1.28
Construction Truck Trips	0.07	0.31	1.18	0.00	0.22	0.07
Worker Trips	0.61	5.83	0.52	0.01	0.28	0.09
Fugitive Dust (Mitigated)					24.09	5.06
Total	4.47	26.02	31.21	0.05	26.02	6.50
Segment E	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	7.60	40.16	59.37	0.07	2.69	2.40
Construction Truck Trips	1.33	5.13	22.80	0.04	3.96	1.25
Worker Trips	1.36	13.11	1.18	0.02	0.63	0.20
Fugitive Dust (Mitigated)					5.89	1.24
Total	10.29	58.40	83.35	0.14	13.17	5.08
Maximum Daily Emissions, 2016	36.52	228.54	295.87	0.47	58.38	21.04
2017	Maximum Daily Construction Emissions, lbs/day					
Segment A	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	4.03	22.71	34.27	0.04	1.43	1.27
Construction Truck Trips	0.14	0.63	2.23	0.00	0.48	0.16
Worker Trips	1.06	10.20	0.92	0.02	0.49	0.15
Helicopter	1.03	4.50	4.50	0.31	3.25	3.25
Total	6.26	38.03	41.92	0.37	5.65	4.84
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	0.76	7.14	9.36	0.01	0.39	0.35
Construction Truck Trips	0.14	0.58	2.14	0.00	0.36	0.13
Worker Trips	0.98	8.98	0.80	0.01	0.46	0.15
Total	1.88	16.70	12.31	0.03	1.21	0.62
Segment D & F	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	4.03	22.71	34.27	0.04	1.43	1.27
Construction Truck Trips	0.14	0.63	2.23	0.00	0.48	0.16
Worker Trips	1.06	10.20	0.92	0.02	0.49	0.15
Helicopter	1.03	4.50	4.50	0.31	3.25	3.25
Total	6.26	38.03	41.92	0.37	5.65	4.84
Segment E	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	6.67	40.87	54.11	0.07	2.81	2.51
Construction Truck Trips	0.34	1.45	5.56	0.01	0.43	1.45
Worker Trips	2.58	24.77	2.23	0.04	1.18	0.37
Total	9.59	67.09	61.90	0.12	4.43	4.32

Table A-29-Q7
Mitigated Construction Emissions Summary
Sycamore to Peñasquitos 230 kV Transmission Line Project

Maximum Daily Emissions, 2017	24.00	159.87	158.05	0.89	16.94	14.63
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Table A-30-Q7. Helicopter Emissions

SX-PQ Transmission Project

Helicopter Model	Engine	Assumed Engine	Operating Mode	Fuel Flow, kg/s	Time in Mode, min	Emission Incides, g/kg fuel					Emissions, lbs/mode					Cruise Mode Emission factor, lbs/hour				
						CO	VOC	NOx	Sox	PM	CO	VOC	NOx	SOx	PM	CO	VOC	NOx	SOx	PM
Hughes 500E	Allison 250-C20B/R	250B17B																		
			Taxi Out	0.008154	19	2.199837	23.004097	2.199837	0.4	4.2	0.045081939	0.471430067	0.045081939	0.008197324	0.086071898					
			Takeoff	0.031642	10.4	6.599994	0.402675	6.599994	0.4	4.2	0.287295342	0.017528297	0.287295342	0.017411855	0.182824475					
			Climbout	0.028926	0.09	5.981142	0.408337	5.981142	0.4	4.2	0.002059694	0.000140617	0.002059694	0.000137746	0.001446332	1.373129585	0.093744575	1.373129585	0.091830596	0.964221257
			Approach	0.010516	10.05	2.200637	5.988767	2.200637	0.4	4.2	0.03076471	0.083722432	0.03076471	0.005591965	0.058715628					
			Taxi In	0.008154	7	2.199837	23.004097	2.199837	0.4	4.2	0.016609136	0.173684761	0.016609136	0.003020067	0.031710699					
											Total per LTO	0.381810822	0.746506173	0.381810822	0.034358955	0.360769031				

* Fuel flow rates and EF's from Federal Aviation Administration, Emission and Dispersion Modeling System (EDMS)

* Time in mode based on default times in EDMS

Therefore

To calculate lbs/day

Component	Emissions (lb/day)				
	CO	HC	NO _x	SO _x	PM
LTO - light helicopter (Hughes 500)	0.382	0.747	0.382	0.034	0.361
Installation/Demolition - light helicopter, 3 hrs cruise	4.119	0.281	4.119	0.275	2.893
Total Light Helicopter	4.501	1.028	4.501	0.310	3.253
Total	4.501	1.028	4.501	0.310	3.253

* Installation/demolition is assumed to be 3 hours (180 minutes) per event at cruise mode factors, assume 2 heavy helicopters used during construction, 10 months, 25 days per month

* SO_x and PM emissions are negligible

Table A-31-Q7
Construction Heavy Equipment Annual
Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-31-Q7. Total Annual Emissions, Equipment

2016				Emission Factors						Emissions						
Equipment	FUEL	HP	Load Factor	ROG (lb/bhp-hr or lbs/hr)	CO (lb/bhp-hr or lbs/hr)	NOX (lb/bhp-hr or lbs/hr)	SOX (lb/bhp-hr or lbs/hr)	PM10 (lb/bhp-hr or lbs/hr)	PM2.5 (lb/bhp-hr or lbs/hr)	Total Use (Hours)	ROG, tons	CO tons	NOX tons	SOX tons	PM10 tons	PM2.5 tons
Total Equipment Use																
2-ton Flatbed Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	528	0.00	0.01	0.04	0.00	0.00	0.00
Aerial Bucket Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	748	0.00	0.02	0.06	0.00	0.00	0.00
Air Compressor	DIESEL	78	0.48	0.0016	0.0132	0.0117	0.0000	0.0013	0.001177249	6380	0.20	1.58	1.40	0.00	0.16	0.14
Backhoe	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	6380	0.15	0.93	1.19	0.00	0.08	0.07
Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	264	0.00	0.01	0.02	0.00	0.00	0.00
Bulldozer	DIESEL	255	0.4	0.0013	0.0132	0.0117	0.0000	0.0013	0.001177249	2860	0.19	1.93	1.71	0.00	0.19	0.17
Concrete Saw	DIESEL	81	0.73	0.0014	0.0082	0.0104	0.0000	0.0007	0.000588624	4400	0.18	1.06	1.35	0.00	0.09	0.08
Concrete Trucks	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	4884	0.01	0.12	0.40	0.00	0.00	0.00
Crane Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	176	0.00	0.00	0.01	0.00	0.00	0.00
Crane	DIESEL	226	0.29	0.0010	0.0057	0.0091	0.0000	0.0003	0.000294312	2860	0.09	0.54	0.85	0.00	0.03	0.03
Drill Rig	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	1100	0.01	0.18	0.23	0.00	0.01	0.01
Dump/Haul Truck	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	12232	0.08	0.45	0.81	0.00	0.00	0.00
Flatbed Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	440	0.00	0.01	0.04	0.00	0.00	0.00
Forklift	DIESEL	83	0.4	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	880	0.02	0.19	0.17	0.00	0.02	0.02
Grader	DIESEL	174	0.41	0.0012	0.0132	0.0117	0.0000	0.0013	0.001177249	1320	0.06	0.62	0.55	0.00	0.06	0.06
Hydraulic Rock Splitter/Rock Drilling Equipment	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	88	0.00	0.01	0.02	0.00	0.00	0.00
Line Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	748	0.00	0.02	0.06	0.00	0.00	0.00
Loader	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Mobile Fueling Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	1100	0.00	0.03	0.09	0.00	0.00	0.00
Mower	DIESEL	25	0.42	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	396	0.00	0.03	0.02	0.00	0.00	0.00
Paving Rig	DIESEL	82	0.36	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	4400	0.10	0.86	0.76	0.00	0.09	0.08
Generator	DIESEL	50	0.74	0.0013	0.0082	0.0117	0.0000	0.0007	0.000588624	4840	0.12	0.73	1.05	0.00	0.06	0.05
Skid-Steer Loader	DIESEL	78	0.37	0.0016	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Wire Puller	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	1760	0.05	0.52	0.57	0.00	0.03	0.03
Wire Tensioner	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	1100	0.03	0.32	0.36	0.00	0.02	0.02
Tool Van	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	220	0.00	0.01	0.02	0.00	0.00	0.00
Semi Tractor with Trailer	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	792	0.01	0.03	0.05	0.00	0.00	0.00
Vacuum Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	880	0.00	0.02	0.07	0.00	0.00	0.00
Water Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	2244	0.00	0.05	0.18	0.00	0.00	0.00
Total											1.31	10.29	12.10	0.01	0.85	0.75

2017				Emission Factors						Emissions						
Equipment	FUEL	HP	Load Factor	ROG (lb/bhp-hr or lbs/hr)	CO (lb/bhp-hr or lbs/hr)	NOX (lb/bhp-hr or lbs/hr)	SOX (lb/bhp-hr or lbs/hr)	PM10 (lb/bhp-hr or lbs/hr)	PM2.5 (lb/bhp-hr or lbs/hr)	Total Use (Hours)	ROG, tons	CO tons	NOX tons	SOX tons	PM10 tons	PM2.5 tons
Total Equipment Use																
2-ton Flatbed Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	88	0.00	0.00	0.01	0.00	0.00	0.00
Aerial Bucket Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	748	0.00	0.02	0.06	0.00	0.00	0.00
Air Compressor	DIESEL	78	0.48	0.0016	0.0132	0.0117	0.0000	0.0013	0.001177249	1760	0.05	0.44	0.39	0.00	0.04	0.04
Backhoe	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	440	0.01	0.06	0.08	0.00	0.01	0.00
Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	440	0.00	0.01	0.04	0.00	0.00	0.00
Bulldozer	DIESEL	255	0.4	0.0013	0.0132	0.0117	0.0000	0.0013	0.001177249	880	0.06	0.59	0.53	0.00	0.06	0.05
Concrete Saw	DIESEL	81	0.73	0.0014	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Concrete Trucks	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	0	0.00	0.00	0.00	0.00	0.00	0.00
Crane Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	0	0.00	0.00	0.00	0.00	0.00	0.00
Crane	DIESEL	226	0.29	0.0010	0.0057	0.0091	0.0000	0.0003	0.000294312	770	0.02	0.14	0.23	0.00	0.01	0.01
Drill Rig	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Dump/Haul Truck	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	88	0.00	0.00	0.01	0.00	0.00	0.00
Flatbed Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	484	0.00	0.01	0.04	0.00	0.00	0.00
Forklift	DIESEL	83	0.4	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	880	0.02	0.19	0.17	0.00	0.02	0.02
Grader	DIESEL	174	0.41	0.0012	0.0132	0.0117	0.0000	0.0013	0.001177249	440	0.02	0.21	0.18	0.00	0.02	0.02
Hydraulic Rock Splitter/Rock Drilling Equipment	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Line Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	616	0.00	0.02	0.05	0.00	0.00	0.00
Loader	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Mobile Fueling Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	396	0.00	0.01	0.03	0.00	0.00	0.00
Mower	DIESEL	25	0.42	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	88	0.00	0.01	0.01	0.00	0.00	0.00
Paving Rig	DIESEL	82	0.36	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	0	0.00	0.00	0.00	0.00	0.00	0.00
Generator	DIESEL	50	0.74	0.0013	0.0082	0.0117	0.0000	0.0007	0.000588624	2640	0.06	0.40	0.57	0.00	0.03	0.03
Skid-Steer Loader	DIESEL	78	0.37	0.0016	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Wire Puller	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	3300	0.10	0.97	1.07	0.00	0.06	0.05
Wire Tensioner	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	1540	0.05	0.45	0.50	0.00	0.03	0.02
Tool Van	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	484	0.00	0.01	0.04	0.00	0.00	0.00
Semi Tractor with Trailer	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	748	0.00	0.03	0.05	0.00	0.00	0.00
Water Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	484	0.00	0.01	0.04	0.00	0.00	0.00
Total											0.41	3.58	4.09	0.01	0.28	0.24

