TRC Solutions
October 8, 2016

PG&E Fulton-Fitch CPUC Data Needs #2: AQ/GHG-01
Page 1

CPUC data needs are reproduced in blue text. Responses are provided in black text.

a. Recalculate criteria air pollutants and GHG emission estimates to include the following revisions:

- Add equipment used for "Vegetation Removal and Trimming"

  See Page 3.

- Add the jackhammer used under "LDS Pole Installation – Ground Access"

  The Jackhammer is pneumatic and has no associated fuel combustion emissions.

- Update equipment usage hours for the following equipment: (1) Off-highway truck: 1.80 hr (listed as 0.50 in CalEEMod output) under "Site Improvements and Reestablishment"; (2) Off-highway truck: 2.70 hr (listed as 2.80 in CalEEMod output) under "Site Improvements and Reestablishment"; and (3) Crawler tractor: 1.80 hr (listed as 1.90 in CalEEMod output) under "Site Improvements and Reestablishment"

  Usage rates for (1) and (2) have been updated. Equipment (3) is no longer part of this phase.

- Update the grading acreage using the final work areas described in PD-04 and PD-05 above and use the most conservative estimate in CalEEMod

  The model has been updated to reflect the final work area.

- Update the emission calculations to include assumptions regarding fugitive dust from helicopter take-off and landing activities

  See Page 4.

- Ensure all haul trips for construction materials are incorporated, including anticipated cut-and-fill soil and gravel

  Haul trips have been added for importing gravel and importing and exporting poles.

- Ensure that any generators at staging areas are incorporated as described in AQ/GHG-2

  One generator for each staging area has conservatively been assumed during the LDS Pole Install - Ground.

- Update the revised construction schedule to July 2018 through January 2020, if not already been updated

  Previously completed.

- Clarify equipment included as "Other Material Handling Equipment" and reclassify any pickup trucks or on road vehicles to EMFAC2014 as appropriate

  See Page 7.

- Specify whether equipment is gas or diesel powered, where applicable

  See Page 7.

b. Provide updated data calculations and spreadsheets that support the revised emission estimates described in part a.

See Pages 1 to 8 and attached CalEEMod files.

c. Provide detailed summaries presenting the estimate results including annual, average daily, and peak daily criteria air pollutant estimates with and without implementation of APMs. Summaries should contain a breakdown of emissions that would be on-site and offsite by project component. Emissions should include helicopter operations, and output from the CalEEMod should be included.

See Page 2.1 to 2.8 and attached CalEEMod files.

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PG&E Fulton-Fitch CPUC Data Needs #2: Summary of Emissions
Page 2.1

Total Project Emissions w/ APMs

	ROG	Nox	CO	SO2	Fugitive PM10	Exhaust PM10	Total PM10	Fugitive PM2.5	Exhaust PM2.5	Total PM2.5
	tons									
CalEEMod Total	0.3	7.0	5.3	0.0	0.1	0.2	0.3	0.0	0.2	0.2
EMFAC	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Veg. Trim Equipment	0.1	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopters	3.0	3.2	3.7	0.4	0.7	0.1	0.8	0.1	0.1	0.2
Total	3.3	10.2	9.6	0.5	0.8	0.3	1.1	0.1	0.3	0.4

Average Daily Emissions w/ APMs

	ROG	Nox	CO	SO2	Fugitive PM10	Exhaust PM10	Total PM10	Fugitive PM2.5	Exhaust PM2.5	Total PM2.5
	average lbs/day									
CalEEMod Total	1.4	36.0	27.1	0.1	0.5	1.0	1.5	0.2	1.0	1.2
EMFAC	0.0	0.1	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Veg. Trim Equipment	0.4	0.0	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopters	15.2	16.2	19.0	2.3	3.4	0.5	3.9	0.3	0.5	0.8
Total	17.0	52.3	49.2	2.3	4.0	1.5	5.5	0.5	1.5	2.0

Peak Daily Emissions w/ APMs

	ROG	Nox	CO	SO2	Fugitive PM10	Exhaust PM10	Total PM10	Fugitive PM2.5	Exhaust PM2.5	Total PM2.5
	lbs/day									
CalEEMod Total	4.1	95.9	72.0	0.2	4.5	2.8	6.4	1.8	2.8	3.7
EMFAC	-	0.2	1.7	-	-	0.0	-	-	0.0	0.0
Veg. Trim Equipment	-	0.1	32.8	-	-	-	-	-	-	0.6
Helicopters	55.5	-	-	10.2	12.7	-	15.1	-	-	-
Total	55.5	96.2	106.5	10.2	12.7	2.9	15.1	1.8	2.8	4.3

Peak Daily Emission Notes

Peak daily ROG, SO2, Fugitive PM10, and Total PM10 occur between 9/30/2019 and 1/26/2020.
Peak daily NOx, CO, Fugitive PM2.5, and Total PM2.5 occur between 8/6/2018 and 8/31/2018.
Peak daily Exhaust PM10 and Exhaust PM2.5 occur between 10/14/2018 and 11/11/2018.

