



**Table 4.3-8 (cont.): Proposed Project Construction Air Emissions**

Year 2017	Maximum Daily Construction Emissions, lbs/day					
Segment A	ROG	CO	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Construction Equipment	9.14	58.53	82.84	0.11	3.53	3.14
Construction Truck Trips	0.24	1.15	3.64	0.01	0.31	0.22
Worker Trips	0.30	4.60	0.39	0.01	0.25	0.10
Helicopter	1.03	4.50	4.50	-	3.25	3.25
<b>Subtotal</b>	<b>10.71</b>	<b>68.77</b>	<b>91.38</b>	<b>0.13</b>	<b>7.34</b>	<b>6.62</b>
Segment B	ROG	CO	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Construction Equipment	1.88	18.74	30.33	0.04	0.89	0.79
Construction Truck Trips	0.25	1.18	3.82	0.01	0.31	0.22
Worker Trips	0.34	5.21	0.45	0.01	0.28	0.12
<b>Subtotal</b>	<b>2.47</b>	<b>25.14</b>	<b>34.59</b>	<b>0.06</b>	<b>1.48</b>	<b>1.12</b>
Segment D	ROG	CO	NO <sub>x</sub>	SO <sub>x</sub>	PM <sub>10</sub>	PM <sub>2.5</sub>
Construction Equipment	3.81	22.50	37.67	0.05	1.27	1.13
Construction Truck Trips	0.12	0.54	1.81	0.00	0.17	0.09
Worker Trips	0.18	2.76	0.24	0.01	0.15	0.06
<b>Subtotal</b>	<b>4.11</b>	<b>25.80</b>	<b>39.71</b>	<b>0.06</b>	<b>1.60</b>	<b>1.27</b>
<b>Maximum Daily Emissions, 2017</b>	<b>17.29</b>	<b>119.71</b>	<b>165.68</b>	<b>0.24</b>	<b>10.42</b>	<b>9.01</b>

Notes: ROG = reactive organic gases; NO<sub>x</sub> = nitrogen oxides; CO = carbon monoxide; SO<sub>x</sub> = sulfur oxides; PM<sub>10</sub> = particulate matter, up to 10 microns; PM<sub>2.5</sub> = particulate matter, up to 2.5 microns.

Refer to Appendix 4.3-A, Air Quality Construction Emissions, for assumptions used in this analysis, including quantified emission reduction by control measures.

Controlled emissions calculated assuming standard fugitive dust control measures, including watering the site three times daily, as SDG&E's ordinary construction restrictions require.

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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 <sub>x</sub>		ROG					SO <sub>x</sub>		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	1.345149433	31.42447989	0.12649885	1.813681924	0.041784969	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.005714994	0.00190965	0.02919863	0.008	0.03675	0.001753	0.026884174	0.002	0.01575	290.1533	448.5481762	0.0177	0.022095932	0.03	0.009722282
Wire Demolition	Light-Duty Truck, catalyst	49	35	80	1.345149433	31.42447989	0.12649885	1.813681924	0.041784969	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.005714994	0.00190965	0.02919863	0.008	0.03675	0.001753	0.026884174	0.002	0.01575	290.1533	448.5481762	0.0177	0.022095932	0.03	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 <sub>x</sub>	VOCs	SO <sub>x</sub>	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	14.71	1.26	0.95	0.04	0.40	0.17	0.41	0.17	2503.84	0.15	0.28
Wire Demolition	Light-Duty Truck, catalyst	49	35	80	15.02	1.29	0.97	0.04	0.41	0.17	0.41	0.17	2556.01	0.16	0.28
Simultaneous Worker Trips		97			29.73	2.55	1.91	0.07	0.80	0.34	0.82	0.34	5059.85	0.31	0.56

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

Equipment/Phase	FUEL	HP	Load Factor	Emission Factors									No of Equipment	Hrs Per Day	Emissions								
				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)	CO2 (lb/bhp-hr or lbs/hr)	CH4 (lb/bhp-hr or lbs/hr)	N2O (lb/bhp-hr or lbs/hr)			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
<b>Foundation Excavation</b>																							
Drill Rig	DIESEL	82	0.5	0.0006	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0002	0.0010	1	10	0.23	3.34	4.27	0.01	0.27	0.24	513.69	0.08	0.41
Dump/Haul Truck	DIESEL	400	0.38	0.0104	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	1	5	0.05	0.37	0.66	0.00	0.00	0.00	74.97	0.00	0.06
Water Truck	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
<b>Subtotal</b>															<b>0.33</b>	<b>4.20</b>	<b>6.55</b>	<b>0.01</b>	<b>0.28</b>	<b>0.25</b>	<b>749.07</b>	<b>0.09</b>	<b>0.62</b>
<b>Foundation Rebar</b>																							
Crane Truck	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	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
<b>Subtotal</b>															<b>0.06</b>	<b>0.73</b>	<b>2.43</b>	<b>0.00</b>	<b>0.01</b>	<b>0.01</b>	<b>240.61</b>	<b>0.00</b>	<b>0.23</b>
<b>Foundation Concrete</b>																							
2-ton Flatbed Truck	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	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	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	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
Generator	DIESEL	50	0.74	0.0013	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.48	3.02	4.34	0.00	0.24	0.22	463.57	0.04	0.41
<b>Subtotal</b>															<b>0.63</b>	<b>4.78</b>	<b>10.17</b>	<b>0.01</b>	<b>0.27</b>	<b>0.24</b>	<b>1041.04</b>	<b>0.05</b>	<b>0.97</b>
<b>Simultaneous Construction Equipment</b>															<b>1.02</b>	<b>9.71</b>	<b>19.15</b>	<b>0.02</b>	<b>0.56</b>	<b>0.50</b>	<b>2030.72</b>	<b>0.14</b>	<b>1.82</b>



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

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

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 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 average

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

For unmitigated, the emission factor is 0.0011 lbs PM10/ton of debris

For unmitigated, the emission factor is 0.00017 lbs PM2.5/ton of debris

Unmitigated	Mitigated	Unit
6.561716	2.55906924	lbs/day
1.014083382	0.395492519	total tons

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	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)	CO2 (lb/bhp-hr or lbs/hr)	CH4 (lb/bhp-hr or lbs/hr)	N2O (lb/bhp-hr or lbs/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
<b>Trenching</b>																							
Concrete Saw	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
Skid-Steer Loader	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	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
Dump/Haul Truck	DIESEL	400	0.38	0.0104	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	20	2	0.42	2.94	5.27	0.01	0.01	0.01	599.80	0.02	0.50
Loader	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
Water Truck	DIESEL	175	0.38	0.0012	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	2	5	0.77	3.81	6.03	0.01	0.22	0.20	833.17	0.07	0.57
<b>Subtotal</b>															<b>7.40</b>	<b>44.53</b>	<b>59.51</b>	<b>0.08</b>	<b>3.30</b>	<b>2.93</b>	<b>7235.11</b>	<b>0.64</b>	<b>5.65</b>
<b>Backfill/Paving</b>																							
Backhoe	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
Flatbed Truck	DIESEL	175	0.38	0.0012	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	2	0.15	0.76	1.21	0.00	0.04	0.04	166.63	0.01	0.11
<b>Subtotal</b>															<b>1.07</b>	<b>6.62</b>	<b>8.68</b>	<b>0.01</b>	<b>0.52</b>	<b>0.46</b>	<b>1065.96</b>	<b>0.09</b>	<b>0.82</b>
<b>Simultaneous Construction Equipment</b>															<b>8.47</b>	<b>51.15</b>	<b>68.18</b>	<b>0.09</b>	<b>3.82</b>	<b>3.40</b>	<b>8301.07</b>	<b>0.74</b>	<b>6.48</b>