Table A-32-Q7
 Construction Truck Trip Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-32-Q7. Total Emissions, Construction Truck Trips

		2016		Speed (mph)	VMT (mi/vehicle-day)	Emissions, g/mi										Emissions, tons									
Vehicle	Vehicle Class	Number of equipment days used	CO			NO _x	ROG	SO _x	PM10		PM2.5			CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5				
									Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)									Brake Wear (g/mi)			
2-ton Flatbed Truck	Light Heavy Duty Truck, Dese	264	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Dese	374	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	
Boom Truck	Light Heavy Duty Truck, Dese	132	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete Trucks	Light Heavy Duty Truck, Dese	2442	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.08	0.30	0.02	0.00	0.02	0.01	0.04	0.04	0.01	0.04	0.01
Crane Truck	Light Heavy Duty Truck, Dese	88	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig/Truck Mounted Auger	Light Heavy Duty Truck, Dese	580	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.02	0.07	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Dump Truck	Heavy Duty Truck, Diesel	6116	30	35.7	1.111513533	5.183568	0.30038695	0.010712	0.069818	0.03599981	0.06173968	0.064233	0.009	0.0264599	0.27	1.25	0.07	0.00	0.04	0.02	0.11	0.03	0.03	0.01	
Flatbed Boom Truck	Light Heavy Duty Truck, Dese	220	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Line Truck	Light Heavy Duty Truck, Dese	374	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	
Mobile Fueling Truck	Light Heavy Duty Truck, Dese	580	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.02	0.07	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Pick-Up Trucks	Light Duty Truck 1, Diesel	3168	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	0.04	0.06	0.01	0.00	0.01	0.01	0.01	0.05	0.01	0.05	
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	1716	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	0.02	0.03	0.00	0.00	0.00	0.00	0.01	0.00	0.03	0.01	
Tool Van	Light Duty Truck 1, Diesel	110	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Semi Tractor with Trailer	Heavy Duty Truck, Diesel	396	30	35.7	1.111513533	5.183568	0.30038695	0.010712	0.069818	0.03599981	0.06173968	0.064233	0.009	0.0264599	0.02	0.08	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	
Vacuum Truck	Light Heavy Duty Truck, Dese	440	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	
Water Truck	Light Heavy Duty Truck, Dese	1122	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.04	0.14	0.01	0.00	0.01	0.00	0.02	0.00	0.02	0.00	
Total														0.56	2.21	0.13	0.00	0.11	0.06	0.31	0.08				

		2017		Speed (mph)	VMT (mi/vehicle-day)	Emissions, g/mi										Emissions, tons								
Vehicle	Vehicle Class	Number of equipment days used	CO			NO _x	ROG	SO _x	PM10		PM2.5			CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5			
									Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)									Brake Wear (g/mi)		
2-ton Flatbed Truck	Light Heavy Duty Truck, Dese	44	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Dese	374	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Boom Truck	Light Heavy Duty Truck, Dese	220	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Concrete Trucks	Light Heavy Duty Truck, Dese	0	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crane Truck	Light Heavy Duty Truck, Dese	0	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig/Truck Mounted Auger	Light Heavy Duty Truck, Dese	0	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dump Truck	Heavy Duty Truck, Diesel	44	30	35.7	1.111513533	5.183568	0.30038695	0.010712	0.069818	0.03599981	0.06173968	0.064233	0.009	0.0264599	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Flatbed Boom Truck	Light Heavy Duty Truck, Dese	242	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Line Truck	Light Heavy Duty Truck, Dese	308	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mobile Fueling Truck	Light Heavy Duty Truck, Dese	198	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pick-Up Trucks	Light Duty Truck 1, Diesel	1628	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	0.02	0.03	0.00	0.00	0.00	0.01	0.00	0.02	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	880	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00
Tool Van	Light Duty Truck 1, Diesel	242	30	35.7	0.292950056	0.476931	0.06521049	0.003186	0.053955	0.00799996	0.03674982	0.049638	0.002	0.0157499	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Semi Tractor with Trailer	Heavy Duty Truck, Diesel	374	30	35.7	1.111513533	5.183568	0.30038695	0.010712	0.069818	0.03599981	0.06173968	0.064233	0.009	0.0264599	0.02	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	Light Heavy Duty Truck, Dese	242	30	35.7	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.01199994	0.13033932	0.036633	0.003	0.0558597	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total														0.10	0.33	0.02	0.00	0.03	0.02	0.04	0.01			

Paved Road Fugitive Dust
 EPA's AP-42, Section 13.2.1, January 2011
 $E = k(SL)^{0.01} \times (W)^{1.02}$
 For LDT assume 2 tons/vehicle, LHDT assume 13 tons/vehicle, HDT assume 20 tons/vehicle; therefore, average weight = 10.19 tons for 2016 and 5.52 tons for 2017
 Assume silt loading for 10,000 ADT roadways = 0.03 g/m³
 Assume k = 0.0022 PM10; 0.00054 PM2.5

Emission Factor
 PM10 2016 0.000965919
 PM2.5 2016 0.000237089
 PM10 2017 0.000516869
 PM2.5 2017 0.000126868

Table A-33-Q7. 2016 Construction Emissions, Worker Trips

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	CO		NO _x		ROG				SO _x		PM10				PM2.5					
						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)
All	Light-Duty Truck, catalyst	145	152	35	80	2.361162	31.42448	0.224936	1.8136819	0.057965	2.3946367	1.6219719	0.707095	0.16038404	0.71464703	0.004128	0.00571499	0.003216	0.0291986	0.008	0.03675	0.002961	0.0268842	0.002	0.01575

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
 Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	Emissions, tons							
						CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5
All	Light-Duty Truck, catalyst	145	152	35	80	5.35	0.48	0.25	0.01	0.09	0.04	0.16	0.04
Total						5.35	0.48	0.25	0.01	0.09	0.04	0.16	0.04

Table A-34-Q7. 2017 Construction Emissions, Worker Trips

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	CO		NO _x		ROG					SO _x		PM10				PM2.5				
						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)
All	Light-Duty Truck, catalyst	103	107	35	80	2.153834	31.4244799	0.205224	1.8136819	0.048784	2.39463668	1.62197187	0.707094998	0.16038404	0.714647031	0.004128	0.00571499	0.003035	0.02919863	0.008	0.03675	0.002803	0.0268842	0.002	0.01575

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
 Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	Emissions, tons								Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5
						CO	NO _x	VOCs	SO _x	PM10	PM2.5				
All	Light-Duty Truck, catalyst	103	107	35	80	2.48	0.22	0.12	0.00	0.05	0.02	0.08	0.02		
						2.48	0.22	0.12	0.00	0.05	0.02	0.08	0.02		

Table A-35-Q7
 Unmitigated Construction Emissions Summary
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-35-Q7. Annual Unmitigated Construction Emissions, Summary

2016	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	1.31	10.29	12.10	0.01	0.85	0.75
Construction Truck Trips	0.13	0.56	2.21	0.00	0.42	0.14
Worker Trips	0.25	5.35	0.48	0.01	0.26	0.08
Helicopter	0.02	0.10	0.10	0.01	0.07	0.07
Fugitive Dust (Unmitigated)					0.79	0.17
Total	1.72	16.29	14.90	0.03	2.38	1.21

2017	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	0.41	3.58	4.09	0.01	0.28	0.24
Construction Truck Trips	0.02	0.10	0.33	0.00	0.07	0.03
Worker Trips	0.12	2.48	0.22	0.00	0.13	0.04
Helicopter	0.03	0.15	0.15	0.01	0.11	0.11
Total	0.59	6.31	4.80	0.02	0.58	0.42

Table A-36-Q7
 Mitigated Construction Emissions Summary
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-36-Q7. Annual Mitigated Construction Emissions, Summary

2016	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	1.31	10.29	12.10	0.01	0.85	0.75
Construction Truck Trips	0.13	0.56	2.21	0.00	0.42	0.14
Worker Trips	0.25	5.35	0.48	0.01	0.26	0.08
Helicopter	0.02	0.10	0.10	0.01	0.07	0.07
Fugitive Dust (Mitigated)					0.31	0.06
Total	1.72	16.29	14.90	0.03	1.90	1.11

2017	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	0.41	3.58	4.09	0.01	0.28	0.24
Construction Truck Trips	0.02	0.10	0.33	0.00	0.07	0.03
Worker Trips	0.12	2.48	0.22	0.00	0.13	0.04
Helicopter	0.03	0.15	0.15	0.01	0.11	0.11
Total	0.59	6.31	4.80	0.02	0.58	0.42

Table A-37-Q7
ARB and USEPA Off-Road Engine Standards
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-37-Q7. ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards (NMHC+NOx/CO/PM in g/bhp-hr). When ARB and USEPA standards differ, the standards shown here represent the more stringent of the two.

Maximum horsepower	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015+
<11	See Table 2 footnote (a)					7.8 / 6.0 / 0.75			5.6 / 6.0 / 0.6			5.6 / 6.0 / 0.30 ^a									
11hp<25						7.1 / 4.9 / 0.60			5.6 / 4.9 / 0.60			5.6 / 4.9 / 0.30									
25hp<50	-					7.1 / 4.1 / 0.60			5.6 / 4.1 / 0.45			5.6 / 4.1 / 0.22			3.5 / 4.1 / 0.02						
50hp<75									5.6 / 3.7 / 0.30			3.5 / 3.7 / 0.22 ^c			3.5 / 3.7 / 0.02 ^c						
75hp<100						- / 6.9 / - / - ^b						3.5 / 3.7 / 0.30			0.14 / 2.5 / 3.7 / 0.015 ^{b,d}		0.14 / 0.30 / 3.7 / 0.015 ^b				
100hp<175									4.9 / 3.7 / 0.22			3.0 / 3.7 / 0.22									
175hp<300									4.9 / 2.6 / 0.15						0.14 / 1.5 / 2.6 / 0.015 ^{b,d}		0.14 / 0.30 / 2.2 / 0.015 ^b				
300hp<600	-	1.0 / 6.9 / 8.5 / 0.40 ^b							4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^e									
600hp@750																					
Mobile Machines > 750hp															0.30 / 2.6 / 2.6 / 0.07 ^b		0.14 / 2.6 / 2.6 / 0.03 ^b				
750hp<GEN @1200hp						1.0 / 6.9 / 8.5 / 0.40 ^b						4.8 / 2.6 / 0.15					0.14 / 0.50 / 2.6 / 0.02 ^b				
GEN>1200 hp															0.30 / 0.50 / 2.6 / 0.07 ^b						

- a) The PM standard for hand-start, air cooled, direct injection engines below 11 hp may be delayed until 2010 and be set at 0.45 g/bhp-hr.
- b) Standards given are NMHC/NOx/CO/PM in g/bhp-hr.
- c) Engine families in this power category may alternately meet Tier 3 PM standards (0.30 g/bhp-hr) from 2008-2011 in exchange for introducing final PM standards in 2012.
- d) The implementation schedule shown is the three-year alternate NOx approach. Other schedules are available.
- e) Certain manufacturers have agreed to comply with these standards by 2005.