Notes:

Average lbs/day is based on a 13-month construction schedule at 30 days per month
Northern Segment: July 2018 through December 2018 (six months)
Northern Segment: May 2019 through June 2019 (two months)
outhern Segment: September 2019 through January 2020 (five months)
Substation Modifications: intermittently throughout the project
Consistent with the BAAQMD CEQA Air Quality Guidelines updated May 2012, the measures associated with minimizing idling time and maintaining equipment are assumed to reduce emissions 5%.

PG&E Fulton-Fitch CPUC Data Needs #2: Summary of Emissions
Page 2.2

Total Project Emissions w/o APMs

	ROG	Nox	CO	SO2	Fugitive PM10	Exhaust PM10	Total PM10	Fugitive PM2.5	Exhaust PM2.5	Total PM2.5
	tons									
CalEEMod Total	0.3	7.4	5.6	0.0	0.1	0.2	0.3	0.0	0.2	0.2
EMFAC	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Veg. Trim Equipment	0.1	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Helicopters	3.1	3.3	3.9	0.5	0.7	0.1	0.8	0.1	0.1	0.2
Total	3.5	10.7	10.1	0.5	0.8	0.3	1.1	0.1	0.3	0.4

Average Daily Emissions w/o APMs

	ROG	Nox	CO	SO2	Fugitive PM10	Exhaust PM10	Total PM10	Fugitive PM2.5	Exhaust PM2.5	Total PM2.5
	average lbs/day									
CalEEMod Total	1.5	37.9	28.5	0.1	0.5	1.0	1.6	0.2	1.0	1.2
EMFAC	0.0	0.1	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Veg. Trim Equipment	0.4	0.0	2.7	0.0	0.0	0.1	0.1	0.0	0.1	0.1
Helicopters	16.0	17.1	20.0	2.4	3.4	0.5	4.0	0.3	0.5	0.9
Total	18	55	52	2	4	2	6	1	2	2

Peak Daily Emissions wo APMs

	ROG	Nox	CO	SO2	Fugitive PM10	Exhaust PM10	Total PM10	Fugitive PM2.5	Exhaust PM2.5	Total PM2.5
	lbs/day									
CalEEMod Total	4.4	100.9	75.8	0.2	4.7	3.0	6.8	1.8	3.0	3.8
EMFAC	-	0.2	1.8	-	-	0.0	-	-	0.0	0.0
Veg. Trim Equipment	-	0.1	34.5	-	-	-	-	-	-	0.7
Helicopters	58.4	-	-	10.8	13.4	-	15.9	-	-	-
Total	58	101	112	11	13	3	16	2	3	5

Peak Daily Emission Notes

Peak daily ROG, SO2, Fugitive PM10, and Total PM10 occur between 9/30/2019 and 1/26/2020.
Peak daily NOx, CO, Fugitive PM2.5, and Total PM2.5 occur between 8/6/2018 and 8/31/2018.
Peak daily Exhaust PM10 and Exhaust PM2.5 occur between 10/14/2018 and 11/11/2018.

Notes:

Average lbs/day is based on a 13-month construction schedule at 30 days per month
Northern Segment: July 2018 through December 2018 (six months)
Northern Segment: May 2019 through June 2019 (two months)
outhern Segment: September 2019 through January 2020 (five months)
Substation Modifications: intermittently throughout the project
Consistent with the BAAQMD CEQA Air Quality Guidelines updated May 2012, the measures associated with minimizing idling time and maintaining equipment are assumed to reduce emissions 5%.

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PG&E Fulton-Fitch CPUC Data Needs #2: Summary of Emissions Onsite vs. Offsite w/ APMS
Page 2.3

Total Project Emissions w/ APMs

	ROG	Nox	CO	SO2	Fugitive PM10	Exhaust PM10	Total PM10	Fugitive PM2.5	Exhaust PM2.5	Total PM2.5
	tons									
Survey - Onsite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Survey - Offsite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Veg. Removal - Onsite	0.10	1.09	1.23	0.00	0.00	0.03	0.03	0.00	0.03	0.03
Veg. Removal - Offsite	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Site Improvement - Onsite	0.00	0.12	0.08	0.00	0.03	0.00	0.03	0.01	0.00	0.01
Site Improvement - Offsite	0.02	0.25	0.29	0.00	0.02	0.00	0.02	0.00	0.00	0.01
Drainage Crossings - Onsite	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drainage Crossings - Offsite	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Auger LDS Holes - Onsite	0.00	0.05	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Auger LDS Holes - Offsite	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pole Delivery - Onsite	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pole Delivery - Offsite	0.00	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Material Haul - Onsite	0.01	0.23	0.16	0.00	0.00	0.01	0.01	0.00	0.01	0.01
Material Haul - Offsite	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LDS Install, Ground - Onsite	0.09	1.79	1.40	0.00	0.00	0.07	0.07	0.00	0.07	0.07
LDS Install, Ground - Offsite	0.01	0.04	0.07	0.00	0.01	0.01	0.01	0.00	0.00	0.00
Conductor Installation - Onsite	0.07	2.07	1.48	0.00	0.00	0.05	0.05	0.00	0.05	0.05
Conductor Installation - Offsite	0.00	0.00	0.03	0.00	0.01	0.00	0.01	0.00	0.00	0.00
Auger TSP Holes - Onsite	0.00	0.15	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Auger TSP Holes - Offsite	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TSP Installation - Onsite	0.01	0.29	0.21	0.00	0.00	0.01	0.01	0.00	0.01	0.01
TSP Installation - Offsite	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Restoration - Onsite	0.01	0.13	0.10	0.00	0.03	0.00	0.04	0.01	0.00	0.01
Restoration - Offsite	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Breaker Install - Onsite	0.03	0.73	0.53	0.00	0.00	0.02	0.02	0.00	0.02	0.02
Breaker Install - Offsite	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LDS Install, Aerial - Onsite	2.96	3.17	3.70	0.44	0.67	0.09	0.77	0.07	0.09	0.16
LDS Install, Aerial - Offsite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Onsite	3.3	9.9	9.1	0.5	0.7	0.3	1.0	0.1	0.3	0.4
Total Offsite	0.0	0.4	0.5	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Total	3.3	10.2	9.6	0.5	0.8	0.3	1.1	0.1	0.3	0.4