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 <sub>x</sub>	ROG	SO <sub>x</sub>	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 <sub>x</sub>	VOCs	SO <sub>x</sub>	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
<b>Trenching</b>																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	4	30	31	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	67.78	0.00	0.00
Dump Truck	Heavy Duty Truck, Diesel	20	30	31	1.111513533	5.1835677	0.30038695	0.0107118	0.069818	0.01199994	0.13033932	0.0642326	0.003	0.0558597	1807.6693	0.10329565	0.05	1.52	7.09	0.41	0.01	0.29	0.17	0.06	0.01	2470.85	0.14	0.06
<b>Subtotal</b>																		<b>1.60</b>	<b>7.22</b>	<b>0.43</b>	<b>0.02</b>	<b>0.32</b>	<b>0.19</b>	<b>0.07</b>	<b>0.02</b>	<b>2538.63</b>	<b>0.15</b>	<b>0.07</b>
<b>Backfill/Paving</b>																												
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	31	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	0.04	0.07	0.01	0.00	0.01	0.01	0.01	0.00	33.89	0.00	0.00
Concrete Trucks	Heavy Duty Truck, Diesel	9	30	31	1.111513533	5.1835677	0.30038695	0.0107118	0.069818	0.01199994	0.13033932	0.0642326	0.003	0.0558597	1807.6693	0.10329565	0.05	0.68	3.19	0.18	0.01	0.13	0.08	0.03	0.01	1111.88	0.06	0.03
<b>Subtotal</b>																		<b>0.72</b>	<b>3.25</b>	<b>0.19</b>	<b>0.01</b>	<b>0.14</b>	<b>0.08</b>	<b>0.03</b>	<b>0.01</b>	<b>1145.77</b>	<b>0.07</b>	<b>0.03</b>
<b>Simultaneous Construction Trucks</b>																		<b>2.32</b>	<b>10.47</b>	<b>0.62</b>	<b>0.02</b>	<b>0.46</b>	<b>0.27</b>	<b>0.11</b>	<b>0.02</b>	<b>3684.41</b>	<b>0.21</b>	<b>0.09</b>



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 <sub>x</sub>		ROG					SO <sub>x</sub>		PM10				PM2.5				CO <sub>2</sub>		CH <sub>4</sub>		N <sub>2</sub> 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)
Trenching	Light-Duty Truck, catalyst	30	35	80	1.345149433	31.42447989	0.12649885	1.813681924	0.041784969	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.0041277	0.00571499	0.00190965	0.02919986	0.008	0.03675	0.001753	0.026884174	0.002	0.01575	290.1533	448.5481762	0.0177	0.02209593	0.03	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 <sub>x</sub>	VOCs	SO <sub>x</sub>	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
Trenching	Light-Duty Truck, catalyst	30	35	80	9.20	0.79	0.59	0.02	0.25	0.10	0.25	0.10	1564.90	0.10	0.17
Simultaneous Worker Trips		30			9.20	0.79	0.59	0.02	0.25	0.10	0.25	0.10	1564.90	0.10	0.17

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

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 H = 15.0% moisture - watering 3 times daily

I = 17,192 cubic yards x 1600 lbs/cubic yard = 13753.6 tons of material

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

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

Unmitigated	Mitigated	Unit
16.0246212	0.95433753	lbs/day
0.00791025	0.007910255	total tons

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	FUEL	HP	Load Factor	Emission Factors									No of Equipment	Hrs Per Day	Emissions									
				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)	CO2 (lb/bhp-hr or lbs/hr)	CH4 (lb/bhp-hr or lbs/hr)	N2O (lb/bhp-hr or lbs/hr)			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	
<b>Road/Pad Maintenance</b>																								
Backhoe	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	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	
Dump/Haul Truck	DIESEL	400	0.38	0.0104	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0006	0.0125	1	5	0.05	0.37	0.66	0.00	0.00	0.00	74.97	0.00	0.06	
Grader	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	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	DIESEL	50	0.74	0.0013	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	10	0.48	3.02	4.34	0.00	0.24	0.22	463.57	0.04	0.41	
Water Truck	DIESEL	175	0.38	0.0012	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	10	0.77	3.81	6.03	0.01	0.22	0.20	833.17	0.07	0.57	
<b>Subtotal</b>															<b>3.16</b>	<b>17.88</b>	<b>24.61</b>	<b>0.03</b>	<b>1.15</b>	<b>1.03</b>	<b>3195.11</b>	<b>0.28</b>	<b>2.34</b>	
<b>Simultaneous Construction Equipment</b>															<b>3.16</b>	<b>17.88</b>	<b>24.61</b>	<b>0.03</b>	<b>1.15</b>	<b>1.03</b>	<b>3195.11</b>	<b>0.28</b>	<b>2.34</b>	

Table A-10  
 Construction and Operational Truck Trip Emissions  
 Sycamore to Peñasquitos 230 kV Transmission Line Project  
 Segment C

Table A-10. 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 <sub>x</sub>	ROG	SO <sub>x</sub>	PM10			PM2.5			CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> 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 <sub>x</sub>	VOCs	SO <sub>x</sub>	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO <sub>2</sub>	CH <sub>4</sub>
<b>Road Pad/Maintenance</b>																														
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	31	0.292950056	0.47693085	0.06521049	0.0031861	0.05395477	0.00799996	0.03674982	0.0496384	0.002	0.0157499	247.93302	0.01416764	0.01	0.04	0.07	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.00	33.89	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	1	30	31	0.292950056	0.47693085	0.06521049	0.0031861	0.05395477	0.00799996	0.03674982	0.0496384	0.002	0.0157499	247.93302	0.01416764	0.01	0.02	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.00	16.94	0.00	0.00	
Dump Truck	Heavy Duty Truck, Diesel	1	30	31	1.111513533	5.1835677	0.30038695	0.0107118	0.06981799	0.01199994	0.13033932	0.0642326	0.003	0.0558597	1807.6693	0.10329565	0.05	0.08	0.35	0.02	0.00	0.01	0.01	0.00	0.00	0.00	123.54	0.01	0.00	
<b>Subtotal</b>																	<b>0.14</b>	<b>0.45</b>	<b>0.03</b>	<b>0.00</b>	<b>0.03</b>	<b>0.02</b>	<b>0.01</b>	<b>0.00</b>	<b>0.01</b>	<b>0.00</b>	<b>174.38</b>	<b>0.01</b>	<b>0.00</b>	
<b>Simultaneous Construction Trucks</b>																	<b>0.14</b>	<b>0.45</b>	<b>0.03</b>	<b>0.00</b>	<b>0.03</b>	<b>0.02</b>	<b>0.01</b>	<b>0.00</b>	<b>0.01</b>	<b>0.00</b>	<b>174.38</b>	<b>0.01</b>	<b>0.00</b>	

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 <sub>x</sub>		ROG					SO <sub>x</sub>		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 C	Light-Duty Truck, catalyst	31	35	80	1.345149	31.42448	0.126499	1.8136819	0.041785	2.39463668	1.6219719	0.707095	0.16038404	0.714647031	0.004128	0.005715	0.00191	0.02919863	0.008	0.03675	0.001753	0.02688417	0.002	0.01575	290.1533	448.548176	0.0177	0.02209593	0.03	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 <sub>x</sub>	VOCs	SO <sub>x</sub>	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
Segment C	Light-Duty Truck, catalyst	31	35	80	9.50	0.82	0.61	0.02	0.26	0.11	0.26	0.11	1617.07	0.10	0.18
Simultaneous Worker Trips		31			<b>9.50</b>	<b>0.82</b>	<b>0.61</b>	<b>0.02</b>	<b>0.26</b>	<b>0.11</b>	<b>0.26</b>	<b>0.11</b>	<b>1617.07</b>	<b>0.10</b>	<b>0.18</b>

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**

**Demolition**

**Earthmoving - Material Handling, loading debris into trucks**

Amount based on CalEEMod Methodology from MRI reference, assuming 5700 square feet of material for wire and structure