: Tier 1
 : Tier 2
 : Tier 3
 : Tier 4 Interim / Final

Table A-37-Q7
 ARB and USEPA Off-Road Engine Standards
 Sycamore to Peñasquitos 230 kV Transmission Line Project

	TIER 2 Emission Factors					
	NOx		CO		PM	
	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr
Maximum horsepower						
<11	5.32	0.0117284	6	0.0132275	0.6	0.0013228
11@hp<25	5.32	0.0117284	4.9	0.0108025	0.6	0.0013228
25@hp<50	5.32	0.0117284	4.1	0.0090388	0.45	0.0009921
50@hp< 75	5.32	0.0117284	3.7	0.008157	0.3	0.0006614
75@hp<100	5.32	0.0117284	3.7	0.008157	0.3	0.0006614
100@hp<175	4.655	0.0102623	3.7	0.008157	0.22	0.000485
175@hp<300	4.655	0.0102623	2.6	0.0057319	0.15	0.0003307
300@hp<600	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
600@hp@750	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
Mobile Machines > 750hp	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
750hp<GEN @1200hp	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
GEN>1200 hp	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307

TIER 3 Emission Factors					
NOx		CO		PM	
g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr
5.32	0.0117284	6	0.0132275	0.6	0.0013228
5.32	0.0117284	4.9	0.0108025	0.6	0.0013228
5.32	0.0117284	4.1	0.0090388	0.45	0.0009921
5.32	0.0117284	3.7	0.008157	0.3	0.0006614
3.325	0.0073302	3.7	0.008157	0.3	0.0006614
2.85	0.0062831	3.7	0.008157	0.22	0.000485
2.85	0.0062831	2.6	0.0057319	0.15	0.0003307
2.85	0.0062831	2.6	0.0057319	0.15	0.0003307
2.85	0.0062831	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307

Composite Emission Factors - 70% Tier 2, 30% Tier 3		
NOx	CO	PM
lb/bhp-hr	lb/bhp-hr	lb/bhp-hr
0.011728395	0.013227513	0.001323
0.011728395	0.010802469	0.001323
0.011728395	0.009038801	0.000992
0.011728395	0.008156966	0.000661
0.010408951	0.008156966	0.000661
0.009068563	0.008156966	0.000485
0.009068563	0.005731922	0.000331
0.008921958	0.005731922	0.000331
0.008921958	0.005731922	0.000331
0.01005291	0.005731922	0.000331
0.01005291	0.005731922	0.000331
0.01005291	0.005731922	0.000331
0.01005291	0.005731922	0.000331

% reduction from TIER 2 to TIER 3		
NOx	CO	PM
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
37.50%	0.00%	0.00%
38.78%	0.00%	0.00%
38.78%	0.00%	0.00%
37.50%	0.00%	0.00%
37.50%	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%

 : Tier 2

 : Tier 3

Table B-1-Q7
Construction Heavy Equipment GHG Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-1-Q7. Total GHG Emissions, Equipment

Equipment	Emission Factors						Emissions			
	FUEL	HP	Load Factor	CO2 (lb/bhp-hr or lbs/hr)	CH4 (lb/bhp-hr or lbs/hr)	N2O (lb/bhp-hr or lbs/hr)	Total Use (Hours)	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)
Total Equipment Use										
2-ton Flatbed Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	616	4.48	0.00	0.00
Aerial Bucket Truck	DIESEL	175	0.38	16.0	0.0002	0.0009	1496	10.88	0.00	0.00
Air Compressor	DIESEL	78	0.48	1.3	0.0001	0.0010	8140	173.19	0.02	0.14
Backhoe	DIESEL	97	0.37	1.3	0.0001	0.0010	6820	139.10	0.01	0.11
Boom Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	704	5.12	0.00	0.00
Bulldozer	DIESEL	255	0.4	1.3	0.0001	0.0009	3740	216.79	0.02	0.15
Concrete Saw	DIESEL	81	0.73	1.3	0.0001	0.0010	4400	147.86	0.01	0.12
Concrete Trucks	DIESEL	175	0.38	16.0	0.0002	0.0154	4884	35.54	0.00	0.03
Crane Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	176	1.28	0.00	0.00
Crane	DIESEL	226	0.29	1.3	0.0001	0.0009	3630	135.20	0.01	0.09
Drill Rig	DIESEL	82	0.5	1.3	0.0002	0.0010	1100	25.63	0.00	0.02
Dump/Haul Truck	DIESEL	400	0.38	15.0	0.0006	0.0125	12320	83.80	0.00	0.07
Flatbed Boom Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	924	6.72	0.00	0.01
Forklift	DIESEL	83	0.4	1.3	0.0001	0.0010	1760	33.21	0.00	0.03
Grader	DIESEL	174	0.41	1.3	0.0001	0.0009	1760	71.36	0.01	0.05
Hydraulic Rock Splitter/Rock Drilling Equipment	DIESEL	82	0.5	1.3	0.0002	0.0010	88	2.05	0.00	0.00
Line Truck	DIESEL	175	0.38	16.0	0.0001	0.0009	1364	9.92	0.00	0.00
Loader	DIESEL	97	0.37	1.3	0.0001	0.0010	0	0.00	0.00	0.00
Mobile Fueling Truck	DIESEL	175	0.38	16.0	0.0001	0.0009	1496	10.88	0.00	0.00
Mower	DIESEL	25	0.42	1.3	0.0001	0.0011	484	2.89	0.00	0.00
Paving Rig	DIESEL	82	0.36	1.3	0.0002	0.0010	4400	73.82	0.01	0.06
Generator	DIESEL	50	0.74	1.3	0.0001	0.0011	7480	157.28	0.01	0.14
Skid-Steer Loader	DIESEL	78	0.37	1.3	0.0001	0.0010	0	0.00	0.00	0.00
Wire Puller	DIESEL	171	0.42	1.3	0.0001	0.0009	5060	206.52	0.01	0.14
Wire Tensioner	DIESEL	171	0.42	1.3	0.0001	0.0009	2640	107.75	0.01	0.07
Tool Van	DIESEL	175	0.38	16.0	0.0002	0.0154	704	5.12	0.00	0.00
Semi Tractor with Trailer	DIESEL	400	0.38	15.0	0.0150	0.0125	1540	10.47	0.01	0.01
Vacuum Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	1364	9.92	0.00	0.01
Water Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	2244	16.33	0.00	0.02
Total								1703.12	0.15	1.28

Table B-2-Q7
Construction and Operational Truck Trip GHG Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-2-Q7. Total GHG Emissions, Construction Truck Trips

Vehicle	Vehicle Class	Number of days used	Speed (mph)	VMT (mi/vehicle-day)	CO2	CH4	N2O	Emissions, metric tons		
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO2	CH4	N2O
2-ton Flatbed Truck	Light Heavy Duty Truck, Diesel	308	30	20	504.222339	0.02881278	0.01	3.11	0.00	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Diesel	748	30	20	504.222339	0.02881278	0.01	7.54	0.00	0.00
Boom Truck	Light Heavy Duty Truck, Diesel	352	30	20	504.222339	0.02881278	0.01	3.55	0.00	0.00
Concrete Trucks	Light Heavy Duty Truck, Diesel	2442	30	30	504.222339	0.02881278	0.01	36.94	0.00	0.00
Crane Truck	Light Heavy Duty Truck, Diesel	88	30	20	504.222339	0.02881278	0.01	0.89	0.00	0.00
Drill Rig/Truck Mounted Auger	Light Heavy Duty Truck, Diesel	550	30	20	504.222339	0.02881278	0.01	5.55	0.00	0.00
Dump Truck	Heavy Duty Truck, Diesel	6160	30	60	1807.66928	0.10329565	0.05	668.12	0.04	0.02
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	462	30	20	504.222339	0.02881278	0.01	4.66	0.00	0.00
Line Truck	Light Heavy Duty Truck, Diesel	682	30	20	504.222339	0.02881278	0.01	6.88	0.00	0.00
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	748	30	30	504.222339	0.02881278	0.01	11.31	0.00	0.00
Pick-Up Trucks	Light Duty Truck 1, Diesel	4796	30	20	247.933018	0.01416764	0.01	23.78	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	2596	30	20	247.933018	0.01416764	0.01	12.87	0.00	0.00
Tool Van	Light Duty Truck 1, Diesel	352	30	20	247.933018	0.01416764	0.01	1.75	0.00	0.00
Semi Tractor with Trailer	Heavy Duty Truck, Diesel	770	30	60	1807.66928	0.10329565	0.05	83.52	0.00	0.00
Vacuum Trucks	Light Heavy Duty Truck, Diesel	440	30	30	504.222339	0.02881278	0.01	6.66	0.00	0.00
Water Truck	Light Heavy Duty Truck, Diesel	1364	30	30	504.222339	0.02881278	0.01	20.63	0.00	0.00
Total								897.75	0.05	0.02

Table B-3-Q7
 Construction and Operations Worker Commute GHG Emission Calculations
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-3-Q7. Total GHG Emissions, Worker Trips

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Number of Days	Speed (mph)	VMT (mi/vehicle-day)	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)
All	Light-Duty Truck, catalyst	248	166	35	80	297.39552	448.5481762	0.0028329	0.02209593	0.0085373	0.00972228

EMFAC2011 emission factors for 2016

Assume startup after 8 hours

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Number of Days	Speed (mph)	VMT (mi/vehicle-day)			
						CO2	CH4	N2O
All	Light-Duty Truck, catalyst	248	166	35	80	997.94	0.01	0.03
Total Worker Trips						997.94	0.01	0.03

Table B-5-Q7
 Total GHG Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-5-Q7. Total GHG Emissions, metric tons

	Total Construction Emissions, metric tons		
	CO2	CH4	N2O
Construction Equipment	1703.12	0.15	1.28
Construction Truck Trips	897.75	0.05	0.02
Worker Trips	997.94	0.01	0.03
Helicopter	59.68	0.01	0.01
Total	3658.49	0.22	1.34

4077.812

APPENDIX J
AIR QUALITY & GREENHOUSE GASES
SUPPORT INFORMATION

**AIR QUALITY AND GREENHOUSE GASES EMISSIONS TABLES
FOR ALTERNATIVE 5**

**APPENDIX J
AIR QUALITY & GREENHOUSE GASES
SUPPORT INFORMATION**

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Table A-1-Q5
 Construction Heavy Equipment Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment A

Table A-1-Q5. 2016 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment A

Equipment/Phase	Source	Emission Factors												Emissions										
		FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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
OFFROAD Equipment																								
Wire Stringing																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.61	3.05	4.39	0.00	0.25	0.22	469.08	0.06	0.42
Bulldozer	CalEEMod User's Guide, Appendix D, 2016 Rubber Tired Dozers, 251/500 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	255	0.4	0.0013	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	5	0.67	2.92	4.62	0.01	0.17	0.15	638.97	0.06	0.44
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	5	0.32	2.67	2.97	0.00	0.11	0.10	410.57	0.03	0.28
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	1	10	0.93	3.34	4.34	0.00	0.37	0.33	463.57	0.04	0.41
Wire Puller	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0104	0.0000	0.0005	0.000431658	1.3	0.0001	0.0010	1	5	0.31	2.93	3.74	0.00	0.17	0.16	449.91	0.03	0.36
Wire Tensioner	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0104	0.0000	0.0005	0.000431658	1.3	0.0001	0.0010	1	5	0.31	2.93	3.74	0.00	0.17	0.16	449.91	0.03	0.36
Cleanup and Restoration																								
Backhoe	CalEEMod User's Guide, Appendix D, 2016 Tractor/Loader/Backhoe, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	97	0.37	0.0013	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.46	2.93	4.21	0.00	0.24	0.21	449.66	0.04	0.40
Bulldozer	CalEEMod User's Guide, Appendix D, 2016 Rubber Tired Dozers, 251/500 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	255	0.4	0.0013	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	5	0.67	2.92	4.62	0.01	0.17	0.15	638.97	0.06	0.44
Grader	CalEEMod User's Guide, Appendix D, 2016 Graders, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	174	0.41	0.0012	0.0082	0.0104	0.0000	0.0005	0.000431658	1.3	0.0001	0.0010	1	10	0.88	5.82	7.43	0.01	0.35	0.31	893.81	0.08	0.71
Mower	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 15/25 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	25	0.42	0.0015	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	1	5	0.08	0.47	0.62	0.00	0.05	0.05	65.78	0.01	0.06
On-Road Certified Truck Emissions																								
Wire Stringing																								
Aerial Bucket Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	3	2	0.03	0.29	0.97	0.00	0.00	0.00	96.25	0.00	0.09
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Tool Van	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Tractor/Trailer	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	1	5	0.07	0.37	0.66	0.00	0.00	0.00	74.97	0.00	0.06
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	10	0.09	0.98	3.24	0.00	0.01	0.01	320.82	0.00	0.31
Subtotal																								
Cleanup and Restoration																								
2-ton Flatbed Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Dump/Haul Truck	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	1	5	0.07	0.37	0.66	0.00	0.00	0.00	74.97	0.00	0.06
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	10	0.09	0.98	3.24	0.00	0.01	0.01	320.82	0.00	0.31
Subtotal																								
Subtotal																5.61	33.37	50.75	0.06	2.08	1.85	5946.41	0.45	4.82
Simultaneous Construction Equipment																5.61	33.37	50.75	0.06	2.08	1.85	5946.41	0.45	4.82