Notes:

Consistent with the BAAQMD CEQA Air Quality Guidelines updated May 2012, the measures associated with minimizing vehicle idling time and maintaining equipment are assumed to reduce emissions 5%.

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PG&E Fulton-Fitch CPUC Data Needs #2: Summary of Emissions Onsite vs. Offsite w/ APMS
Page 2.4

Average Daily Emissions w/ APMs

	ROG	Nox	CO	SO2	Fugitive PM10	Exhaust PM10	Total PM10	Fugitive PM2.5	Exhaust PM2.5	Total PM2.5
	average lbs/day									
Survey - Onsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Survey - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Veg. Removal - Onsite	0.5	5.6	6.3	0.0	0.0	0.2	0.2	0.0	0.2	0.2
Veg. Removal - Offsite	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Site Improvement - Onsite	0.0	0.6	0.4	0.0	0.1	0.0	0.1	0.1	0.0	0.1
Site Improvement - Offsite	0.1	1.3	1.5	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Drainage Crossings - Onsite	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drainage Crossings - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auger LDS Holes - Onsite	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auger LDS Holes - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pole Delivery - Onsite	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pole Delivery - Offsite	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Haul - Onsite	0.0	1.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Haul - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LDS Install, Ground - Onsite	0.4	9.2	7.2	0.0	0.0	0.4	0.4	0.0	0.4	0.4
LDS Install, Ground - Offsite	0.0	0.2	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Conductor Installation - Onsite	0.4	10.6	7.6	0.0	0.0	0.3	0.3	0.0	0.3	0.3
Conductor Installation - Offsite	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auger TSP Holes - Onsite	0.0	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auger TSP Holes - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TSP Installation - Onsite	0.1	1.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TSP Installation - Offsite	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Restoration - Onsite	0.0	0.6	0.5	0.0	0.2	0.0	0.2	0.1	0.0	0.1
Restoration - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Breaker Install - Onsite	0.1	3.7	2.7	0.0	0.0	0.1	0.1	0.0	0.1	0.1
Breaker Install - Offsite	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LDS Install, Aerial - Onsite	15.2	16.2	19.0	2.3	3.4	0.5	3.9	0.3	0.5	0.8
LDS Install, Aerial - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Onsite	16.8	50.5	46.5	2.3	3.7	1.5	5.3	0.5	1.5	2.0
Total Offsite	0.2	1.8	2.8	0.0	0.3	0.0	0.3	0.1	0.0	0.1
Total	17.0	52.3	49.2	2.3	4.0	1.6	5.6	0.5	1.5	2.1

Notes:

Average lbs/day is based on a 13-month construction schedule at 30 days per month

Northern Segment: July 2018 through December 2018 (six months)

Northern Segment: May 2019 through June 2019 (two months)

Southern Segment: September 2019 through January 2020 (five months)

Substation Modifications: intermittently throughout the project

Consistent with the BAAQMD CEQA Air Quality Guidelines updated May 2012, the measures associated with minimizing vehicle idling time and maintaining equipment are assumed to reduce emissions 5%.

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PG&E Fulton-Fitch CPUC Data Needs #2: Summary of Emissions Onsite vs. Offsite w/ APMS
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Peak Daily Emissions During the Phase w/ APMs