0.046 tons of material per square foot = 524 tons of debris

Days of demolition 14

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

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

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 H = 2.0% moisture - unmitigated

Assume 61% control efficiency for watering 3 times/day

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

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

For unmitigated, the emission factor is 0.0011 lbs PM10/ton of debris

For unmitigated, the emission factor is 0.00017 lbs PM2.5/ton of debris

Unmitigated	Mitigated	Unit
0.41202857	0.160691143	lbs/day
0.06367714	0.024834086	total tons

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	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)	CO2 (lb/bhp-hr or lbs/hr)	CH4 (lb/bhp-hr or lbs/hr)	N2O (lb/bhp-hr or lbs/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	
<b>Build Retaining Wall</b>																								
2-ton Flatbed Truck	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	
Forklift	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	
<b>Subtotal</b>															<b>0.33</b>	<b>2.11</b>	<b>3.69</b>	<b>0.00</b>	<b>0.14</b>	<b>0.12</b>	<b>409.98</b>	<b>0.03</b>	<b>0.35</b>	
Simultaneous Construction Equipment															<b>0.33</b>	<b>2.11</b>	<b>3.69</b>	<b>0.00</b>	<b>0.14</b>	<b>0.12</b>	<b>409.98</b>	<b>0.03</b>	<b>0.35</b>	

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 <sub>x</sub>	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)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO	NOx	VOCs	SOx	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O				
<b>Build Retaining Wall</b>																																
2-ton Flatbed Truck	Light Heavy Duty Truck, Diesel	1	30	31	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.00799996	0.03674982	0.036633	0.002	0.0157499	504.2223	0.02881278	0.01	0.06	0.21	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	34.46	0.00	0.00
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	31	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	0.04	0.07	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	33.89	0.00	0.00	
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	1	30	31	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	0.02	0.03	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	16.94	0.00	0.00		
<b>Subtotal</b>																		<b>0.12</b>	<b>0.31</b>	<b>0.03</b>	<b>0.00</b>	<b>0.03</b>	<b>0.02</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>85.29</b>	<b>0.00</b>	<b>0.00</b>		
<b>Simultaneous Construction Trucks</b>																		<b>0.12</b>	<b>0.31</b>	<b>0.03</b>	<b>0.00</b>	<b>0.03</b>	<b>0.02</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>85.29</b>	<b>0.00</b>	<b>0.00</b>			



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 <sub>x</sub>		ROG					SO <sub>x</sub>		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	1.345149	31.42448	0.126499	1.8136819	0.041785	2.3946367	1.6219719	0.707095	0.16038404	0.71464703	0.004128	0.00571499	0.00191	0.0291986	0.008	0.03675	0.001753	0.0268842	0.002	0.01575	290.1533	448.54818	0.0177	0.02209593	0.03	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 <sub>x</sub>	VOCs	SO <sub>x</sub>	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	9.50	0.82	0.61	0.02	0.26	0.11	0.26	0.11	1617.07	0.10	0.18
Simultaneous Worker Trips		31			<b>9.50</b>	<b>0.82</b>	<b>0.61</b>	<b>0.02</b>	<b>0.26</b>	<b>0.11</b>	<b>0.26</b>	<b>0.11</b>	<b>1617.07</b>	<b>0.10</b>	<b>0.18</b>

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**

**Site Preparation**

**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 H = 15.0% moisture - watering 3 times daily

I = 2.2046 lb/kg

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

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

Unmitigated	Mitigated	Unit
61.7706548	3.678717483	lbs/day
0.77213318	0.045983969	total tons

**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

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 H = 15.0% moisture - watering 3 times daily

I = 11370 cubic yards x 1600 lbs/cubic yard = 9096

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

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

Unmitigated	Mitigated	Unit
22.7098912	1.352475119	lbs/day
0.00094673	0.000946733	total tons

**Storm Drain**

**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

H = Moisture content of surface material

I = Pounds of overburden handled per day

J = lbs/ton, 2000

For the Salt Creek Substation, assume 12 miles per hour daily maximum wind speed

Assume H = 2.0% moisture - unmitigated

Assume H = 15.0% moisture - watering 3 times daily

I = 2,000 cubic yards x 1600 lbs/cubic yard = 3,200,000 lbs

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

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

Unmitigated	Mitigated	Unit
1.86419511	0.111021118	lbs/day
0.00279629	0.000166532	total tons

**Substation CMU Wall**

**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

H = Moisture content of surface material

I = Pounds of overburden handled per day

J = lbs/ton, 2000

For the Salt Creek Substation, assume 12 miles per hour daily maximum wind speed

Assume H = 2.0% moisture - unmitigated

Assume H = 15.0% moisture - watering 3 times daily

I = 665 cubic yards x 1600 lbs/cubic yard = 800,000 lbs

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

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

Unmitigated	Mitigated	Unit
0.61984487	0.036914522	lbs/day
0.00092977	5.53718E-05	total tons

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	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)	CO2 (lb/bhp-hr or lbs/hr)	CH4 (lb/bhp-hr or lbs/hr)	N2O (lb/bhp-hr or lbs/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	
<b>Wire Stringing/Sagging/Clipping</b>																								
Aerial Bucket Truck	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	
Air Compressor	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	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	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	
Line Truck	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	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	
Generator	DIESEL	84	0.74	0.0013	0.0082	0.0104	0.0000	0.0007	0.000588624	1.3	0.0001	0.0010	3	10	2.40	15.21	19.41	0.02	1.23	1.10	2336.39	0.21	1.84	
Wire Puller	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	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	
Semi Tractor with Trailer	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0150	0.0125	6	10	0.79	4.41	7.91	0.01	0.02	0.02	899.69	0.90	0.75	
Water Truck	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	
<b>Subtotal</b>															<b>9.14</b>	<b>58.53</b>	<b>82.84</b>	<b>0.11</b>	<b>3.53</b>	<b>3.14</b>	<b>10548.47</b>	<b>1.64</b>	<b>7.87</b>	
Simultaneous Construction Equipment															<b>9.14</b>	<b>58.53</b>	<b>82.84</b>	<b>0.11</b>	<b>3.53</b>	<b>3.14</b>	<b>10548.47</b>	<b>1.64</b>	<b>7.87</b>	

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 <sub>x</sub>	ROG	SO <sub>x</sub>	PM10		PM2.5			CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> 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 <sub>x</sub>	VOCs	SO <sub>x</sub>	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O											
<b>Wire Stringing, Saggins, and Clipping</b>																																							
Pick-Up Trucks	Light Duty Truck 1, Diesel	12	30	31	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	0.24	0.39	0.05	0.00	0.08	0.06	0.00	0.00	0.00	0.00	203.34	0.01	0.01									
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	3	30	31	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	0.06	0.10	0.01	0.00	0.02	0.01	0.00	0.00	0.00	50.83	0.00	0.00										
Aerial Bucket Truck	Light Heavy Duty Truck, Diesel	9	30	31	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.00799996	0.03674982	0.036633	0.002	0.0157499	504.2223	0.02881278	0.01	0.51	1.89	0.11	0.00	0.05	0.03	0.00	0.00	0.00	310.14	0.02	0.01										
Line Truck	Light Heavy Duty Truck, Diesel	3	30	31	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.00799996	0.03674982	0.036633	0.002	0.0157499	504.2223	0.02881278	0.01	0.17	0.63	0.04	0.00	0.02	0.01	0.00	0.00	0.00	103.38	0.01	0.00										
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	3	30	31	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.00799996	0.03674982	0.036633	0.002	0.0157499	504.2223	0.02881278	0.01	0.17	0.63	0.04	0.00	0.02	0.01	0.00	0.00	0.00	103.38	0.01	0.00										
Tool Van	Light Duty Truck 1, Diesel	3	30	31	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	0.06	0.10	0.01	0.00	0.02	0.01	0.00	0.00	0.00	50.83	0.00	0.00										
Semi Tractor with Trailer	Heavy Duty Truck, Diesel	3	30	31	1.111513533	5.183568	0.30038695	0.010712	0.069818	0.0199994	0.13033932	0.064233	0.003	0.0558597	1807.669	0.10329565	0.05	0.23	1.06	0.06	0.00	0.04	0.03	0.00	0.00	0.00	370.63	0.02	0.01										
<b>Subtotal</b>																	<b>1.15</b>	<b>3.64</b>	<b>0.24</b>	<b>0.01</b>	<b>0.19</b>	<b>0.12</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>771.08</b>	<b>0.04</b>	<b>0.02</b>										
<b>Simultaneous Construction Trucks</b>																	<b>1.15</b>	<b>3.64</b>	<b>0.24</b>	<b>0.01</b>	<b>0.19</b>	<b>0.12</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>771.08</b>	<b>0.04</b>	<b>0.02</b>										