Table A-2-Q5
 Construction and Operational Truck Trip Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment A

Table A-2-Q5. 2016 Maximum Daily Construction Emissions, Construction Truck Trips, Segment A

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SOx	PM10			PM2.5			CO2	CH4	N2O	Emissions, lbs/day										
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NO _x	VOCs	SOx	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5
Wire Stringing																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	6	30	20	0.292950056	0.47693085	0.065210487	0.00318614	0.05395477	0.007999958	0.036749816	0.04963839	0.002	0.01574992	247.933018	0.014167636	0.01	0.08	0.13	0.02	0.00	0.03	0.02	0.10	0.02	65.59	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	3	30	20	0.292950056	0.47693085	0.065210487	0.00318614	0.05395477	0.007999958	0.036749816	0.04963839	0.002	0.01574992	247.933018	0.014167636	0.01	0.04	0.06	0.01	0.00	0.01	0.01	0.05	0.01	32.80	0.00	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Diesel	3	30	20	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.05	0.01	66.70	0.00	0.00
Line Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.02	0.00	22.23	0.00	0.00
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.02	0.01	33.35	0.00	0.00
Tool Van	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.02	0.01	33.35	0.00	0.00
Tractor/Trailer	Heavy Duty Truck, Diesel	1	30	60	1.111513533	5.1835677	0.300386954	0.01071182	0.06981799	0.035999812	0.061739677	0.06423255	0.009	0.026459862	1807.66928	0.103295646	0.05	0.15	0.69	0.04	0.00	0.02	0.01	0.05	0.01	239.11	0.01	0.01
Water Truck	Light Heavy Duty Truck, Diesel	2	30	30	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.05	0.01	66.70	0.00	0.00
Subtotal																		0.63	2.23	0.14	0.00	0.12	0.07	0.35	0.09	559.83	0.03	0.01
Cleanup and Restoration																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	4	30	20	0.292950056	0.47693085	0.065210487	0.00318614	0.05395477	0.007999958	0.036749816	0.04963839	0.002	0.01574992	247.933018	0.014167636	0.01	0.05	0.08	0.01	0.00	0.02	0.01	0.06	0.02	43.73	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.47693085	0.065210487	0.00318614	0.05395477	0.007999958	0.036749816	0.04963839	0.002	0.01574992	247.933018	0.014167636	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.03	0.01	21.86	0.00	0.00
2-ton Flatbed Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.02	0.00	22.23	0.00	0.00
Dump Truck	Heavy Duty Truck, Diesel	1	30	60	1.111513533	5.1835677	0.300386954	0.01071182	0.06981799	0.035999812	0.061739677	0.06423255	0.009	0.026459862	1807.66928	0.103295646	0.05	0.15	0.69	0.04	0.00	0.02	0.01	0.05	0.01	239.11	0.01	0.01
Water Truck	Light Heavy Duty Truck, Diesel	2	30	30	0.824603222	3.07224465	0.173432606	0.00318614	0.03981854	0.011999937	0.089179533	0.03663306	0.003	0.038219796	504.222339	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.05	0.01	66.70	0.00	0.00
Subtotal																		0.37	1.35	0.09	0.00	0.07	0.04	0.21	0.05	393.64	0.02	0.01
Simultaneous Construction Trucks																		1.00	3.58	0.23	0.01	0.20	0.12	0.56	0.14	953.47	0.05	0.02

Table A-3-Q5. 2016 Maximum Daily Construction Emissions, Worker Trips, Segment A

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)
Wire Stringing	Light-Duty Truck, catalyst	21	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.005714994	0.00321577	0.02919863	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.022095932	0.01	0.009722282
Cleanup and Restoration	Light-Duty Truck, catalyst	12	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.005714994	0.00321577	0.02919863	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.022095932	0.01	0.009722282

EMFAC2011 emission factors for 2016
 Assume startup after 8 hours

Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Wire Stringing	Light-Duty Truck, catalyst	21	35	80	10.20	0.92	1.06	0.02	0.18	0.08	0.31	0.08	1163.90	0.01	0.04
Cleanup and Restoration	Light-Duty Truck, catalyst	12	35	80	5.83	0.52	0.61	0.01	0.10	0.04	0.18	0.04	665.08	0.01	0.02
Simultaneous Worker Trips		33			16.03	1.44	1.67	0.02	0.28	0.12	0.48	0.12	1828.98	0.02	0.06

Table A-4-Q5
 Fugitive Dust Emission Calculations
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment A

Table A-4-Q5. 2016 Maximum Daily Construction Emissions, Fugitive Dust, Segment A

Cleanup and Restoration

Grading - Bulldozer Operations

Emission factor from SCAQMD CEQA Air Quality Handbook, Table A9-9-F

$$E = ([0.45 \times \{([G]^{1.5})/([H]^{1.4})\}] \times I) \times J$$

where

G = silt content of material in percent, assumed to be 7.5%

Assume H = 2.0% moisture - unmitigated

Assume 61% control efficiency for watering 3 times/day

I = 2.2046 lb/kg

J = hours of bulldozing operations, based on construction scenario, 8 hrs/day for 25 days

$$E = ([0.45 \times \{([G]^{1.5})/([H]^{1.4})\}] \times I) \times J =$$

PM10

Unmitigated	Mitigated	Unit
61.77065479	24.09055537	lbs/day
0.772133185	0.301131942	total tons

PM2.5

Unmitigated	Mitigated	Unit
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Table A-5-Q5. 2016 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment B

Equipment/Phase	Source	Emission Factors											Emissions											
		FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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)
OFFROAD Equipment																								
Excavate and Install Vaults and Trench																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	3	10	1.84	9.16	13.17	0.01	0.74	0.66	1407.25	0.17	1.25
Backhoe	CalEEMod User's Guide, Appendix D, 2016 Tractor/Loader/Backhoe, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	7	10	3.19	20.49	26.15	0.03	1.66	1.48	3147.64	0.28	2.48
Bulldozer	CalEEMod User's Guide, Appendix D, 2016 Rubber Tired Dozers, 251/500 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	255	0.4	0.0013	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	4	5	2.69	11.69	18.50	0.03	0.67	0.60	2555.90	0.24	1.76
Concrete Saw	CalEEMod User's Guide, Appendix D, 2016 Concrete Saws, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	81	0.73	0.0014	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	4	10	3.23	19.29	24.62	0.03	1.56	1.39	2963.34	0.29	2.34
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	2	5	0.64	5.35	5.94	0.01	0.22	0.19	821.15	0.06	0.56
Jackhammer	Note: Jackhammers are powered by the air compressors on the site.												11											
Paver	CalEEMod User's Guide, Appendix D, 2016 Paver, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	89	0.42	0.0021	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0002	0.0010	7	10	5.51	21.34	27.24	0.03	1.73	1.54	3278.32	0.50	2.59
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.00082937	1.3	0.0001	0.0011	1	10	0.93	3.34	4.34	0.00	0.37	0.33	463.57	0.04	0.41
Loader	CalEEMod User's Guide, Appendix D, 2016 Tractor/Loader/Backhoe, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	4	10	1.82	11.71	14.94	0.02	0.95	0.85	1798.65	0.16	1.42
Ducts through Bridge																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.61	3.05	4.39	0.00	0.25	0.22	469.08	0.06	0.42
Concrete Saw	CalEEMod User's Guide, Appendix D, 2016 Concrete Saws, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	81	0.73	0.0014	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	1	10	0.81	4.82	6.15	0.01	0.39	0.35	740.83	0.07	0.58
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	5	0.32	2.67	2.97	0.00	0.11	0.10	410.57	0.03	0.28
Drill Rig	CalEEMod User's Guide, Appendix D, 2016 Bore/Drill Rigs, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	82	0.5	0.0006	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0002	0.0011	1	10	0.23	3.34	4.81	0.01	0.27	0.24	513.69	0.08	0.46
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.00082937	1.3	0.0001	0.0011	1	10	0.93	3.34	4.34	0.00	0.37	0.33	463.57	0.04	0.41
Cleaning and Proving Ducts																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	2	10	1.23	6.11	8.78	0.01	0.50	0.44	938.17	0.11	0.83
Cabling																								
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	6	10	3.68	18.32	26.35	0.03	1.49	1.32	2814.50	0.33	2.50
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	3	5	0.96	8.02	8.92	0.01	0.33	0.29	1231.72	0.09	0.85
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.00082937	1.3	0.0001	0.0011	3	10	2.80	10.03	13.02	0.01	1.10	0.98	1390.71	0.13	1.24
Pulling Rig	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	1.3	0.0001	0.0009	9	6	3.32	31.64	35.17	0.05	1.88	1.67	4859.06	0.30	3.34
On-Road Certified Truck Emissions																								
Excavate and Install Vaults and Trench																								
Concrete Trucks	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	45	2	0.39	4.40	14.58	0.01	0.06	0.05	1443.68	0.02	1.39
Dump/Haul Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	400	0.38	0.0132	0.0735	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	96	2	2.53	14.12	25.30	0.03	0.07	0.06	2879.02	0.12	2.40
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Semi Tractor with Trailer	EMFAC2011 emission factors, MHDT idling	DIESEL	400	0.38	0.0135	0.0756	0.1230	0.0001	0.0003	0.000265501	15.0	0.0150	0.0117	4	2	0.11	0.61	0.98	0.00	0.00	0.00	119.98	0.12	0.09
Vacuum Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	7	2	0.06	0.68	2.27	0.00	0.01	0.01	224.57	0.00	0.22
Water Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	7	10	0.30	3.42	11.34	0.01	0.04	0.04	1122.86	0.01	1.08
Ducts through Bridge																								
Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	2	2	0.02	0.20	0.65	0.00	0.00	0.00	64.16	0.00	0.06
Flatbed Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Semi Tractor with Trailer	EMFAC2011 emission factors, MHDT idling	DIESEL	400	0.38	0.0135	0.0756	0.1230	0.0001	0.0003	0.000265501	15.0	0.0150	0.0117	1	2	0.03	0.15	0.25	0.00	0.00	0.00	29.99	0.03	0.02
Cleaning and Proving Ducts																								
Flatbed Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	1	2	0.01	0.10	0.32	0.00	0.00	0.00	32.08	0.00	0.03
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	16.0	0.0002	0.0154	4	2	0.03	0.39	1.30	0.00	0.00	0.00	128.33	0.00	0.12
Cabling																								
Aerial Bucket Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	3	2	0.03	0.29	0.92	0.00	0.00	0.00	95.08	0.00	0.09
Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	9	2	0.08	0.88	2.76	0.00	0.01	0.01	285.24	0.00	0.26
Flatbed Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	6	2	0.05	0.59	1.84	0.00	0.01	0.01	190.16	0.00	0.17
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	6	2	0.05	0.59	1.84	0.00	0.01	0.01	190.16	0.00	0.17
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	3	2	0.03	0.29	0.92	0.00	0.00	0.00	95.08	0.00	0.09
Tool Van	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	3	2	0.03	0.29	0.92	0.00	0.00	0.00	95.08	0.00	0.09
Semi Tractor with Trailer	EMFAC2011 emission factors, MHDT idling	DIESEL	400	0.38	0.0135	0.0756	0.1230	0.0001	0.0003	0.000265501	15.0	0.0150	0.0117	9	2	0.24	1.36	2.21	0.00	0.01	0.00	269.91	0.27	0.21
Simultaneous Construction Equipment															38.77	222.29	318.85	0.39	14.80	13.18	37597.22	3.56	30.29	