	ROG	Nox	CO	SO2	Fugitive PM10	Exhaust PM10	Total PM10	Fugitive PM2.5	Exhaust PM2.5	Total PM2.5
	lbs/day									
Survey - Onsite	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Survey - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Veg. Removal - Onsite	5.7	60.5	68.4	0.1	0.0	1.9	1.9	0.0	1.9	1.9
Veg. Removal - Offsite	0.1	0.1	0.8	0.0	0.2	0.0	0.2	0.0	0.0	0.0
Site Improvement - Onsite	0.4	11.6	8.0	0.0	2.5	0.3	2.8	1.2	0.3	1.5
Site Improvement - Offsite	2.0	24.5	29.0	0.1	1.8	0.3	2.1	0.5	0.3	0.8
Drainage Crossings - Onsite	0.1	1.4	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drainage Crossings - Offsite	0.0	0.1	0.5	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Auger LDS Holes - Onsite	0.1	3.2	2.6	0.0	0.0	0.1	0.1	0.0	0.1	0.1
Auger LDS Holes - Offsite	0.0	0.1	0.6	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Pole Delivery - Onsite	0.2	4.8	3.3	0.0	0.0	0.1	0.1	0.0	0.1	0.1
Pole Delivery - Offsite	0.7	9.2	10.8	0.0	0.7	0.1	0.8	0.2	0.1	0.3
Material Haul - Onsite	0.2	6.5	4.5	0.0	0.0	0.2	0.2	0.0	0.2	0.2
Material Haul - Offsite	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LDS Install, Ground - Onsite	1.6	34.2	26.6	0.0	0.0	1.4	1.4	0.0	1.4	1.4
LDS Install, Ground - Offsite	0.1	0.7	1.4	0.0	0.2	0.1	0.3	0.0	0.0	0.1
Conductor Installation - Onsite	1.3	39.4	28.2	0.1	0.0	1.0	1.0	0.0	0.9	0.9
Conductor Installation - Offsite	0.0	0.1	0.6	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Auger TSP Holes - Onsite	0.4	11.9	7.9	0.0	0.0	0.3	0.3	0.0	0.3	0.3
Auger TSP Holes - Offsite	0.0	0.1	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TSP Installation - Onsite	0.5	14.0	10.1	0.0	0.0	0.3	0.3	0.0	0.3	0.3
TSP Installation - Offsite	0.1	0.6	1.2	0.0	0.2	0.0	0.2	0.0	0.0	0.1
Restoration - Onsite	0.3	6.3	5.1	0.0	1.6	0.2	1.8	0.6	0.2	0.7
Restoration - Offsite	0.0	0.1	0.5	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Breaker Install - Onsite	0.9	24.3	17.8	0.0	0.0	0.7	0.7	0.0	0.7	0.7
Breaker Install - Offsite	0.0	0.1	0.6	0.0	0.1	0.0	0.1	0.0	0.0	0.0
LDS Install, Aerial - Onsite	58.4	87.6	72.8	10.8	11.3	2.5	12.9	1.1	2.5	2.7
LDS Install, Aerial - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Notes:

Consistent with the BAAQMD CEQA Air Quality Guidelines updated May 2012, the measures associated with minimizing vehicle idling time and maintaining equipment are assumed to reduce emissions 5%.

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PG&E Fulton-Fitch CPUC Data Needs #2: Summary of Emissions Onsite vs. Offsite w/o APMS
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Total Project Emissions w/o APMs

	ROG	Nox	CO	SO2	Fugitive PM10	Exhaust PM10	Total PM10	Fugitive PM2.5	Exhaust PM2.5	Total PM2.5
	tons									
Survey - Onsite	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Survey - Offsite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Veg. Removal - Onsite	0.11	1.15	1.30	0.00	0.00	0.04	0.04	0.00	0.04	0.04
Veg. Removal - Offsite	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Site Improvement - Onsite	0.00	0.12	0.08	0.00	0.03	0.00	0.03	0.01	0.00	0.02
Site Improvement - Offsite	0.02	0.26	0.31	0.00	0.02	0.00	0.02	0.01	0.00	0.01
Drainage Crossings - Onsite	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drainage Crossings - Offsite	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Auger LDS Holes - Onsite	0.00	0.05	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Auger LDS Holes - Offsite	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pole Delivery - Onsite	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pole Delivery - Offsite	0.00	0.05	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Material Haul - Onsite	0.01	0.24	0.16	0.00	0.00	0.01	0.01	0.00	0.01	0.01
Material Haul - Offsite	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LDS Install, Ground - Onsite	0.09	1.89	1.47	0.00	0.00	0.08	0.08	0.00	0.08	0.08
LDS Install, Ground - Offsite	0.01	0.04	0.07	0.00	0.01	0.01	0.01	0.00	0.00	0.00
Conductor Installation - Onsite	0.07	2.18	1.56	0.00	0.00	0.05	0.05	0.00	0.05	0.05
Conductor Installation - Offsite	0.00	0.00	0.03	0.00	0.01	0.00	0.01	0.00	0.00	0.00
Auger TSP Holes - Onsite	0.00	0.16	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Auger TSP Holes - Offsite	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TSP Installation - Onsite	0.01	0.31	0.22	0.00	0.00	0.01	0.01	0.00	0.01	0.01
TSP Installation - Offsite	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Restoration - Onsite	0.01	0.13	0.11	0.00	0.05	0.00	0.05	0.02	0.00	0.03
Restoration - Offsite	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Breaker Install - Onsite	0.03	0.77	0.56	0.00	0.00	0.02	0.02	0.00	0.02	0.02
Breaker Install - Offsite	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LDS Install, Aerial - Onsite	3.11	3.33	3.89	0.46	0.67	0.10	0.77	0.07	0.10	0.17
LDS Install, Aerial - Offsite	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Onsite	3.4	10.4	9.5	0.5	0.7	0.3	1.1	0.1	0.3	0.4
Total Offsite	0.0	0.4	0.6	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Total	3.5	10.7	10.1	0.5	0.8	0.3	1.1	0.1	0.3	0.4