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 <sub>x</sub>		ROG					SO <sub>x</sub>		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	1.345149	31.4244799	0.126499	1.8136819	0.041785	2.3946367	1.6219719	0.707095	0.16038404	0.714647031	0.004128	0.005715	0.00191	0.0291986	0.008	0.03675	0.001753	0.02688417	0.002	0.01575	290.1533	448.548176	0.0177	0.02209593	0.03	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 <sub>x</sub>	VOCs	SO <sub>x</sub>	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	4.60	0.39	0.30	0.01	0.12	0.05	0.13	0.05	782.45	0.05	0.09
Simultaneous Worker Trips		15			<b>4.60</b>	<b>0.39</b>	<b>0.30</b>	<b>0.01</b>	<b>0.12</b>	<b>0.05</b>	<b>0.13</b>	<b>0.05</b>	<b>782.45</b>	<b>0.05</b>	<b>0.09</b>

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	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)	CO2 (lb/bhp-hr or lbs/hr)	CH4 (lb/bhp-hr or lbs/hr)	N2O (lb/bhp-hr or lbs/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
<b>Cable Pulling</b>																							
Pulling Rig	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
Line Truck	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	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
<b>Subtotal</b>															<b>1.68</b>	<b>16.40</b>	<b>22.98</b>	<b>0.03</b>	<b>0.86</b>	<b>0.77</b>	<b>2920.22</b>	<b>0.14</b>	<b>2.18</b>
<b>Splice and Termination</b>																							
Splice Trailer (no emissions)																							
Line Truck	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	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
<b>Subtotal</b>															<b>0.20</b>	<b>2.34</b>	<b>7.35</b>	<b>0.01</b>	<b>0.02</b>	<b>0.02</b>	<b>760.64</b>	<b>0.01</b>	<b>0.70</b>
<b>Simultaneous Construction Equipment</b>																							
															<b>1.88</b>	<b>18.74</b>	<b>30.33</b>	<b>0.04</b>	<b>0.89</b>	<b>0.79</b>	<b>3680.86</b>	<b>0.15</b>	<b>2.88</b>

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 <sub>x</sub>	ROG	SO <sub>x</sub>	PM10		PM2.5			CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> 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 <sub>x</sub>	VOCs	SO <sub>x</sub>	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	
<b>Cable Pulling</b>																													
Pick-Up Trucks	Light Duty Truck 1, Diesel	6	30	31	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	0.12	0.20	0.03	0.00	0.04	0.03	0.02	0.00	101.67	0.01	0.00	
Line Truck	Light Heavy Duty Truck, Diesel	4	30	31	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.00799996	0.03674982	0.036633	0.002	0.0157499	504.2223	0.02881278	0.01	0.23	0.84	0.05	0.00	0.02	0.01	0.01	0.00	137.84	0.01	0.00	
Assist Truck	Light Heavy Duty Truck, Diesel	4	30	31	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.00799996	0.03674982	0.036633	0.002	0.0157499	504.2223	0.02881278	0.01	0.23	0.84	0.05	0.00	0.02	0.01	0.01	0.00	137.84	0.01	0.00	
<b>Subtotal</b>																	<b>0.57</b>	<b>1.88</b>	<b>0.12</b>	<b>0.00</b>	<b>0.09</b>	<b>0.06</b>	<b>0.04</b>	<b>0.01</b>	<b>377.35</b>	<b>0.02</b>	<b>0.01</b>		
<b>Splice and Termination</b>																													
Pick-Up Trucks	Light Duty Truck 1, Diesel	8	30	31	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	0.16	0.26	0.04	0.00	0.05	0.04	0.02	0.01	135.56	0.01	0.00	
Line Truck	Light Heavy Duty Truck, Diesel	4	30	31	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.00799996	0.03674982	0.036633	0.002	0.0157499	504.2223	0.02881278	0.01	0.23	0.84	0.05	0.00	0.02	0.01	0.01	0.00	137.84	0.01	0.00	
Assist Truck	Light Heavy Duty Truck, Diesel	4	30	31	0.824603222	3.072245	0.17343261	0.003186	0.039819	0.00799996	0.03674982	0.036633	0.002	0.0157499	504.2223	0.02881278	0.01	0.23	0.84	0.05	0.00	0.02	0.01	0.01	0.00	137.84	0.01	0.00	
<b>Subtotal</b>																	<b>0.61</b>	<b>1.94</b>	<b>0.13</b>	<b>0.00</b>	<b>0.10</b>	<b>0.07</b>	<b>0.05</b>	<b>0.01</b>	<b>411.24</b>	<b>0.02</b>	<b>0.01</b>		
<b>Simultaneous Construction Trucks</b>																													
																	<b>1.18</b>	<b>3.82</b>	<b>0.25</b>	<b>0.01</b>	<b>0.19</b>	<b>0.12</b>	<b>0.09</b>	<b>0.02</b>	<b>788.59</b>	<b>0.05</b>	<b>0.02</b>		

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 <sub>x</sub>		ROG					SO <sub>x</sub>		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)	Start-Up (g/vehicle-day)	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)
Cable Pulling	Light-Duty Truck, catalyst	17	35	80	1.345149433	31.42447989	0.12649885	1.813681924	0.041784969	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.004127654	0.005714994	0.001909651	0.029198634	0.007999958	0.036749816	0.001753023	0.026884174	0.001999999	0.01574992	290.1533005	448.5481762	0.0177	0.022095932	0.03	0.009722282
Splice & Termination	Light-Duty Truck, catalyst	13	35	80	1.345149433	31.42447989	0.12649885	1.813681924	0.041784969	2.394636679	1.621971872	0.707094998	0.16038404	0.714647031	0.004127654	0.005714994	0.001909651	0.029198634	0.007999958	0.036749816	0.001753023	0.026884174	0.001999999	0.01574992	290.1533005	448.5481762	0.0177	0.022095932	0.03	0.009722282

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										
					CO	NO <sub>x</sub>	VOCs	SO <sub>x</sub>	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	5.21	0.45	0.34	0.01	0.14	0.06	0.14	0.06	886.78	0.05	0.10
Splice & Termination	Light-Duty Truck, catalyst	13	35	80	3.96	0.34	0.26	0.01	0.11	0.05	0.11	0.04	678.12	0.04	0.08
Simultaneous Worker Trips		17			5.21	0.45	0.34	0.01	0.14	0.06	0.14	0.06	886.78	0.05	0.10