Table A-6-Q5
Construction and Operational Truck Trip Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project
Segment B

Table A-6. 2016 Maximum Daily Construction Emissions, Construction Truck Trips, Segment B

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO _x	ROG	SO _x	PM10		PM2.5			CO ₂	CH ₄	N ₂ O	Emissions, lbs/day											
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	Tire Wear (g/mi)	Brake Wear (g/mi)	Running Exhaust (g/mi)	CH ₄	N ₂ O	CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO ₂	CH ₄	N ₂ O
Excavate and Install Vaults and Trench																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	6	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.08	0.13	0.02	0.00	0.03	0.02	0.17	0.04	65.59	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	3	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.04	0.06	0.01	0.00	0.01	0.01	0.09	0.02	32.80	0.00	0.00
Concrete Trucks	Light Heavy Duty Truck, Diesel	45	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	2.45	9.14	0.52	0.01	0.42	0.23	1.95	0.48	1500.69	0.09	0.04
Dump Truck	Heavy Duty Truck, Diesel	96	30	60	1.111513533	5.1835677	0.300386954	0.0107118	0.069818	0.035999812	0.061739677	0.0642326	0.008999953	0.026459862	1807.6693	0.103295646	0.05	14.11	65.82	3.81	0.14	2.13	1.27	8.32	2.04	22955.04	1.31	0.59
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	1	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.05	0.20	0.01	0.00	0.01	0.01	0.00	0.00	33.35	0.00	0.00
Tractor/Trailer Truck	Heavy Duty Truck, Diesel	4	30	60	1.111513533	5.1835677	0.300386954	0.0107118	0.069818	0.035999812	0.061739677	0.0642326	0.008999953	0.026459862	1807.6693	0.103295646	0.05	0.59	2.74	0.16	0.01	0.09	0.05	0.35	0.09	956.46	0.05	0.02
Vacuum Truck	Light Heavy Duty Truck, Diesel	7	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.38	1.42	0.08	0.00	0.07	0.04	0.00	0.00	233.44	0.01	0.01
Water Truck	Light Heavy Duty Truck, Diesel	7	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.38	1.42	0.08	0.00	0.07	0.04	0.00	0.00	233.44	0.01	0.01
Subtotal																		18.09	80.95	4.69	0.16	2.82	1.65	10.87	2.67	26010.81	1.49	0.67
Ducts through Bridge																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.06	0.01	21.86	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	1	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.03	0.01	10.93	0.00	0.00
Boom Truck	Light Heavy Duty Truck, Diesel	2	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.07	0.27	0.02	0.00	0.01	0.01	0.00	0.00	44.47	0.00	0.00
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.00	0.00	22.23	0.00	0.00
Tractor/Trailer Truck	Heavy Duty Truck, Diesel	1	30	60	1.111513533	5.1835677	0.300386954	0.0107118	0.069818	0.035999812	0.061739677	0.0642326	0.008999953	0.026459862	1807.6693	0.103295646	0.05	0.15	0.69	0.04	0.00	0.02	0.01	0.09	0.02	239.11	0.01	0.01
Subtotal																		0.29	1.16	0.07	0.00	0.05	0.03	0.17	0.04	338.61	0.02	0.01
Cleaning and Proving Ducts																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.03	0.04	0.01	0.00	0.01	0.01	0.06	0.01	21.86	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	1	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.03	0.01	10.93	0.00	0.00
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	1	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.04	0.14	0.01	0.00	0.01	0.00	0.00	0.00	22.23	0.00	0.00
Line Trucks	Light Heavy Duty Truck, Diesel	4	30	30	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.22	0.81	0.05	0.00	0.04	0.02	0.17	0.04	133.40	0.01	0.00
Subtotal																		0.29	1.01	0.06	0.00	0.06	0.03	0.26	0.06	188.42	0.01	0.00
Cabling																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	12	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.16	0.25	0.03	0.00	0.05	0.04	0.35	0.09	131.18	0.01	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	9	30	20	0.292950056	0.4769309	0.065210487	0.0031861	0.0539548	0.007999958	0.036749816	0.0496384	0.001999999	0.01574992	247.93302	0.014167636	0.01	0.12	0.19	0.03	0.00	0.04	0.03	0.26	0.06	98.39	0.01	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Diesel	3	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.09	0.02	66.70	0.00	0.00
Boom Truck	Light Heavy Duty Truck, Diesel	9	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.33	1.22	0.07	0.00	0.06	0.03	0.26	0.06	200.09	0.01	0.01
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	6	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.22	0.81	0.05	0.00	0.04	0.02	0.17	0.04	133.40	0.01	0.00
Line Truck	Light Heavy Duty Truck, Diesel	6	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.22	0.81	0.05	0.00	0.04	0.02	0.17	0.04	133.40	0.01	0.00
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	3	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.09	0.02	66.70	0.00	0.00
Tool Van	Light Heavy Duty Truck, Diesel	3	30	20	0.824603222	3.0722446	0.173432606	0.0031861	0.0398185	0.011999937	0.089179533	0.0366331	0.002999984	0.038219796	504.22234	0.028812777	0.01	0.11	0.41	0.02	0.00	0.02	0.01	0.09	0.02	66.70	0.00	0.00
Tractor/Trailer Truck	Heavy Duty Truck, Diesel	9	30	60	1.111513533	5.1835677	0.300386954	0.0107118	0.069818	0.035999812	0.061739677	0.0642326	0.008999953	0.026459862	1807.6693	0.103295646	0.05	1.32	6.17	0.36	0.01	0.20	0.12	0.78	0.19	2152.03	0.12	0.06
Subtotal																		2.69	10.68	0.65	0.02	0.48	0.28	2.25	0.55	3048.58	0.17	0.08
Simultaneous Construction Trucks																		21.36	93.79	5.47	0.18	3.40	2.00	13.56	3.33	29586.43	1.69	0.76

Table A-7-Q5
 Construction and Operations Worker Commute Emission Calculations
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment B

Table A-7-Q5. 2016 Maximum Daily Construction Emissions, Worker Trips, Segment B

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)
Excavate and Install Trench and Ducts	Light-Duty Truck, catalyst	93	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.00571499	0.00321577	0.0291986	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.02209593	0.01	0.00972228
Ducts through Bridge	Light-Duty Truck, catalyst	12	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.00571499	0.00321577	0.0291986	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.02209593	0.01	0.00972228
Cleaning and Proving Ducts	Light-Duty Truck, catalyst	40	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.00571499	0.00321577	0.0291986	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.02209593	0.01	0.00972228
Cabling	Light-Duty Truck, catalyst	30	35	80	2.361162204	31.42447989	0.22493614	1.813681924	0.057965153	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.00571499	0.00321577	0.0291986	0.008	0.03675	0.0029606	0.026884174	0.002	0.01575	308.6379	448.5481762	0.0032779	0.02209593	0.01	0.00972228

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
 Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Excavate and Install Trench and Ducts	Light-Duty Truck, catalyst	93	35	80	45.17	4.06	4.70	0.07	0.79	0.35	1.37	0.34	5154.39	0.06	0.16
Ducts through Bridge	Light-Duty Truck, catalyst	12	35	80	5.83	0.52	0.61	0.01	0.10	0.04	0.18	0.04	665.08	0.01	0.02
Cleaning and Proving Ducts	Light-Duty Truck, catalyst	40	35	80	19.43	1.75	2.02	0.03	0.34	0.15	0.59	0.14	2216.94	0.03	0.07
Cabling	Light-Duty Truck, catalyst	30	35	80	14.57	1.31	1.51	0.02	0.26	0.11	0.44	0.11	1662.71	0.02	0.05
Simultaneous Worker Trips		93			85.00	7.64	8.84	0.13	1.49	0.65	2.57	0.63	9699.13	0.11	0.29

Table A-8-Q5
 Fugitive Dust Emission Calculations
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment B

Table A-8-Q5. 2016 Maximum Daily Construction Emissions, Fugitive Dust, Segment B

Excavation and Install Vaults and Trench

Earthmoving - Material Handling

Emission Factor from SCAQMD CEQA Air Quality Handbook, Table A9-9-G

$$E = [0.00112 \times \{ \{ [G/5]^{1.3} \} / \{ [H/2]^{1.4} \} \}] \times [I/J]$$

where

G = Mean wind speed in miles per hour- based on data from the website below, assuming a maximum wind speed of 12 mph

H = Moisture content of surface material, assumed to be 2%

I = Pounds of overburden handled per day

J = lbs/ton, 2000

Assume 12 miles per hour daily maximum wind speed

Assume H = 2.0% moisture - unmitigated

Assume 61% control efficiency for watering 3 times/day

I = 16,200 cubic yards x 1600 lbs/cubic yard = 12960 tons of material

Assume earthmoving occurs over 30 days, maximum per day could be 10 x daily average

PM10

Unmitigated	Mitigated	Unit
15.0999804	5.888992358	lbs/day
0.00791025	0.003084999	total tons

$$E = [0.00112 \times \{ \{ [G/5]^{1.3} \} / \{ [H/2]^{1.4} \} \}] \times [I/J] =$$

PM2.5

Unmitigated	Mitigated	Unit
3.17099589	1.236688395	lbs/day
0.00166115	0.00064785	total tons

NOTE: PM2.5 is assumed to be 21% of PM10 based on SCAQMD's Final –Methodology to Calculate Particulate Matter (PM) 2.5 and PM 2.5 Significance Thresholds (October 2006)

Table A-9-Q5
 Construction Heavy Equipment Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project
 Segment B

Table A-9-Q5. 2017 Maximum Daily Construction Emissions, Construction Heavy Equipment Use, Segment B

Equipment/Phase	Source	Emission Factors											Emissions																
		FUEL	HP	Load Factor	ROG (lb/bhp-hr)	CO (lb/bhp-hr)	NOX (lb/bhp-hr)	SOX (lb/bhp-hr)	PM10 (lb/bhp-hr)	PM2.5 (lb/bhp-hr)	CO2 (lb/bhp-hr)	CH4 (lb/bhp-hr)	N2O (lb/bhp-hr)	No of Equipment	Hrs Per Day	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					
OFFROAD Equipment																													
Cabling																													
Air Compressors	CalEEMod User's Guide, Appendix D, 2016 Air Compressors, 51/120 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	78	0.48	0.0016	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	6	10	3.68	18.32	26.35	0.03	1.49	1.32	2814.50	0.33	2.50					
Crane	CalEEMod User's Guide, Appendix D, 2016 Cranes, 176/250 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	226	0.29	0.0010	0.0082	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	3	5	0.96	8.02	8.92	0.01	0.33	0.29	1231.72	0.09	0.85					
Generator	CalEEMod User's Guide, Appendix D, 2016 Generators, 26/50 hp; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	50	0.74	0.0025	0.0090	0.0117	0.0000	0.0010	0.000882937	1.3	0.0001	0.0011	3	10	2.80	10.03	13.02	0.01	1.10	0.98	1390.71	0.13	1.24					
Pulling Rig	CalEEMod User's Guide, Appendix D, 2016 Other Construction Equipment, 121/175 hp for ROG, SOx, CO2, and CH4; 70% Tier2/Tier3 emission factors from Table A-29 for CO, NOx, and PM.	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	1.3	0.0001	0.0009	9	6	3.32	31.64	35.17	0.05	1.88	1.67	4859.06	0.30	3.34					
On-Road Certified Truck Emissions																													
Cable Pulling																													
Aerial Bucket Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	3	2	0.03	0.29	0.92	0.00	0.00	0.00	95.08	0.00	0.09					
Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	9	2	0.08	0.88	2.76	0.00	0.01	0.01	285.24	0.00	0.26					
Flatbed Boom Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	6	2	0.05	0.59	1.84	0.00	0.01	0.01	190.16	0.00	0.17					
Line Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	6	2	0.05	0.59	1.84	0.00	0.01	0.01	190.16	0.00	0.17					
Mobile Fueling Truck	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	3	2	0.03	0.29	0.92	0.00	0.00	0.00	95.08	0.00	0.09					
Tool Van	EMFAC2011 emission factors, MHDT idling	DIESEL	175	0.38	0.0043	0.0488	0.1531	0.0002	0.0005	0.000478907	15.8	0.0002	0.0145	3	2	0.03	0.29	0.92	0.00	0.00	0.00	95.08	0.00	0.09					
Semi Tractor with Trailer	EMFAC2011 emission factors, HHDT idling	DIESEL	400	0.38	0.0135	0.0756	0.1230	0.0001	0.0003	0.000265501	15.0	0.0150	0.0117	9	2	0.24	1.36	2.21	0.00	0.01	0.00	269.91	0.27	0.21					
Simultaneous Construction Equipment															11.27	72.30	94.85	0.12	4.83	4.30	11516.69	1.13	9.01						