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PG&E Fulton-Fitch CPUC Data Needs #2: Summary of Emissions Onsite vs. Offsite w/o APMS
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Average Daily Emissions w/o APMs

	ROG	Nox	CO	SO2	Fugitive PM10	Exhaust PM10	Total PM10	Fugitive PM2.5	Exhaust PM2.5	Total PM2.5
	average lbs/day									
Survey - Onsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Survey - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Veg. Removal - Onsite	0.6	5.9	6.6	0.0	0.0	0.2	0.2	0.0	0.2	0.2
Veg. Removal - Offsite	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Site Improvement - Onsite	0.0	0.6	0.4	0.0	0.1	0.0	0.1	0.1	0.0	0.1
Site Improvement - Offsite	0.1	1.3	1.6	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Drainage Crossings - Onsite	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drainage Crossings - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auger LDS Holes - Onsite	0.0	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auger LDS Holes - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pole Delivery - Onsite	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pole Delivery - Offsite	0.0	0.2	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Haul - Onsite	0.0	1.2	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Material Haul - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LDS Install, Ground - Onsite	0.5	9.7	7.5	0.0	0.0	0.4	0.4	0.0	0.4	0.4
LDS Install, Ground - Offsite	0.0	0.2	0.4	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Conductor Installation - Onsite	0.4	11.2	8.0	0.0	0.0	0.3	0.3	0.0	0.3	0.3
Conductor Installation - Offsite	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auger TSP Holes - Onsite	0.0	0.8	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Auger TSP Holes - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TSP Installation - Onsite	0.1	1.6	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TSP Installation - Offsite	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Restoration - Onsite	0.0	0.7	0.5	0.0	0.2	0.0	0.3	0.1	0.0	0.1
Restoration - Offsite	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Breaker Install - Onsite	0.1	3.9	2.9	0.0	0.0	0.1	0.1	0.0	0.1	0.1
Breaker Install - Offsite	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LDS Install, Aerial - Onsite	16.0	17.1	20.0	2.4	3.4	0.5	4.0	0.3	0.5	0.9
LDS Install, Aerial - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Onsite	17.7	53.2	48.9	2.4	3.8	1.6	5.4	0.5	1.6	2.1
Total Offsite	0.2	1.9	2.9	0.0	0.3	0.1	0.3	0.1	0.0	0.1
Total	17.9	55.1	51.8	2.4	4.1	1.6	5.7	0.6	1.6	2.2

Notes:

Average lbs/day is based on a 13-month construction schedule at 30 days per month

Northern Segment: July 2018 through December 2018 (six months)

Northern Segment: May 2019 through June 2019 (two months)

Southern Segment: September 2019 through January 2020 (five months)

Substation Modifications: intermittently throughout the project

TRC Solutions
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PG&E Fulton-Fitch CPUC Data Needs #2: Summary of Emissions Onsite vs. Offsite w/o APMS
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Peak Daily Emissions During the Phase w/o APMs

	ROG	Nox	CO	SO2	Fugitive PM10	Exhaust PM10	Total PM10	Fugitive PM2.5	Exhaust PM2.5	Total PM2.5
	lbs/day									
Survey - Onsite	0.0	0.1	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Survey - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Veg. Removal - Onsite	6.0	63.7	72.0	0.1	0.0	2.0	2.0	0.0	2.0	2.0
Veg. Removal - Offsite	0.1	0.1	0.9	0.0	0.2	0.0	0.2	0.0	0.0	0.0
Site Improvement - Onsite	0.4	12.2	8.4	0.0	2.6	0.3	2.8	1.2	0.3	1.5
Site Improvement - Offsite	2.1	25.8	30.6	0.1	1.9	0.4	2.2	0.5	0.3	0.8
Drainage Crossings - Onsite	0.1	1.5	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Drainage Crossings - Offsite	0.0	0.1	0.5	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Auger LDS Holes - Onsite	0.1	3.4	2.7	0.0	0.0	0.1	0.1	0.0	0.1	0.1
Auger LDS Holes - Offsite	0.0	0.1	0.6	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Pole Delivery - Onsite	0.2	5.1	3.5	0.0	0.0	0.1	0.1	0.0	0.1	0.1
Pole Delivery - Offsite	0.8	9.7	11.4	0.0	0.7	0.1	0.8	0.2	0.1	0.3
Material Haul - Onsite	0.2	6.9	4.7	0.0	0.0	0.2	0.2	0.0	0.2	0.2
Material Haul - Offsite	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
LDS Install, Ground - Onsite	1.7	36.0	28.0	0.0	0.0	1.4	1.4	0.0	1.4	1.4
LDS Install, Ground - Offsite	0.1	0.8	1.4	0.0	0.2	0.1	0.3	0.0	0.0	0.1
Conductor Installation - Onsite	1.4	41.5	29.6	0.1	0.0	1.0	1.0	0.0	1.0	1.0
Conductor Installation - Offsite	0.0	0.1	0.6	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Auger TSP Holes - Onsite	0.4	12.5	8.3	0.0	0.0	0.3	0.3	0.0	0.3	0.3
Auger TSP Holes - Offsite	0.0	0.1	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TSP Installation - Onsite	0.5	14.7	10.7	0.0	0.0	0.4	0.4	0.0	0.3	0.3
TSP Installation - Offsite	0.1	0.6	1.3	0.0	0.2	0.0	0.2	0.0	0.0	0.1
Restoration - Onsite	0.3	6.6	5.3	0.0	2.3	0.2	2.4	1.2	0.2	1.4
Restoration - Offsite	0.0	0.1	0.5	0.0	0.1	0.0	0.1	0.0	0.0	0.0
Breaker Install - Onsite	1.0	25.6	18.8	0.0	0.0	0.7	0.7	0.0	0.7	0.7
Breaker Install - Offsite	0.0	0.1	0.6	0.0	0.1	0.0	0.1	0.0	0.0	0.0
LDS Install, Aerial - Onsite	58.4	87.6	72.8	10.8	11.3	2.5	13.0	1.1	2.5	2.8
LDS Install, Aerial - Offsite	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