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 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)	CO2 (lb/bhp-hr or lbs/hr)	CH4 (lb/bhp-hr or lbs/hr)	N2O (lb/bhp-hr or lbs/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
<b>Steel Hauling</b>																							
Crane Truck	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	DIESEL	400	0.38	0.0132	0.0736	0.1318	0.0001	0.0003	0.000317344	15.0	0.0150	0.0125	2	12	0.32	1.77	3.16	0.00	0.01	0.01	359.88	0.36	0.30
Water Truck	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
<b>Subtotal</b>															<b>0.44</b>	<b>3.23</b>	<b>7.76</b>	<b>0.01</b>	<b>0.02</b>	<b>0.02</b>	<b>835.28</b>	<b>0.37</b>	<b>0.74</b>
<b>Steel Structure Assembly</b>																							
Air Compressor	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	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
Line Truck	DIESEL	175	0.38	0.0012	0.0057	0.0091	0.0000	0.0003	0.000294312	1.3	0.0001	0.0009	1	6	0.46	2.29	3.62	0.01	0.13	0.12	499.90	0.04	0.34
Mobile Fueling Truck	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
Generator	DIESEL	50	0.74	0.0013	0.0082	0.0117	0.0000	0.0007	0.000588624	1.3	0.0001	0.0011	1	12	0.57	3.62	5.21	0.01	0.29	0.26	556.28	0.05	0.49
Water Truck	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
<b>Subtotal</b>															<b>3.37</b>	<b>19.27</b>	<b>29.91</b>	<b>0.04</b>	<b>1.25</b>	<b>1.11</b>	<b>3811.69</b>	<b>0.30</b>	<b>2.84</b>
Simultaneous Construction Equipment															<b>3.81</b>	<b>22.50</b>	<b>37.67</b>	<b>0.05</b>	<b>1.27</b>	<b>1.13</b>	<b>4646.96</b>	<b>0.67</b>	<b>3.58</b>

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 <sub>x</sub>	ROG	SO <sub>x</sub>	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 <sub>x</sub>	VOCs	SO <sub>x</sub>	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4
<b>Steel Hauling</b>																														
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	31	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	0.04	0.07	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	33.89	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	2	30	31	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	0.04	0.07	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	33.89	0.00	0.00
Crane Truck	Light Heavy Duty Truck, Diesel	2	30	31	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.008	0.03674982	0.0366331	0.002	0.0157499	504.22234	0.02881278	0.01	0.11	0.42	0.02	0.00	0.01	0.01	0.00	0.00	0.00	68.92	0.00	0.00	
Semi Tractor with Trailer	Heavy Duty Truck, Diesel	2	30	31	1.111513533	5.1835677	0.30038695	0.0107118	0.069818	0.0119999	0.13033932	0.0642326	0.003	0.0558597	1807.6693	0.10329565	0.05	0.15	0.71	0.04	0.00	0.03	0.02	0.00	0.00	0.00	247.09	0.01	0.01	
<b>Subtotal</b>																		<b>0.34</b>	<b>1.26</b>	<b>0.08</b>	<b>0.00</b>	<b>0.07</b>	<b>0.04</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>383.78</b>	<b>0.02</b>	<b>0.01</b>	
<b>Steel Structure Assembly</b>																														
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	31	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	0.04	0.07	0.01	0.00	0.01	0.01	0.00	0.00	0.00	33.89	0.00	0.00	
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	2	30	31	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	0.04	0.07	0.01	0.00	0.01	0.01	0.00	0.00	0.00	33.89	0.00	0.00	
Line Truck	Light Heavy Duty Truck, Diesel	1	30	31	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.008	0.03674982	0.0366331	0.002	0.0157499	504.22234	0.02881278	0.01	0.06	0.21	0.01	0.00	0.01	0.00	0.00	0.00	0.00	34.46	0.00	0.00	
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	1	30	31	0.824603222	3.0722446	0.17343261	0.0031861	0.0398185	0.008	0.03674982	0.0366331	0.002	0.0157499	504.22234	0.02881278	0.01	0.06	0.21	0.01	0.00	0.01	0.00	0.00	0.00	0.00	34.46	0.00	0.00	
<b>Subtotal</b>																		<b>0.19</b>	<b>0.55</b>	<b>0.04</b>	<b>0.00</b>	<b>0.04</b>	<b>0.03</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>136.70</b>	<b>0.01</b>	<b>0.00</b>	
<b>Simultaneous Construction Trucks</b>																														
																		<b>0.54</b>	<b>1.81</b>	<b>0.12</b>	<b>0.00</b>	<b>0.11</b>	<b>0.07</b>	<b>0.00</b>	<b>0.00</b>	<b>520.48</b>	<b>0.03</b>	<b>0.01</b>		

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 <sub>x</sub>		ROG					SO <sub>x</sub>		PM10				PM2.5				CO <sub>2</sub>		CH <sub>4</sub>		N <sub>2</sub> 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)
Steel Hauling	Light-Duty Truck, catalyst	9	35	80	1.345149	31.4244799	0.126499	1.8136819	0.041785	2.39463668	1.62197187	0.707094998	0.16038404	0.714647031	0.004128	0.00571499	0.00191	0.02919863	0.008	0.03675	0.001753	0.0268842	0.002	0.01575	290.1533	448.548176	0.0177	0.02209593	0.03	0.009722282

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											
					CO	NO <sub>x</sub>	VOCs	SO <sub>x</sub>	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	
Steel Hauling	Light-Duty Truck, catalyst	9	35	80	2.76	0.24	0.18	0.01	0.07	0.03	0.08	0.03	0.03	469.47	0.03	0.05
Simultaneous Worker Trips		9			2.76	0.24	0.18	0.01	0.07	0.03	0.08	0.03	0.03	469.47	0.03	0.05

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	NO <sub>x</sub>	PM	CO	VOC	NO <sub>x</sub>	PM	CO	VOC	NO <sub>x</sub>	PM
Hughes 500E	Allison 250-C20B/R	250B17B	Taxi Out	0.008154	19	2.199837	23.004097	2.199837	4.2	0.045081939	0.471430067	0.045081939	0.086071898				
			Takeoff	0.031642	10.4	6.599994	0.402675	6.599994	4.2	0.287295342	0.017528297	0.287295342	0.182824475				
			Climbout	0.028926	0.09	5.981142	0.408337	5.981142	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	4.2	0.03076471	0.083722432	0.03076471	0.058715628				
			Taxi In	0.008154	7	2.199837	23.004097	2.199837	4.2	0.016609136	0.173684761	0.016609136	0.031710699				
			<b>Total per LTO</b>														
										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	4.2	8.10115881	4.602480362	0.055397664	0.193730382				
			Takeoff	0.112337	1.5	8.787	2.123	7.088	4.2	0.195858528	0.047320776	0.157988534	0.093616231				
			Climbout	0.079	1.5	14	1.32	5.58	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	4.2	4.123145244	2.342168652	0.027954196	0.097192143				
			Taxi In	0.018353	7	2.199837	23.004097	2.199837	4.2	0.037383795	0.390929167	0.037383795	0.071374351				
			<b>Total per LTO</b>														
										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	NO <sub>x</sub>	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
<b>Total Light Helicopter</b>	<b>4.501</b>	<b>1.028</b>	<b>4.501</b>	<b>3.253</b>
<b>Total Heavy Helicopter</b>	<b>39.011</b>	<b>9.887</b>	<b>10.862</b>	<b>8.422</b>
<b>Total</b>	<b>43.512</b>	<b>10.914</b>	<b>15.363</b>	<b>11.675</b>