Equipment amounts tripled to account for three crews

Table A-11-Q5. 2017 Maximum Daily Construction Emissions, Worker Trips, Segment B

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 Exhaust (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)
Cabling	Light-Duty Truck, catalyst	30	35	80	2.153833594	31.42447989	0.20522395	1.813681924	0.048783653	2.394636679	1.621971672	0.707094998	0.16038404	0.714647031	0.004127654	0.005714994	0.003035358	0.029198634	0.007999958	0.036749816	0.002803369	0.026884174	0.001999999	0.01574992	297.39552	448.5481762	0.0028329	0.022095932	0.01	0.009722282

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

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	Emissions, lbs/day										
					CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Cabling	Light-Duty Truck, catalyst	30	35	80	13.47	1.21	1.47	0.02	0.25	0.11	0.44	0.11	1603.22	0.02	0.05
Simultaneous Worker Trips		30			13.47	1.21	1.47	0.02	0.25	0.11	0.44	0.11	1603.22	0.02	0.05

Table A-12-Q5
 Unmitigated Construction Emissions Summary
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-12-Q5. Maximum Daily Unmitigated Construction Emissions, Summary, Alternative Q5

2016	Maximum Daily Construction Emissions, lbs/day					
Segment A	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	5.61	33.37	50.75	0.06	2.08	1.85
Construction Truck Trips	0.23	1.00	3.58	0.01	0.76	0.26
Worker Trips	1.67	16.03	1.44	0.02	0.77	0.24
Helicopter	1.03	4.50	4.50	0.31	3.25	3.25
Fugitive Dust (Unmitigated)					61.77	12.97
Total	8.53	54.90	60.27	0.40	68.63	18.58
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Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	38.77	222.29	318.85	0.39	14.80	13.18
Construction Truck Trips	5.47	21.36	93.79	0.18	16.96	5.33
Worker Trips	8.84	85.00	1.44	0.13	4.06	1.28
Fugitive Dust (Unmitigated)					15.10	3.17
Total	53.07	328.65	414.08	0.70	50.92	22.96
<hr/>						
Maximum Daily Emissions, 2016	61.60	383.55	474.36	1.10	119.55	41.54
<hr/>						
2017	Maximum Daily Construction Emissions, lbs/day					
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	11.27	72.30	94.85	0.12	4.83	4.30
Construction Truck Trips	0.65	2.69	10.68	0.02	1.33	0.47
Worker Trips	1.47	13.47	1.21	0.02	0.70	0.22
Total	13.38	88.46	106.74	0.16	6.86	4.99
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Maximum Daily Emissions, 2017	13.38	88.46	106.74	0.16	6.86	4.99

Table A-12-Q5
Mitigated Construction Emissions Summary
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-13-Q5. Maximum Daily Mitigated Construction Emissions, Summary, Alternative Q5

2016	Maximum Daily Construction Emissions, lbs/day					
Segment A	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	5.61	33.37	50.75	0.06	2.08	1.85
Construction Truck Trips	0.23	1.00	3.58	0.01	0.76	0.26
Worker Trips	1.67	16.03	1.44	0.02	0.77	0.24
Helicopter	1.03	4.50	4.50	0.31	3.25	3.25
Fugitive Dust (Mitigated)					24.09	5.06
Total	8.53	54.90	60.27	0.40	30.95	10.66
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Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	38.77	222.29	318.85	0.39	14.80	13.18
Construction Truck Trips	5.47	21.36	93.79	0.18	16.96	5.33
Worker Trips	8.84	85.00	1.44	0.13	4.06	1.28
Fugitive Dust (Mitigated)					5.89	1.24
Total	53.07	328.65	414.08	0.70	41.71	21.03
<hr/>						
Maximum Daily Emissions, 2016	61.60	383.55	474.36	1.10	72.66	31.69
<hr/>						
2017	Maximum Daily Construction Emissions, lbs/day					
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	11.27	72.30	94.85	0.12	4.83	4.30
Construction Truck Trips	0.65	2.69	10.68	0.02	1.33	0.47
Worker Trips	1.47	13.47	1.21	0.02	0.70	0.22
Total	13.38	88.46	106.74	0.16	6.86	4.99
<hr/>						
Maximum Daily Emissions, 2017	13.38	88.46	106.74	0.16	6.86	4.99

Table A-14-Q5. Helicopter Emissions

SX-PQ Transmission Project

Helicopter Model	Engine	Assumed Engine	Operating Mode	Fuel Flow, kg/s	Time in Mode, min	Emission Incides, g/kg fuel					Emissions, lbs/mode					Cruise Mode Emission factor, lbs/hour				
						CO	VOC	NOx	Sox	PM	CO	VOC	NOx	SOx	PM	CO	VOC	NOx	SOx	PM
Hughes 500E	Allison 250-C20B/R	250B17B																		
			Taxi Out	0.008154	19	2.199837	23.004097	2.199837	0.4	4.2	0.045081939	0.471430067	0.045081939	0.008197324	0.086071898					
			Takeoff	0.031642	10.4	6.599994	0.402675	6.599994	0.4	4.2	0.287295342	0.017528297	0.287295342	0.017411855	0.182824475					
			Climbout	0.028926	0.09	5.981142	0.408337	5.981142	0.4	4.2	0.002059694	0.000140617	0.002059694	0.000137746	0.001446332	1.373129585	0.093744575	1.373129585	0.091830596	0.964221257
			Approach	0.010516	10.05	2.200637	5.988767	2.200637	0.4	4.2	0.03076471	0.083722432	0.03076471	0.005591965	0.058715628					
			Taxi In	0.008154	7	2.199837	23.004097	2.199837	0.4	4.2	0.016609136	0.173684761	0.016609136	0.003020067	0.031710699					
											Total per LTO	0.381810822	0.746506173	0.381810822	0.034358955	0.360769031				

* Fuel flow rates and EF's from Federal Aviation Administration, Emission and Dispersion Modeling System (EDMS)

* Time in mode based on default times in EDMS

Therefore

To calculate lbs/day

Component	Emissions (lb/day)				
	CO	HC	NO _x	SO _x	PM
LTO - light helicopter (Hughes 500)	0.382	0.747	0.382	0.034	0.361
Installation/Demolition - light helicopter, 3 hrs cruise	4.119	0.281	4.119	0.275	2.893
Total Light Helicopter	4.501	1.028	4.501	0.310	3.253
Total	4.501	1.028	4.501	0.310	3.253

* Installation/demolition is assumed to be 3 hours (180 minutes) per event at cruise mode factors, assume 2 heavy helicopters used during construction, 10 months, 25 days per month

* SO_x and PM emissions are negligible

Table A-15-Q5
 Construction Heavy Equipment Annual
 Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-15-Q5. Total Annual Emissions, Equipment

2016				Emission Factors						Emissions						
Equipment	FUEL	HP	Load Factor	ROG (lb/bhp-hr or lbs/hr)	CO (lb/bhp-hr or lbs/hr)	NOX (lb/bhp-hr or lbs/hr)	SOX (lb/bhp-hr or lbs/hr)	PM10 (lb/bhp-hr or lbs/hr)	PM2.5 (lb/bhp-hr or lbs/hr)	Total Use (Hours)	ROG, tons	CO tons	NOX tons	SOX tons	PM10 tons	PM2.5 tons
Total Equipment Use																
2-ton Flatbed Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	352	0.00	0.01	0.03	0.00	0.00	0.00
Aerial Bucket Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	748	0.00	0.02	0.06	0.00	0.00	0.00
Air Compressor	DIESEL	78	0.48	0.0016	0.0132	0.0117	0.0000	0.0013	0.001177249	12100	0.37	3.00	2.66	0.00	0.30	0.27
Backhoe	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	9020	0.21	1.32	1.68	0.00	0.11	0.10
Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	1408	0.00	0.03	0.11	0.00	0.00	0.00
Bulldozer	DIESEL	255	0.4	0.0013	0.0132	0.0117	0.0000	0.0013	0.001177249	3322	0.22	2.24	1.99	0.00	0.22	0.20
Concrete Saw	DIESEL	81	0.73	0.0014	0.0082	0.0104	0.0000	0.0007	0.000588624	4840	0.20	1.17	1.49	0.00	0.09	0.08
Concrete Trucks	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	10164	0.02	0.25	0.82	0.00	0.00	0.00
Crane Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	132	0.00	0.00	0.01	0.00	0.00	0.00
Crane	DIESEL	226	0.29	0.0010	0.0057	0.0091	0.0000	0.0003	0.000294312	3190	0.10	0.60	0.95	0.00	0.03	0.03
Drill Rig	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	1320	0.02	0.22	0.28	0.00	0.02	0.02
Dump/Haul Truck	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	21692	0.14	0.80	1.43	0.00	0.00	0.00
Flatbed Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	1276	0.00	0.03	0.10	0.00	0.00	0.00
Forklift	DIESEL	83	0.4	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	2640	0.06	0.58	0.51	0.00	0.06	0.05
Grader	DIESEL	174	0.41	0.0012	0.0132	0.0117	0.0000	0.0013	0.001177249	1100	0.05	0.52	0.46	0.00	0.05	0.05
Hydraulic Rock Splitter/Rock Drilling Equipment	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	440	0.01	0.07	0.09	0.00	0.01	0.01
Line Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	2581	0.01	0.06	0.21	0.00	0.00	0.00
Loader	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Mobile Fueling Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	968	0.00	0.02	0.08	0.00	0.00	0.00
Mower	DIESEL	25	0.42	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	1320	0.01	0.09	0.08	0.00	0.01	0.01
Paving Rig	DIESEL	82	0.36	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	7700	0.17	1.50	1.33	0.00	0.15	0.13
Generator	DIESEL	50	0.74	0.0013	0.0082	0.0117	0.0000	0.0007	0.000588624	6160	0.15	0.93	1.34	0.00	0.08	0.07
Skid-Steer Loader	DIESEL	78	0.37	0.0016	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Wire Puller	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	5940	0.18	1.74	1.93	0.00	0.10	0.09
Wire Tensioner	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	660	0.02	0.19	0.21	0.00	0.01	0.01
Tool Van	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	572	0.00	0.01	0.05	0.00	0.00	0.00
Semi Tractor with Trailer	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	2376	0.02	0.09	0.16	0.00	0.00	0.00
Vacuum Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	1540	0.00	0.04	0.12	0.00	0.00	0.00
Water Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	12540	0.03	0.31	1.02	0.00	0.00	0.00
Total											1.99	15.85	19.22	0.02	1.26	1.12