"*Add equipment used for "Vegetation Removal and Trimming"* "

Equipment for this Phase is listed below.

Equipment	Quantity	Fuel	Days/Wk	Hrs/Day	No. Wks	Notes
Pickup Trucks	2	Gasoline	6	10	5	Removed from CalEEMod Input. Added to EMFAC Calculation (see below). Not likely to operate 10 hrs/day.
Bucket Trucks	2	Diesel	6	10	5	Previously included in CalEEMod input. Not likely to operate 10 hrs/day.
Chipper Truck	2	Diesel	6	4	5	Previously included in CalEEMod input. Hours operating reduced to accommodate chipper.
Chipper Engine	2	Diesel	6	6	5	Added to CalEEMod input. Chipper Truck will not be operating while Chipper Engine is operating.
Chainsaw	2	Gasoline	6	8	5	Emissions are estimated below.
Leaf Blowers	2	Gasoline	6	2	5	Emissions are estimated below. This equipment is unlikely to be used.

Emissions Estimates for Gasoline Fueled Equipment

		Total Emissions (lbs)					
Equipment	**Quantity**	ROG	CO	NOx	PM10	PM2.5	SOx
Pickup Trucks		INCLUDED WITH EMFAC CALCULATIONS					
Chainsaws (5 hp)	2	126.9	749.7	2.4	20.4	20.4	-
Leaf Blowers (2 hp)	2	17.1	286.1	0.7	0.0	0.0	-
Total		**144.0**	**1035.7**	**3.2**	**20.4**	**20.4**	**-**

		Daily Emissions (lbs/day)					
Equipment	**Quantity**	ROG	CO	NOx	PM10	PM2.5	SOx
Pickup Trucks		INCLUDED WITH EMFAC CALCULATIONS					
Chainsaws (5 hp)	2	4.2	25.0	0.1	0.7	0.7	-
Leaf Blowers (2 hp)	2	0.6	9.5	0.0	0.0	0.0	-
Total		**4.8**	**34.5**	**0.1**	**0.7**	**0.7**	**-**

Sources

Pickup trucks: see EMFAC calculations.

Chainsaw/Leaf Blower factors: EPA (2010). *Exhaust Emission Factors for Nonroad Engines Modeling - Spark-Ignition.* Phase 2 small SI engines

Notes

SO2 assumed to be negligible.

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PG&E Fulton-Fitch CPUC Data Needs #2: Helicopter Fugitive Emissions
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"Update the emission calculations to include assumptions regarding fugitive dust from helicopter take-off and landing activities"

Activity	Qty.	Equip.	Mode	Days/ Week	LTO/ Day	Duration (weeks)	PM10 (tons)	PM10 (lbs/day)	PM10 (lbs/day)	PM2.5 (tons)	PM2.5 (lbs/day)	PM2.5 (lbs/day)
Pole Installation	2	light duty - Hughes 500	LTO	7	3	17	0.5	2.7	8.9	0.1	0.3	0.9
Pole Installation	1	heavy duty - Bell 214B	LTO	7	3	9	0.1	0.7	4.5	0.0	0.1	0.4
Total							**0.7**	**3.4**	**13.4**	**0.1**	**0.3**	**1.3**

Notes:

Average lbs/day is based on a 13-month construction schedule at 30 days per month
- Northern Segment: July 2018 through December 2018 (six months)
- Northern Segment: May 2019 through June 2019 (two months)
- Southern Segment: September 2019 through January 2020 (five months)
- Substation Modifications: intermittently throughout the project

Emission Factor Source: Dr. J. A. Gillies et. al. December 31, 2007. *Particulate Matter Emissions for Dust from Unique Military Activities* .
- Measurements indicated approximately 0.5 kg of PM10 during takeoff and 1 kg during landing.
- Measurements were conducted in dry, unpaved, desert in Arizona.
- The model used in testing was a UH-1H Huey, more similar to the Bell 214B above.
- It is assumed the light duty Hughes 500 would produce less fugitive dust emissions.
- The 0.5 kg takeoff and 1 kg landing emission factor is conservatively assumed for both helicopters.
- The landing and takeoff surface is assumed to be watered, reducing fugitive dust emissions 55%.