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

\* SO<sub>x</sub> 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	1.02	9.71	19.15	0.02	0.56	0.50
Construction Truck Trips	0.20	0.88	2.96	0.01	0.22	0.11
Worker Trips	1.91	29.73	2.55	0.07	1.62	0.68
Helicopter	10.91	43.51	15.36		11.68	11.68
Fugitive Dust (Unmitigated)					6.56	1.01
<b>Total</b>	<b>14.05</b>	<b>83.83</b>	<b>40.02</b>	<b>0.10</b>	<b>20.63</b>	<b>13.97</b>
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	8.47	51.15	68.18	0.09	3.82	3.40
Construction Truck Trips	0.62	2.32	10.47	0.02	0.57	0.29
Worker Trips	0.59	9.20	2.55	0.02	0.50	0.21
Fugitive Dust (Unmitigated)					16.02	3.37
<b>Total</b>	<b>9.68</b>	<b>62.67</b>	<b>81.20</b>	<b>0.13</b>	<b>20.91</b>	<b>7.26</b>
Segment C	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	3.16	17.88	24.61	0.03	1.15	1.03
Construction Truck Trips	0.03	0.14	0.45	0.00	0.05	0.02
Worker Trips	0.61	9.50	2.55	0.02	0.52	0.22
Fugitive Dust (Unmitigated)					0.41	0.06
<b>Total</b>	<b>3.80</b>	<b>27.52</b>	<b>27.61</b>	<b>0.06</b>	<b>2.13</b>	<b>1.33</b>
Segment D	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	0.33	2.11	3.69	0.00	0.14	0.12
Construction Truck Trips	0.03	0.12	0.31	0.00	0.03	0.02
Worker Trips	0.61	9.50	2.55	0.02	0.52	0.22
Fugitive Dust (Unmitigated)					22.71	4.77
<b>Total</b>	<b>0.97</b>	<b>11.73</b>	<b>6.55</b>	<b>0.03</b>	<b>23.39</b>	<b>5.13</b>
<b>Maximum Daily Emissions, 2016</b>	<b>28.50</b>	<b>185.75</b>	<b>155.39</b>	<b>0.32</b>	<b>67.07</b>	<b>27.69</b>
2017	Maximum Daily Construction Emissions, lbs/day					
Segment A	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	9.14	58.53	82.84	0.11	3.53	3.14
Construction Truck Trips	0.24	1.15	3.64	0.01	0.31	0.12
Worker Trips	0.30	4.60	0.39	0.01	0.25	0.10
Helicopter	1.03	4.50	4.50		3.25	3.25
<b>Total</b>	<b>10.71</b>	<b>68.77</b>	<b>91.38</b>	<b>0.13</b>	<b>7.34</b>	<b>6.62</b>
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	0.25	1.18	3.82	0.01	0.31	0.22
Worker Trips	0.34	5.21	0.45	0.01	0.28	0.12
<b>Total</b>	<b>2.47</b>	<b>25.14</b>	<b>34.59</b>	<b>0.06</b>	<b>1.48</b>	<b>1.12</b>
Segment D	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	3.81	22.50	37.67	0.05	1.27	1.13
Construction Truck Trips	0.12	0.54	1.81	0.00	0.17	0.07
Worker Trips	0.18	2.76	0.24	0.01	0.15	0.06
<b>Total</b>	<b>4.11</b>	<b>25.80</b>	<b>39.71</b>	<b>0.06</b>	<b>1.60</b>	<b>1.27</b>
<b>Maximum Daily Emissions, 2017</b>	<b>17.29</b>	<b>119.71</b>	<b>165.68</b>	<b>0.24</b>	<b>10.42</b>	<b>9.01</b>

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	1.02	9.71	19.15	0.02	0.56	0.50
Construction Truck Trips	0.20	0.88	2.96	0.01	0.22	0.11
Worker Trips	1.91	29.73	2.55	0.07	1.62	0.68
Helicopter	10.91	43.51	15.36		11.68	11.68
Fugitive Dust (Unmitigated)					2.56	0.40
<b>Total</b>	<b>14.05</b>	<b>83.83</b>	<b>40.02</b>	<b>0.10</b>	<b>16.63</b>	<b>13.36</b>
Segment B	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	8.47	51.15	68.18	0.09	3.82	3.40
Construction Truck Trips	0.62	2.32	10.47	0.02	0.57	0.29
Worker Trips	0.59	9.20	2.55	0.02	0.50	0.21
Fugitive Dust (Unmitigated)					0.95	0.20
<b>Total</b>	<b>9.68</b>	<b>62.67</b>	<b>81.20</b>	<b>0.13</b>	<b>5.84</b>	<b>4.10</b>
Segment C	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	3.16	17.88	24.61	0.03	1.15	1.03
Construction Truck Trips	0.03	0.14	0.45	0.00	0.05	0.02
Worker Trips	0.61	9.50	2.55	0.02	0.52	0.22
Fugitive Dust (Unmitigated)					0.16	0.02
<b>Total</b>	<b>3.80</b>	<b>27.52</b>	<b>27.61</b>	<b>0.06</b>	<b>1.88</b>	<b>1.29</b>
Segment D	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	0.33	2.11	3.69	0.00	0.14	0.12
Construction Truck Trips	0.03	0.12	0.31	0.00	0.03	0.02
Worker Trips	0.61	9.50	2.55	0.02	0.52	0.22
Fugitive Dust (Unmitigated)					1.35	0.28
<b>Total</b>	<b>0.97</b>	<b>11.73</b>	<b>6.55</b>	<b>0.03</b>	<b>2.04</b>	<b>0.64</b>
<b>Maximum Daily Emissions, 2016</b>	<b>28.50</b>	<b>185.75</b>	<b>155.39</b>	<b>0.32</b>	<b>26.38</b>	<b>19.39</b>

2017	Maximum Daily Construction Emissions, lbs/day					
Segment A	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	9.14	58.53	82.84	0.11	3.53	3.14
Construction Truck Trips	0.24	1.15	3.64	0.01	0.31	0.12
Worker Trips	0.30	4.60	0.39	0.01	0.25	0.10
Helicopter	1.03	4.50	4.50		3.25	3.25
<b>Total</b>	<b>10.71</b>	<b>68.77</b>	<b>91.38</b>	<b>0.13</b>	<b>7.34</b>	<b>6.62</b>
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	0.25	1.18	3.82	0.01	0.31	0.22
Worker Trips	0.34	5.21	0.45	0.01	0.28	0.12
<b>Total</b>	<b>2.47</b>	<b>25.14</b>	<b>34.59</b>	<b>0.06</b>	<b>1.48</b>	<b>1.12</b>
Segment D	ROG	CO	NOx	SOx	PM10	PM2.5
Construction Equipment	3.81	22.50	37.67	0.05	1.27	1.13
Construction Truck Trips	0.12	0.54	1.81	0.00	0.17	0.07
Worker Trips	0.18	2.76	0.24	0.01	0.15	0.06
<b>Total</b>	<b>4.11</b>	<b>25.80</b>	<b>39.71</b>	<b>0.06</b>	<b>1.60</b>	<b>1.27</b>
<b>Maximum Daily Emissions, 2017</b>	<b>17.29</b>	<b>119.71</b>	<b>165.68</b>	<b>0.24</b>	<b>10.42</b>	<b>9.01</b>

Table A-29  
 ARB and USEPA Off-Road Engine Standards  
 Sycamore to Peñasquitos 230 kV Transmission Line Project

**Table A-29. 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 <sup>a</sup>									
11 <input type="checkbox"/> hp < 25						7.1 / 4.9 / 0.60			5.6 / 4.9 / 0.60			5.6 / 4.9 / 0.30									
25 <input type="checkbox"/> hp < 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 <input type="checkbox"/> hp < 75									5.6 / 3.7 / 0.30			3.5 / 3.7 / 0.22 <sup>c</sup>				3.5 / 3.7 / 0.02 <sup>c</sup>					
75 <input type="checkbox"/> hp < 100							- / 6.9 / - / - <sup>b</sup>						3.5 / 3.7 / 0.30			0.14 / 2.5 / 3.7 / 0.015 <sup>b,d</sup>			0.14 / 0.30 / 3.7 / 0.015 <sup>b</sup>		
100 <input type="checkbox"/> hp < 175									4.9 / 3.7 / 0.22			3.0 / 3.7 / 0.22									
175 <input type="checkbox"/> hp < 300										4.9 / 2.6 / 0.15							0.14 / 1.5 / 2.6 / 0.015 <sup>b,d</sup>			0.14 / 0.30 / 2.2 / 0.015 <sup>b</sup>	
300 <input type="checkbox"/> hp < 600	1.0 / 6.9 / 8.5 / 0.40 <sup>b</sup>								4.8 / 2.6 / 0.15			3.0 / 2.6 / 0.15 <sup>e</sup>									
600 <input type="checkbox"/> hp < 750																					
Mobile Machines > 750hp																0.30 / 2.6 / 2.6 / 0.07 <sup>b</sup>			0.14 / 2.6 / 2.6 / 0.03 <sup>b</sup>		
750hp < GEN <input type="checkbox"/> 1200hp							1.0 / 6.9 / 8.5 / 0.40 <sup>b</sup>						4.8 / 2.6 / 0.15							0.14 / 0.50 / 2.6 / 0.02 <sup>b</sup>	
GEN > 1200 hp																	0.30 / 0.50 / 2.6 / 0.07 <sup>b</sup>				