2017				Emission Factors						Emissions						
Equipment	FUEL	HP	Load Factor	ROG (lb/bhp-hr or lbs/hr)	CO (lb/bhp-hr or lbs/hr)	NOX (lb/bhp-hr or lbs/hr)	SOX (lb/bhp-hr or lbs/hr)	PM10 (lb/bhp-hr or lbs/hr)	PM2.5 (lb/bhp-hr or lbs/hr)	Total Use (Hours)	ROG, tons	CO tons	NOX tons	SOX tons	PM10 tons	PM2.5 tons
Total Equipment Use																
Construction Inspector																
2-ton Flatbed Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	0	0.00	0.00	0.00	0.00	0.00	0.00
Aerial Bucket Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	132	0.00	0.00	0.01	0.00	0.00	0.00
Air Compressor	DIESEL	78	0.48	0.0016	0.0132	0.0117	0.0000	0.0013	0.001177249	0	0.00	0.00	0.00	0.00	0.00	0.00
Backhoe	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	0	0.00	0.00	0.00	0.00	0.00	0.00
Bulldozer	DIESEL	255	0.4	0.0013	0.0132	0.0117	0.0000	0.0013	0.001177249	0	0.00	0.00	0.00	0.00	0.00	0.00
Concrete Saw	DIESEL	81	0.73	0.0014	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Concrete Trucks	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	0	0.00	0.00	0.00	0.00	0.00	0.00
Crane Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	0	0.00	0.00	0.00	0.00	0.00	0.00
Crane	DIESEL	226	0.29	0.0010	0.0057	0.0091	0.0000	0.0003	0.000294312	0	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Dump/Haul Truck	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	0	0.00	0.00	0.00	0.00	0.00	0.00
Flatbed Boom Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	44	0.00	0.00	0.00	0.00	0.00	0.00
Forklift	DIESEL	83	0.4	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	0	0.00	0.00	0.00	0.00	0.00	0.00
Grader	DIESEL	174	0.41	0.0012	0.0132	0.0117	0.0000	0.0013	0.001177249	0	0.00	0.00	0.00	0.00	0.00	0.00
Hydraulic Rock Splitter/Rock Drilling Equipment	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Line Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	132	0.00	0.00	0.01	0.00	0.00	0.00
Loader	DIESEL	97	0.37	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Mobile Fueling Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	0	0.00	0.00	0.00	0.00	0.00	0.00
Mower	DIESEL	25	0.42	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	0	0.00	0.00	0.00	0.00	0.00	0.00
Paving Rig	DIESEL	82	0.36	0.0015	0.0132	0.0117	0.0000	0.0013	0.001177249	0	0.00	0.00	0.00	0.00	0.00	0.00
Generator	DIESEL	50	0.74	0.0013	0.0082	0.0117	0.0000	0.0007	0.000588624	264	0.01	0.04	0.06	0.00	0.00	0.00
Skid-Steer Loader	DIESEL	78	0.37	0.0016	0.0082	0.0104	0.0000	0.0007	0.000588624	0	0.00	0.00	0.00	0.00	0.00	0.00
Wire Puller	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	0	0.00	0.00	0.00	0.00	0.00	0.00
Wire Tensioner	DIESEL	171	0.42	0.0009	0.0082	0.0091	0.0000	0.0005	0.000431658	0	0.00	0.00	0.00	0.00	0.00	0.00
Tool Van	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	0	0.00	0.00	0.00	0.00	0.00	0.00
Semi Tractor with Trailer	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	44	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	DIESEL	175	0.38	0.0043	0.0488	0.1621	0.0002	0.0006	0.000565652	220	0.00	0.01	0.02	0.00	0.00	0.00
Total											0.01	0.05	0.10	0.00	0.00	0.00

Table A-17-Q5. 2016 Construction Emissions, Worker Trips

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	CO		NO _x		ROG				SO _x		PM10				PM2.5					
						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)
All	Light-Duty Truck, catalyst	199	152	35	80	2.361162	31.42448	0.224936	1.8136819	0.057965	2.3946367	1.6219719	0.707095	0.16038404	0.71464703	0.004128	0.00571499	0.003216	0.0291986	0.008	0.03675	0.002961	0.0268842	0.002	0.01575

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
 Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	Emissions, tons							
						CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5
All	Light-Duty Truck, catalyst	199	152	35	80	7.35	0.66	0.34	0.01	0.13	0.06	0.22	0.05
Total						7.35	0.66	0.34	0.01	0.13	0.06	0.22	0.05

Table A-18-Q5. 2017 Construction Emissions, Worker Trips

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	CO		NO _x		ROG					SO _x		PM10				PM2.5				
						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)
All	Light-Duty Truck, catalyst	18	107	35	80	2.153834	31.4244799	0.205224	1.8136819	0.048784	2.39463668	1.62197187	0.707094998	0.16038404	0.714647031	0.004128	0.00571499	0.003035	0.02919863	0.008	0.03675	0.002803	0.0268842	0.002	0.01575

EMFAC2011 emission factors for 2016

Assume startup after 8 hours
 Assume 45 minutes run time total

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Days	Speed (mph)	VMT (mi/vehicle-day)	Emissions, tons							
						CO	NO _x	VOCs	SO _x	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5
All	Light-Duty Truck, catalyst	18	107	35	80	0.43	0.04	0.02	0.00	0.01	0.00	0.01	0.00
						0.43	0.04	0.02	0.00	0.01	0.00	0.01	0.00

Table A-19-Q5
 Unmitigated Construction Emissions Summary
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-19-Q5. Annual Unmitigated Construction Emissions, Summary

2016	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	1.99	15.85	19.22	0.02	1.26	1.12
Construction Truck Trips	0.52	2.11	8.74	0.02	1.47	0.49
Worker Trips	0.34	7.35	0.66	0.01	0.35	0.11
Helicopter	0.02	0.10	0.10	0.01	0.07	0.07
Fugitive Dust (Unmitigated)					0.78	0.16
Total	2.87	25.40	28.72	0.06	3.93	1.96

2017	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	0.01	0.05	0.10	0.00	0.00	0.00
Construction Truck Trips	0.00	0.02	0.05	0.00	0.02	0.01
Worker Trips	0.02	0.43	0.04	0.00	0.02	0.01
Helicopter	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.03	0.51	0.19	0.00	0.04	0.02

Table A-20-Q5
 Mitigated Construction Emissions Summary
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-20-Q5. Annual Mitigated Construction Emissions, Summary

2016	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	1.99	15.85	19.22	0.02	1.26	1.12
Construction Truck Trips	0.52	2.11	8.74	0.02	1.47	0.49
Worker Trips	0.34	7.35	0.66	0.01	0.35	0.11
Helicopter	0.02	0.10	0.10	0.01	0.07	0.07
Fugitive Dust (Mitigated)					0.30	0.06
Total	2.87	25.40	28.72	0.06	3.45	1.86

2017	Annual Construction Emissions, tons					
	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	0.01	0.05	0.10	0.00	0.00	0.00
Construction Truck Trips	0.00	0.02	0.05	0.00	0.02	0.01
Worker Trips	0.02	0.43	0.04	0.00	0.02	0.01
Helicopter	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.03	0.51	0.19	0.00	0.04	0.02

Table A-21-Q5
ARB and USEPA Off-Road Engine Standards
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-21-Q5. ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards (NMHC+NOx/CO/PM in g/bhp-hr). When ARB and USEPA standards differ, the standards shown here represent the more stringent of the two.

Maximum horsepower	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015+
<11	See Table 2 footnote (a)					7.8 / 6.0 / 0.75			5.6 / 6.0 / 0.6			5.6 / 6.0 / 0.30 ^a									
11hp<25						7.1 / 4.9 / 0.60			5.6 / 4.9 / 0.60			5.6 / 4.9 / 0.30									
25hp<50	-					7.1 / 4.1 / 0.60			5.6 / 4.1 / 0.45			5.6 / 4.1 / 0.22			3.5 / 4.1 / 0.02						
50hp<75									5.6 / 3.7 / 0.30			3.5 / 3.7 / 0.22 ^c			3.5 / 3.7 / 0.02 ^c						
75hp<100						- / 6.9 / - / - ^b						3.5 / 3.7 / 0.30			0.14 / 2.5 / 3.7 / 0.015 ^{b,d}		0.14 / 0.30 / 3.7 / 0.015 ^b				
100hp<175									4.9 / 3.7 / 0.22			3.0 / 3.7 / 0.22									
175hp<300									4.9 / 2.6 / 0.15						0.14 / 1.5 / 2.6 / 0.015 ^{b,d}		0.14 / 0.30 / 2.2 / 0.015 ^b				
300hp<600	-	1.0 / 6.9 / 8.5 / 0.40 ^b							4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 ^e									
600hp@750																					
Mobile Machines > 750hp															0.30 / 2.6 / 2.6 / 0.07 ^b		0.14 / 2.6 / 2.6 / 0.03 ^b				
750hp<GEN @1200hp						1.0 / 6.9 / 8.5 / 0.40 ^b						4.8 / 2.6 / 0.15					0.14 / 0.50 / 2.6 / 0.02 ^b				
GEN>1200 hp															0.30 / 0.50 / 2.6 / 0.07 ^b						

- a) The PM standard for hand-start, air cooled, direct injection engines below 11 hp may be delayed until 2010 and be set at 0.45 g/bhp-hr.
- b) Standards given are NMHC/NOx/CO/PM in g/bhp-hr.
- c) Engine families in this power category may alternately meet Tier 3 PM standards (0.30 g/bhp-hr) from 2008-2011 in exchange for introducing final PM standards in 2012.
- d) The implementation schedule shown is the three-year alternate NOx approach. Other schedules are available.
- e) Certain manufacturers have agreed to comply with these standards by 2005.

: Tier 1
 : Tier 2
 : Tier 3
 : Tier 4 Interim / Final

Table A-21-Q5
 ARB and USEPA Off-Road Engine Standards
 Sycamore to Peñasquitos 230 kV Transmission Line Project

	TIER 2 Emission Factors					
	NOx		CO		PM	
	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr
Maximum horsepower						
<11	5.32	0.0117284	6	0.0132275	0.6	0.0013228
11@hp<25	5.32	0.0117284	4.9	0.0108025	0.6	0.0013228
25@hp<50	5.32	0.0117284	4.1	0.0090388	0.45	0.0009921
50@hp< 75	5.32	0.0117284	3.7	0.008157	0.3	0.0006614
75@hp<100	5.32	0.0117284	3.7	0.008157	0.3	0.0006614
100@hp<175	4.655	0.0102623	3.7	0.008157	0.22	0.000485
175@hp<300	4.655	0.0102623	2.6	0.0057319	0.15	0.0003307
300@hp<600	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
600@hp@750	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
Mobile Machines > 750hp	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
750hp<GEN @1200hp	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
GEN>1200 hp	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307

TIER 3 Emission Factors					
NOx		CO		PM	
g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr	g/bhp-hr	lb/bhp-hr
5.32	0.0117284	6	0.0132275	0.6	0.0013228
5.32	0.0117284	4.9	0.0108025	0.6	0.0013228
5.32	0.0117284	4.1	0.0090388	0.45	0.0009921
5.32	0.0117284	3.7	0.008157	0.3	0.0006614
3.325	0.0073302	3.7	0.008157	0.3	0.0006614
2.85	0.0062831	3.7	0.008157	0.22	0.000485
2.85	0.0062831	2.6	0.0057319	0.15	0.0003307
2.85	0.0062831	2.6	0.0057319	0.15	0.0003307
2.85	0.0062831	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
4.56	0.0100529	2.6	0.0057319	0.15	0.0003307