PM2.5/PM10 Factor: Western Governors' Association. September 7, 2006. *WRAP Fugitive Dust Handbook.*
- The emission factor for PM2.5 for unpaved roads is 0.1 x PM10 emissions.

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PG&E Fulton-Fitch CPUC Data Needs #2: EMFAC Emissions Calculations
Page 5

"...reclassify any pickup trucks or on road vehicles to EMFAC2014 as appropriate

Total Emissions

								Emissions (lbs)					
Phase	Category	Quantity	Days/Wk	Total Wks	Hours/Day	Miles/Hour	Miles/Day	ROG	CO	NOx	PM10	PM2.5	SOx
Survey	MDV	1	4	5	8	15	120	0.64	10.13	1.30	0.25	0.104	0.028
Vegetation Removal and Trimming	MDV	2	6	5	10	15	150	2.39	38.00	4.87	0.93	0.389	0.105
Site Improvements and Reestablishment	MDV	1	4	4	8	15	120	0.51	8.11	1.04	0.20	0.083	0.022
Drainage Crossings	MDV	1	4	4	4	15	60	0.25	4.05	0.52	0.10	0.041	0.011
Auger LDS Pole Holes	MDV	1	5	6	6	15	90	0.72	11.40	1.46	0.28	0.117	0.032
LDS Pole Install - Aerial	MDV	1	7	4	4	15	60	0.45	7.09	0.91	0.17	0.073	0.020
LDS Pole Install - Ground	MDV	1	7	4	6	15	90	0.67	10.64	1.36	0.26	0.109	0.029
TSP Installation	MDV	2	7	6	6	15	90	2.01	31.92	4.09	0.78	0.327	0.088
Conductor Installation	MDV	3	7	15	7	15	105	8.78	139.64	17.90	3.41	1.429	0.387
Right-of-Way Restoration and Cleanup	MDV	1	5	8	6	15	90	0.96	15.20	1.95	0.37	0.155	0.042
							Total	**17.4**	**276.2**	**35.4**	**6.7**	**2.8**	**0.8**

Peak Daily Emissions

						Emissions (lbs)					
Phase	Category	Quantity	Hours/Day	Miles/Hour	Miles/Day	ROG	CO	NOx	PM10	PM2.5	SOx
Survey	MDV	1	8	15	120	0.03	0.51	0.06	0.01	0.005	0.001
Vegetation Removal and Trimming	MDV	2	10	15	150	0.08	1.27	0.16	0.03	0.013	0.004
Site Improvements and Reestablishment	MDV	1	8	15	120	0.03	0.51	0.06	0.01	0.005	0.001
Drainage Crossings	MDV	1	4	15	60	0.02	0.25	0.03	0.01	0.003	0.001
Auger LDS Pole Holes	MDV	1	6	15	90	0.02	0.38	0.05	0.01	0.004	0.001
LDS Pole Install - Aerial	MDV	1	4	15	60	0.02	0.25	0.03	0.01	0.003	0.001
LDS Pole Install - Ground	MDV	1	6	15	90	0.02	0.38	0.05	0.01	0.004	0.001
TSP Installation	MDV	2	6	15	90	0.05	0.76	0.10	0.02	0.008	0.002
Conductor Installation	MDV	3	7	15	105	0.08	1.33	0.17	0.03	0.014	0.004
Right-of-Way Restoration and Cleanup	MDV	1	6	15	90	0.02	0.38	0.05	0.01	0.004	0.001

Notes
Assumes one engine start/stop per hour, rounded up.

EMFAC2014 (v1.0.7) Emission Rates
Region Type: Air District
Region: Bay Area AQMD
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HTSK and RUNLS, g/vehicle/day for IDLEX, RESTL and DIURN

Calendar Year: **2018**

Region	CalYr	VehClass	MdlYr	Speed	Fuel	ROG_RUN	ROG_STRE	ROG_HOT	ROG_RUN	ROG_REST	ROG_DIUR	CO_RUNEX	CO_STREX	NOx_RUNI	NOx_STRE	PM10_RUI	PM10_STR	PM10_PM	PM10_PM	PM2_5_RU	PM2_5_ST	PM2_5_PM	PM2_5_PM	SOx_RUNE	SOx_STREX
Bay Area A	2018	MDV	Aggregate	Aggregate	GAS	0.043894	0.350651	0.190122	0.606893	0.365543	0.386159	1.626779	4.324828	0.218427	0.405203	0.001818	0.00272	0.008	0.03675	0.001674	0.002505	0.002	0.01575	0.00522	0.001243