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 A-29  
 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
Maximum horsepower	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			
<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 <input type="checkbox"/> 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 <input type="checkbox"/> 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 <input type="checkbox"/> 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 <input type="checkbox"/> 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 <input type="checkbox"/> 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 <input type="checkbox"/> 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 <input type="checkbox"/> 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 <input type="checkbox"/> 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 <input type="checkbox"/> 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 A-30  
 Construction and Operational Truck Trip Emissions  
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-30. Operational Truck Trips

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO	NO <sub>x</sub>	ROG	SO <sub>x</sub>	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 <sub>x</sub>	VOCs	SO <sub>x</sub>	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO2	CH4	N2O
<b>Operations</b>																												
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	0.00	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	0.00	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	0.00799996	0.03674982	0.0366331	0.002	0.0157499	504.22234	0.02881278	0.01	0.22	0.81	0.05	0.00	0.02	0.01	0.00	0.00	133.40	0.01	0.00
<b>Subtotal</b>																	<b>0.37</b>	<b>1.07</b>	<b>0.08</b>	<b>0.00</b>	<b>0.07</b>	<b>0.05</b>	<b>0.00</b>	<b>0.00</b>	<b>264.58</b>	<b>0.02</b>	<b>0.01</b>	
<b>Simultaneous Construction Trucks</b>																												
																	<b>0.37</b>	<b>1.07</b>	<b>0.08</b>	<b>0.00</b>	<b>0.07</b>	<b>0.05</b>	<b>0.00</b>	<b>0.00</b>	<b>264.58</b>	<b>0.02</b>	<b>0.01</b>	

Table A-31  
Construction and Operations Worker Commute Emission Calculations  
Sycamore to Peñasquitos 230 kV Transmission Line Project

Table A-31. Operational Worker Trips

Construction Phase	Vehicle Class	No. of Daily Workers Per Construction Phase	Speed (mph)	VMT (mi/vehicle-day)	CO		NO <sub>x</sub>		ROG					SO <sub>x</sub>		PM10				PM2.5				CO <sub>2</sub>		CH <sub>4</sub>		N <sub>2</sub> 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)
Operations	Light-Duty Truck, catalyst	9	35	80	1.345149	31.42448	0.126499	1.8136819	0.041785	2.39463668	1.62197187	0.707095	0.16038404	0.714647031	0.004128	0.00571499	0.00191	0.02919863	0.008	0.03675	0.001753	0.0268842	0.002	0.01575	290.1533	448.548176	0.0177	0.02209593	0.03	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												
					CO	NO <sub>x</sub>	VOCs	SO <sub>x</sub>	PM10	PM2.5	Paved Road Fugitive Dust PM10	Paved Road Fugitive Dust PM2.5	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O		
Operations	Light-Duty Truck, catalyst	9	35	80	2.76	0.24	0.18	0.01	0.07	0.03	0.08	0.03	0.08	0.03	469.47	0.03	0.05
Simultaneous Worker Trips		9			2.76	0.24	0.18	0.01	0.07	0.03	0.08	0.03	0.08	0.03	469.47	0.03	0.05

Table A-32  
Operational Emissions Summary  
Sycamore to Peñasquitos 230 kV Transmission Line Project

**Table A-32. 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	0.07	0.05
Worker Trips	0.18	2.76	0.24	0.01	0.15	0.06
<b>Total</b>	<b>0.26</b>	<b>3.13</b>	<b>1.30</b>	<b>0.01</b>	<b>0.23</b>	<b>0.11</b>

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)
<b>Total Equipment Use</b>										
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	0.06	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	0.57	0.00	0.00
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
<b>Total</b>								<b>852.98</b>	<b>0.08</b>	<b>0.67</b>

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	31	504.222339	0.02881278	0.01	1.28	0.00	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Diesel	200	30	31	504.222339	0.02881278	0.01	3.13	0.00	0.00
Boom Truck	Light Heavy Duty Truck, Diesel	35	30	31	504.222339	0.02881278	0.01	0.55	0.00	0.00
Concrete Trucks	Light Heavy Duty Truck, Diesel	223	30	31	504.222339	0.02881278	0.01	3.49	0.00	0.00
Crane Truck	Light Heavy Duty Truck, Diesel	111.5	30	31	504.222339	0.02881278	0.01	1.74	0.00	0.00
Drill Rig/Truck Mounted Auger	Light Heavy Duty Truck, Diesel	48.3	30	31	504.222339	0.02881278	0.01	0.75	0.00	0.00
Dump Truck	Heavy Duty Truck, Diesel	1950.4	30	31	1807.66928	0.10329565	0.05	109.30	0.01	0.00
Flatbed Boom Truck	Light Heavy Duty Truck, Diesel	31.5	30	31	504.222339	0.02881278	0.01	0.49	0.00	0.00
Line Truck	Light Heavy Duty Truck, Diesel	384.3	30	31	504.222339	0.02881278	0.01	6.01	0.00	0.00
Mobile Fueling Truck	Light Heavy Duty Truck, Diesel	172.3	30	31	504.222339	0.02881278	0.01	2.69	0.00	0.00
Pick-Up Trucks	Light Duty Truck 1, Diesel	5091.7	30	31	247.933018	0.01416764	0.01	39.14	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	1914.4	30	31	247.933018	0.01416764	0.01	14.71	0.00	0.00
Tool Van	Light Duty Truck 1, Diesel	330	30	31	247.933018	0.01416764	0.01	2.54	0.00	0.00
Semi Tractor with Trailer	Heavy Duty Truck, Diesel	295	30	31	1807.66928	0.10329565	0.05	16.53	0.00	0.00
Water Truck	Light Heavy Duty Truck, Diesel	717.2	30	31	504.222339	0.02881278	0.01	11.21	0.00	0.00
<b>Total</b>								<b>213.56</b>	<b>0.01</b>	<b>0.01</b>

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	290.1533	448.5481762	0.0177	0.02209593	0.03	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	392.78	0.02	0.04
<b>Total Worker Trips</b>						<b>392.78</b>	<b>0.02</b>	<b>0.04</b>

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	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	4.2	0.045081939	0.471430067	0.045081939	0.086071898				
			Takeoff	0.031642	10.4	6.599994	0.402675	6.599994	4.2	0.287295342	0.017528297	0.287295342	0.182824475				
			Climbout	0.028926	0.09	5.981142	0.408337	5.981142	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	4.2	0.03076471	0.083722432	0.03076471	0.058715628				
			Taxi In	0.008154	7	2.199837	23.004097	2.199837	4.2	0.016609136	0.173684761	0.016609136	0.031710699				
			<b>Total per LTO</b>														
SkyKing	Allison 250-C20B/R	250B17B	Taxi Out	0.018353	19	175.63	99.78	1.201	4.2	8.10115881	4.602480362	0.055397664	0.193730382				
			Takeoff	0.112337	1.5	8.787	2.123	7.088	4.2	0.195858528	0.047320776	0.157988534	0.093616231				
			Climbout	0.079	1.5	14	1.32	5.58	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	4.2	4.123145244	2.342168652	0.027954196	0.097192143				
			Taxi In	0.018353	7	2.199837	23.004097	2.199837	4.2	0.037383795	0.390929167	0.037383795	0.071374351				
			<b>Total per LTO</b>														