Composite Emission Factors - 70% Tier 2, 30% Tier 3		
NOx	CO	PM
lb/bhp-hr	lb/bhp-hr	lb/bhp-hr
0.011728395	0.013227513	0.001323
0.011728395	0.010802469	0.001323
0.011728395	0.009038801	0.000992
0.011728395	0.008156966	0.000661
0.010408951	0.008156966	0.000661
0.009068563	0.008156966	0.000485
0.009068563	0.005731922	0.000331
0.008921958	0.005731922	0.000331
0.008921958	0.005731922	0.000331
0.01005291	0.005731922	0.000331
0.01005291	0.005731922	0.000331
0.01005291	0.005731922	0.000331
0.01005291	0.005731922	0.000331

% reduction from TIER 2 to TIER 3		
NOx	CO	PM
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
0.00%	0.00%	0.00%
37.50%	0.00%	0.00%
38.78%	0.00%	0.00%
38.78%	0.00%	0.00%
37.50%	0.00%	0.00%
37.50%	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%

 : Tier 2

 : Tier 3

Table B-1-Q5
 Construction Heavy Equipment GHG Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-1-Q5. Total GHG Emissions, Equipment

Equipment	Emission Factors						Emissions			
	FUEL	HP	Load Factor	CO2 (lb/bhp-hr or lbs/hr)	CH4 (lb/bhp-hr or lbs/hr)	N2O (lb/bhp-hr or lbs/hr)	Total Use (Hours)	CO2 (metric tons)	CH4 (metric tons)	N2O (metric tons)
Total Equipment Use										
2-ton Flatbed Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	352	2.56	0.00	0.00
Aerial Bucket Truck	DIESEL	175	0.38	16.0	0.0002	0.0009	880	6.40	0.00	0.00
Air Compressor	DIESEL	78	0.48	1.3	0.0001	0.0010	12100	257.46	0.03	0.20
Backhoe	DIESEL	97	0.37	1.3	0.0001	0.0010	9020	183.98	0.02	0.15
Boom Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	1408	10.24	0.00	0.01
Bulldozer	DIESEL	255	0.4	1.3	0.0001	0.0009	3322	192.57	0.02	0.13
Concrete Saw	DIESEL	81	0.73	1.3	0.0001	0.0010	4840	162.64	0.02	0.13
Concrete Trucks	DIESEL	175	0.38	16.0	0.0002	0.0154	10164	73.95	0.00	0.07
Crane Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	132	0.96	0.00	0.00
Crane	DIESEL	226	0.29	1.3	0.0001	0.0009	3190	118.82	0.01	0.08
Drill Rig	DIESEL	82	0.5	1.3	0.0002	0.0010	1320	30.76	0.00	0.02
Dump/Haul Truck	DIESEL	400	0.38	15.0	0.0006	0.0125	21692	147.54	0.01	0.12
Flatbed Boom Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	1320	9.60	0.00	0.01
Forklift	DIESEL	83	0.4	1.3	0.0001	0.0010	2640	49.81	0.01	0.04
Grader	DIESEL	174	0.41	1.3	0.0001	0.0009	1100	44.60	0.00	0.03
Hydraulic Rock Splitter/Rock Drilling Equipment	DIESEL	82	0.5	1.3	0.0002	0.0010	440	10.25	0.00	0.01
Line Truck	DIESEL	175	0.38	16.0	0.0001	0.0009	2713	19.74	0.00	0.00
Loader	DIESEL	97	0.37	1.3	0.0001	0.0010	0	0.00	0.00	0.00
Mobile Fueling Truck	DIESEL	175	0.38	16.0	0.0001	0.0009	968	7.04	0.00	0.00
Mower	DIESEL	25	0.42	1.3	0.0001	0.0011	1320	7.88	0.00	0.01
Paving Rig	DIESEL	82	0.36	1.3	0.0002	0.0010	7700	129.18	0.02	0.10
Generator	DIESEL	50	0.74	1.3	0.0001	0.0011	6424	135.08	0.01	0.12
Skid-Steer Loader	DIESEL	78	0.37	1.3	0.0001	0.0010	0	0.00	0.00	0.00
Wire Puller	DIESEL	171	0.42	1.3	0.0001	0.0009	5940	242.45	0.01	0.17
Wire Tensioner	DIESEL	171	0.42	1.3	0.0001	0.0009	660	26.94	0.00	0.02
Tool Van	DIESEL	175	0.38	16.0	0.0002	0.0154	572	4.16	0.00	0.00
Semi Tractor with Trailer	DIESEL	400	0.38	15.0	0.0150	0.0125	2420	16.46	0.02	0.01
Water Truck	DIESEL	175	0.38	16.0	0.0002	0.0154	1760	12.81	0.00	0.01
Total								1903.88	0.18	1.46

Table B-2-Q5
Construction and Operational Truck Trip GHG Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-2-Q5. Total GHG Emissions, Construction Truck Trips

Vehicle	Vehicle Class	Number of days used	Speed (mph)	VMT (mi/vehicle-day)	CO2	CH4	N2O	Emissions, metric tons		
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO2	CH4	N2O
2-ton Flatbed Truck	Light Heavy Duty Truck, Diesel	176	30	20	504.222339	0.02881278	0.01	1.77	0.00	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Diesel	440	30	20	504.222339	0.02881278	0.01	4.44	0.00	0.00
Boom Truck	Light Heavy Duty Truck, Diesel	616	30	20	504.222339	0.02881278	0.01	6.21	0.00	0.00
Concrete Trucks	Light Heavy Duty Truck, Diesel	12520	30	30	504.222339	0.02881278	0.01	189.39	0.01	0.00
Crane Truck	Light Heavy Duty Truck, Diesel	66	30	20	504.222339	0.02881278	0.01	0.67	0.00	0.00
Drill Rig/Truck Mounted Auger	Light Heavy Duty Truck, Diesel	440	30	20	504.222339	0.02881278	0.01	4.44	0.00	0.00
Dump Truck	Heavy Duty Truck, Diesel	27081	30	60	1807.66928	0.10329565	0.05	2937.25	0.17	0.08
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	616	30	20	504.222339	0.02881278	0.01	6.21	0.00	0.00
Line Truck	Light Heavy Duty Truck, Diesel	924	30	20	504.222339	0.02881278	0.01	9.32	0.00	0.00
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	484	30	30	504.222339	0.02881278	0.01	7.32	0.00	0.00
Pick-Up Trucks	Light Duty Truck 1, Diesel	7744	30	20	247.933018	0.01416764	0.01	38.40	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	3828	30	20	247.933018	0.01416764	0.01	18.98	0.00	0.00
Tool Van	Light Duty Truck 1, Diesel	286	30	20	247.933018	0.01416764	0.01	1.42	0.00	0.00
Semi Tractor with Trailer	Heavy Duty Truck, Diesel	1166	30	60	1807.66928	0.10329565	0.05	126.47	0.01	0.00
Water Truck	Light Heavy Duty Truck, Diesel	880	30	30	504.222339	0.02881278	0.01	13.31	0.00	0.00
Total								3365.60	0.19	0.09

Table B-3-Q5
 Construction and Operations Worker Commute GHG Emission Calculations
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-3-Q5. Total GHG Emissions, Worker Trips

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Number of Days	Speed (mph)	VMT (mi/vehicle-day)	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)
All	Light-Duty Truck, catalyst	217	166	35	80	297.39552	448.5481762	0.0028329	0.02209593	0.0085373	0.00972228

EMFAC2011 emission factors for 2016

Assume startup after 8 hours

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Number of Days	Speed (mph)	VMT (mi/vehicle-day)			
						CO2	CH4	N2O
All	Light-Duty Truck, catalyst	217	166	35	80	873.19	0.01	0.02
Total Worker Trips						873.19	0.01	0.02

Table B-4-Q5
Helicopter GHG Emissions
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-4-Q5. Helicopter Emissions

Helicopter Model	Engine	Assumed Engine	Operating Mode	Fuel Flow (kg/s)	Time in Mode (min)	Emission Incides, g/kg fuel					Emissions, lbs/mode				Cruise Mode Emission factor, lbs/hour			
						CO	VOC	NOx	Sox	PM	CO	VOC	NOx	PM	CO	VOC	NOx	PM
Hughes 500E	Allison 250-C20B/R	250B17B	Taxi Out	0.008154	19	2.199837	23.004097	2.199837	1.292	4.2	0.045081939	0.471430067	0.045081939	0.086071898				
			Takeoff	0.031642	10.4	6.599994	0.402675	6.599994	1.292	4.2	0.287295342	0.017528297	0.287295342	0.182824475				
			Climbout	0.028926	0.09	5.981142	0.408337	5.981142	1.292	4.2	0.002059694	0.000140617	0.002059694	0.001446332	1.373129585	0.093744575	1.373129585	0.964221257
			Approach	0.010516	10.05	2.200637	5.988767	2.200637	1.292	4.2	0.03076471	0.083722432	0.03076471	0.058715628				
			Taxi In	0.008154	7	2.199837	23.004097	2.199837	1.292	4.2	0.016609136	0.173684761	0.016609136	0.031710699				
			Total per LTO								0.381810822	0.746506173	0.381810822	0.360769031				

* Fuel flow rates and EF's from Federal Aviation Administration, Emission and Dispersion Modeling System (EDMS)
* Time in mode based on default times in EDMS

Therefore

To calculate lbs/day

Component	Emissions (lb/day)			
	CO	HC	NO _x	PM
LTO - light helicopter (Hughes 500)	0.382	0.747	0.382	0.361
Installation/Demolition - light helicopter, 3 hrs cruise	4.119	0.281	4.119	2.893
Total Light Helicopter	4.501	1.028	4.501	3.253
Total	4.501	1.028	4.501	3.253

* Installation/demolition is assumed to be 3 hours (180 minutes) per event at cruise mode factors
* SO_x and PM emissions are negligible

Helicopter GHG Emission Estimates

Table of Factors and Constants

Value Units	Description
6.84 lb/gallon	Jet Fuel Density (at 15 degrees C) -- equivalent to 820 kg/m ³
142 lb/hr	Jet Fuel Usage at Idle
20.8 gallon/hr	Calculated Usage at Idle
679 lb/hr	Jet Fuel Usage at Climbout/Approach
99.3 gallon/hr	Calculated Usage at Climbout/Approach
9.57 kg CO ₂ /gallon	CO ₂ emission factor for Jet fuel
0.31 g N ₂ O/gallon	N ₂ O emission factor for Jet fuel
0.27 g CH ₄ /gallon	CH ₄ emission factor for Jet fuel

* Fuel usage rates from EPA AP-42, Table II-1-8, Modal Emission Rates - Military Aircraft Engines
* Fuel density from air BP Handbook of Products - © Air BP Ltd. 2000
* Emission factors from California Climate Action Registry's General Reporting Protocol 3.1

GHG Emissions

Component	Time in mode (hrs)	Emissions (tonnes/day)				Days of Operation	Emissions (total tonnes)			
		CO ₂	N ₂ O	CH ₄	CO ₂ e		CO ₂	N ₂ O	CH ₄	CO ₂ e
Light Helicopter										
LTO - Idle	0.433	0.086	0.000013	0.000012	0.090	44	3.788	0.0006	0.0003	3.977
LTO - Other	0.342	0.068	0.000011	0.000009	0.071		2.993	0.0005	0.0003	3.142
Installation	3.000	0.596	0.000092	0.000080	0.626		26.225	0.0041	0.0024	27.535
Total per Installation	3.776	0.750	0.000116	0.000101	0.788276		33.006	0.0051	0.0030	34.654

* Jet Fuel usage was based on fuel usage time spent in approach, idle, and takeoff for each LTO and 3 hours for installation

Table B-5-Q5
 Total GHG Emissions
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table B-5-Q5. Total GHG Emissions, metric tons

	Total Construction Emissions, metric tons		
	CO2	CH4	N2O
Construction Equipment	1903.88	0.18	1.46
Construction Truck Trips	3365.60	0.19	0.09
Worker Trips	873.19	0.01	0.02
Helicopter	33.01	0.01	0.00
Total	6175.68	0.38	1.57

6670.459