

CONSTRUCTION AIR QUALITY EMISSIONS METHODOLOGY

OVERVIEW

This Appendix summarizes Pacific Gas & Electric's (PG&E's) construction-phase air quality and greenhouse gas (GHG) modeling efforts and results for the Santa Cruz 115kV Reinforcement Project.

ON- AND OFF-ROAD VEHICLES

Methodology

Modeling

PG&E initially used Urban Emissions version 9.2.4 (URBEMIS 2007) and Emission Factors version 2.30 (EMFAC2007) to estimate criteria air pollutant emissions and carbon dioxide emissions from off- and on-road vehicle use. Upon request, PG&E remodeled the air emissions using the most recent version (version 2011.11.1) of the California Emissions Estimator Model version 2011.11.1 (CalEEMod).

Emissions Factors

The emissions factors for CalEEMod are taken from EMFAC2007 for on-road vehicles and OFFROAD 2007 for off-road equipment. The emissions factors are contained in Attachment A to the CalEEMod User's Guide as "Calculation Details."

Model Input

PG&E's initial URBEMIS modeling and EMFAC calculations were converted for use in CalEEMod.

Results

Calculations were completed for mitigated and unmitigated emissions. Emissions are summarized below.

Mitigated

Table 1 contains the results of calculations of mitigated criteria pollutant emissions from vehicles and fugitive dust. APM AIR-01 and APM AIR-02 were factored into the calculation of emissions. APM AIR-01 requires that active construction areas, unpaved access roads, parking areas, and staging areas be watered or stabilized with non-toxic soil stabilizers at least two times per day or as needed to control fugitive dust. APM AIR-02, which has since been deleted, required that traffic speeds on unpaved roads and rights-of-way be limited to 15 miles per hour

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(mph). Although APM AIR-02 has been deleted, APM BIO-10 also required a 15 mph speed limit on unpaved access roads.

Table 1: Mitigated Criteria Pollutant Emissions from Vehicles and Fugitive Dust (pounds per day)					
PM _{2.5}	PM ₁₀	NO _x	SO _x	CO	VOCs
21.90	41.98	349.16	0.51	234.24	50.75

Table 2 contains the results of calculations of mitigated GHG emissions from off- and on-road vehicles. APM AIR-03 and APM AIR-04 were factored into the emissions calculation. APM AIR-03, which has since been deleted, required that vehicle idling time be limited to a maximum of 5 minutes, except where vehicle idling is required for the equipment to perform the task. It was assumed that implementation of APM AIR-03 would result in an emissions reduction of 10 percent. APM AIR-04, which has since been deleted, required that PG&E encourage its workers to carpool to the job site, to the extent feasible. It was assumed that implementation of AIR-04 would result in an emissions reduction of 5 percent.

Table 2: Mitigated On- and Off-Road GHG Emissions (metric tons)			
Equipment Type	Approximate CO ₂ Emissions	Approximate CH ₄ Emissions	Approximate N ₂ O Emissions
Off-Road Vehicles	281.11	0.010	<0.001
On-Road Vehicles	1,509.95	0.135	<0.001
Total	1,791.06	0.145	<0.002

Unmitigated

PG&E did not calculate unmitigated criteria pollutant emissions for on- and off-road vehicles. PG&E conducted emissions calculations for unmitigated GHG emissions. Table 3 contains the results of the calculations.

Table 3: On- and Off-Road GHG Emissions (metric tons)		
Approximate CO ₂ Emissions	Approximate CH ₄ Emissions	Approximate N ₂ O Emissions
1,973.62	0.180	<0.001

HELICOPTERS

Methodology

Modeling

Past modeling from similar runs of the Federal Aviation Administration’s Emissions and Dispersion Modeling System (EDMS) were used to estimate emissions from helicopter use for the project. The past modeling runs were scaled according to the number of trips anticipated on the proposed project.

Emissions Factors

Helicopter emissions were estimated using emission factors from the Emissions and Dispersion Modeling System (EDMS) and the California Climate Action Registry General Reporting Protocol. The emission factors are shown in Table 4.

Table 4: Helicopter Emissions Factors								
Mode	Fuel Flow (kilograms per second)	Time in Mode (minutes)	Emission Factor (pounds per minute)					
			CO	ROG	NO _x	SO _x	PM ¹	CO ₂
Taxi Out	0.013	2	0.007	0.069	0.007	0.004	0.010	10.838
Takeoff	0.119	1	0.228	0.001	0.228	0.040	0.054	98.788
Climbout	0.117	2	0.227	0.001	0.227	0.040	0.045	97.732
Approach	0.029	20	0.032	0.001	0.032	0.010	0.018	23.855
Taxi In	0.013	1	0.007	0.069	0.007	0.004	0.010	10.838
Note								
1	PM estimates were assumed to be entirely PM ₁₀ . PM ₁₀ emissions were assumed to be comprised of 90 percent PM _{2.5} .							

Model Assumptions and Emission Rates

It was assumed that up to 190 hours of helicopter use, spread over 35 days, would be required to assist with the construction of TSP foundations, installation of TSPs, and pulling and stringing of conductor. Activity and emission rates are given in Table 5.

Results

Table 6 displays the results of the helicopter emissions calculations for criteria pollutants. Table 7 displays the results of the helicopter greenhouse gas emissions calculations.

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Table 5: Helicopter Emission Rates											
Activity	Days of Use	Duration of Use (hours per day)	Cycles per Day	Total Flight Cycles	Emission Rate (pounds per day)						
					CO	ROG	NO _x	SO _x	PM ¹	CO ₂	
Foundations	5	3	7	35	0.10	0.96	0.10	0.06	0.14	151.74	
TSP Installation	5	8	19	95	4.33	0.02	4.33	0.76	1.03	1,876.97	
Remove Poles	5	3	7	35	3.18	0.01	3.18	0.57	0.64	1,368.25	
String Conductor	20	6	14	280	8.90	0.28	8.90	2.73	5.08	6,679.32	
TOTAL	—	—	—	—	16.51	1.27	16.51	4.12	6.88	10,076.29	
Note											
1 PM estimates were assumed to be entirely PM10. PM10 emissions were assumed to be comprised of 90 percent PM2.5.											

Table 6: Helicopter Criteria Pollutant Emissions (pounds per day)					
PM _{2.5}	PM ₁₀	NO _x	SO _x	CO	VOCs
12.39	13.77	33.02	8.23	33.02	2.55

Table 7: Helicopter GHG Emissions (metric tons)		
Approximate CO ₂ Emissions	Approximate CH ₄ Emissions	Approximate N ₂ O Emissions
136.60	0.004	0.004