\* 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 <sub>x</sub>	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
<b>Total Light Helicopter</b>	<b>4.501</b>	<b>1.028</b>	<b>4.501</b>	<b>3.253</b>
<b>Total Heavy Helicopter</b>	<b>39.011</b>	<b>9.887</b>	<b>10.862</b>	<b>8.422</b>
<b>Total</b>	<b>43.512</b>	<b>10.914</b>	<b>15.363</b>	<b>11.675</b>

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

\* SO<sub>x</sub> 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 <sup>3</sup>
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
8.32	kg CO <sub>2</sub> /gallon	CO <sub>2</sub> emission factor for Jet fuel
0.31	g N <sub>2</sub> O/gallon	N <sub>2</sub> O emission factor for Jet fuel
0.27	g CH <sub>4</sub> /gallon	CH <sub>4</sub> 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 <sub>2</sub>	N <sub>2</sub> O	CH <sub>4</sub>	CO <sub>2</sub> e		CO <sub>2</sub>	CH <sub>4</sub>	CO <sub>2</sub> e
Light Helicopter									
LTO - Idle	0.433	0.075	0.000013	0.000012	0.079	30	2.245	0.0003	2.377
LTO - Other	0.342	0.059	0.000011	0.000009	0.063		1.774	0.0003	1.878
Installation	3.000	0.518	0.000092	0.000080	0.548		15.545	0.0024	16.454
Heavy Helicopter									
LTO - Idle	0.433	0.075	0.000013	0.000012	0.079	9	2.245	0.0003	2.377
LTO - Other	0.212	0.037	0.000007	0.000006	0.039		1.098	0.0002	1.163
Installation	3.000	0.518	0.000092	0.000080	0.548		15.545	0.0024	16.454
<b>Total per Installation</b>	<b>7.421</b>	<b>1.282</b>	<b>0.000228</b>	<b>0.000199</b>	<b>1.356762</b>		<b>38.454</b>	<b>0.0060</b>	<b>40.703</b>

\* 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**

	<b>Total Construction Emissions, metric tons</b>		
	<b>CO2</b>	<b>CH4</b>	<b>N2O</b>
Construction Equipment	852.98	0.08	0.67
Construction Truck Trips	213.56	0.01	0.01
Worker Trips	392.78	0.02	0.04
Helicopter	38.45	0.01	
<b>Total</b>	<b>1497.77</b>	<b>0.12</b>	<b>0.72</b>



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 <sup>a</sup>								
11 <input type="checkbox"/> hp < 25						7.1 / 4.9 / 0.60				5.6 / 4.9 / 0.60			5.6 / 4.9 / 0.30								
25 <input type="checkbox"/> hp < 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 <input type="checkbox"/> hp < 75									5.6 / 3.7 / 0.30			3.5 / 3.7 / 0.22 <sup>c</sup>				3.5 / 3.7 / 0.02 <sup>c</sup>					
75 <input type="checkbox"/> hp < 100					- / 6.9 / - / - <sup>b</sup>				4.9 / 3.7 / 0.22			3.0 / 3.7 / 0.22			0.14 / 2.5 / 3.7 /		0.14 /				
100 <input type="checkbox"/> hp < 175															0.015 <sup>b,d</sup>		0.30 / 3.7 / 0.015 <sup>b</sup>				
175 <input type="checkbox"/> hp < 300									4.9 / 2.6 / 0.15			3.0 / 2.6 / 0.15 <sup>e</sup>				0.14 / 1.5 / 2.6 /		0.14 /			
300 <input type="checkbox"/> hp < 600					1.0 / 6.9 / 8.5 / 0.40 <sup>b</sup>				4.8 / 2.6 / 0.15							0.015 <sup>b,d</sup>		0.30 / 2.2 / 0.015 <sup>b</sup>			
600 <input type="checkbox"/> hp < 750																					
Mobile Machines > 750hp																0.30 / 2.6 / 2.6 / 0.07 <sup>b</sup>		0.14 / 2.6 / 2.6 / 0.03 <sup>b</sup>			
750hp < GEN <input type="checkbox"/> 1200hp					1.0 / 6.9 / 8.5 / 0.40 <sup>b</sup>				4.8 / 2.6 / 0.15							0.14 / 0.50 / 2.6 /					
GEN > 1200 hp																0.30 / 0.50 / 2.6 / 0.07 <sup>b</sup>		0.02 <sup>b</sup>			

- 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.

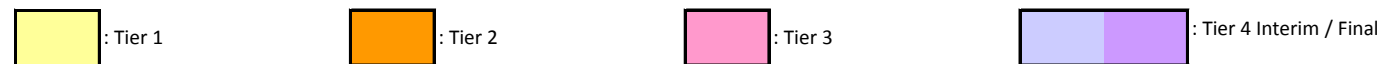


Table B-6  
 ARB and USEPA Off-Road Engine Standards  
 Sycamore to Peñasquitos 230 kV Transmission Line Project

Maximum horsepower	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
<11	5.32	0.0117284	6	0.0132275	0.6	0.0013228
11 <input type="checkbox"/> hp<25	5.32	0.0117284	4.9	0.0108025	0.6	0.0013228
25 <input type="checkbox"/> hp<50	5.32	0.0117284	4.1	0.0090388	0.45	0.0009921
50 <input type="checkbox"/> hp<75	5.32	0.0117284	3.7	0.008157	0.3	0.0006614
75 <input type="checkbox"/> hp<100	5.32	0.0117284	3.7	0.008157	0.3	0.0006614
100 <input type="checkbox"/> hp<175	4.655	0.0102623	3.7	0.008157	0.22	0.000485
175 <input type="checkbox"/> hp<300	4.655	0.0102623	2.6	0.0057319	0.15	0.0003307
300 <input type="checkbox"/> hp<600	4.56	0.0100529	2.6	0.0057319	0.15	0.0003307
600 <input type="checkbox"/> 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 <input type="checkbox"/> 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%

 : Tier 2

 : Tier 3

Table B-7  
 Construction and Operational Truck Trip Emissions  
 Sycamore to Peñasquitos 230 kV Transmission Line Project

**Table B-7. Operational Truck Trips**

Vehicle	Vehicle Class	Peak No. of Trucks per day	Speed (mph)	VMT (mi/vehicle-day)	CO2	CH4	N2O	Emissions, lbs/day		
					Running Exhaust (g/mi)	Running Exhaust (g/mi)	Running Exhaust (g/mi)	CO2	CH4	N2O
<b>Operations</b>										
Pick-Up Trucks	Light Duty Truck 1, Diesel	2	30	60	247.933018	0.01416764	0.01	65.59	0.00	0.00
Pick-Up Trucks, Crew Cab	Light Duty Truck 1, Diesel	2	30	60	247.933018	0.01416764	0.01	65.59	0.00	0.00
Aerial Bucket Truck	Light Heavy Duty Truck, Diesel	2	30	60	504.2223392	0.02881278	0.01	133.40	0.01	0.00
<b>Subtotal</b>								<b>264.58</b>	<b>0.02</b>	<b>0.01</b>
<b>Operations</b>								<b>264.58</b>	<b>0.02</b>	<b>0.01</b>

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	290.1533	448.548176	0.0177	0.02209593	0.03	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	469.47	0.03	0.05	2.56	0.00	0.00
Worker Trips		9	-	-	469.47	0.03	0.05	2.56	0.00	0.00

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	2.56	0.00	0.00	2.65
<b>Total</b>	<b>4.00</b>	<b>0.00</b>	<b>0.00</b>	<b>4.10</b>