Calendar Year: **2019**

Region	CalYr	VehClass	MdlYr	Speed	Fuel	ROG_RUN	ROG_STRE	ROG_HOT	ROG_RUN	ROG_REST	ROG_DIUR	CO_RUNEX	CO_STREX	NOx_RUNI	NOx_STRE	PM10_RUI	PM10_STR	PM10_PM	PM10_PM	PM2_5_RU	PM2_5_ST	PM2_5_PM	PM2_5_PM	SOx_RUNE	SOx_STREX
Bay Area A	2019	MDV	Aggregate	Aggregate	GAS	0.039772	0.318334	0.186388	0.592685	0.36674	0.381231	1.50524	3.979181	0.196963	0.366874	0.001838	0.002696	0.008	0.03675	0.001692	0.002483	0.002	0.01575	0.005099	0.001216

Calendar Year: **2020**

Region	CalYr	VehClass	MdlYr	Speed	Fuel	ROG_RUN	ROG_STRE	ROG_HOT	ROG_RUN	ROG_REST	ROG_DIUR	CO_RUNEX	CO_STREX	NOx_RUNI	NOx_STRE	PM10_RUI	PM10_STR	PM10_PM	PM10_PM	PM2_5_RU	PM2_5_ST	PM2_5_PM	PM2_5_PM	SOx_RUNE	SOx_STREX
Bay Area A	2020	MDV	Aggregate	Aggregate	GAS	0.036036	0.288349	0.182199	0.578969	0.36667	0.375963	1.39572	3.658991	0.177861	0.331162	0.001837	0.002667	0.008	0.03675	0.001691	0.002456	0.002	0.01575	0.004974	0.001188

PG&E Fulton-Fitch CPUC Data Needs #2: Equipment List Updates

"Clarify equipment included as "Other Material Handling Equipment" and reclassify any pickup trucks or on road vehicles to EMFAC2014 as appropriate"

All of the following equipment is gasoline fueled. Remaining equipment modeled in CalEEMod is diesel fueled.

Activity	Equipment	Quantity	Explanation
Survey	Pickup Truck	1	Previously classified as 'Other Material Handling Equipment in CalEEMod. This has been reclassified under EMFAC emission on Page 5.
Vegetation Removal and Trimming	Pickup Truck	2	Previously classified as 'Other Material Handling Equipment in CalEEMod. This has been reclassified under EMFAC emission on Page 5.
Vegetation Removal and Trimming	Chainsaws	4	Added to equipment list. See Page 3.
Vegetation Removal and Trimming	Leaf Blowers	2	Added to equipment list. See Page 3.
Site Improvements and Reestablishment	Pickup Truck	1	Previously classified as 'Other Material Handling Equipment in CalEEMod. This has been reclassified under EMFAC emission on Page 5.
Drainage Crossings	Pickup Truck	1	Previously classified as 'Other Material Handling Equipment in CalEEMod. This has been reclassified under EMFAC emission on Page 5.
LDS Pole Install - Aerial	Crew Cab Pickup Truck	1	Previously classified as 'Other Material Handling Equipment in CalEEMod. This has been reclassified under EMFAC emission on Page 5.
LDS Pole Install - Ground	Crew Cab Pickup Truck	1	Previously classified as 'Other Material Handling Equipment in CalEEMod. This has been reclassified under EMFAC emission on Page 5.
Auger TSP Pole Holes	Pickup Truck	1	Previously classified as 'Other Material Handling Equipment in CalEEMod. This has been reclassified under EMFAC emission on Page 5.
TSP Installation	Pickup Truck	1	Previously classified as 'Other Material Handling Equipment in CalEEMod. This has been reclassified under EMFAC emission on Page 5.
TSP Installation	Crew Cab Pickup Truck	1	Previously classified as 'Other Material Handling Equipment in CalEEMod. This has been reclassified under EMFAC emission on Page 5.
Conductor Installation	Pickup Truck	3	Previously classified as 'Other Material Handling Equipment in CalEEMod. This has been reclassified under EMFAC emission on Page 5.
Right-of-Way Restoration and Cleanup	Pickup Truck	1	Previously classified as 'Other Material Handling Equipment in CalEEMod. This has been reclassified under EMFAC emission on Page 5.

Helicopter Emissions Calculations - Air Quality

Activity	Qty.	Equip.	Mode	Days/ Week	Hours/ Day	Duration (weeks)	Power (shp)	Fuel Consumption (lb/hr)	Emission Factors (lb/hr)					Emissions total (tons)					Emissions Peak daily (lbs/day)				
									HC	Nox	CO	SOx	PM10	HC	Nox	CO	SOx	PM10	HC	Nox	CO	SOx	PM10
Pole Installation	2	light duty - Hughes 500	LTO	7	0.68	17	317	36.2	4.4	0.6	5.7	0.0	0.0	0.35	0.05	0.46	0.00	0.00	5.9	0.8	7.7	0.1	0.0
Pole Installation	2	light duty - Hughes 500	Operation	7	9.33	17	317	218.3	2.1	1.1	2.6	0.2	0.0	2.35	1.17	2.94	0.26	0.04	39.5	19.7	49.3	4.4	0.7
Pole Installation	1	heavy duty - Bell 214B	LTO	7	0.68	9	1850	87.3	2.7	3.2	3.5	0.1	0.1	0.06	0.07	0.07	0.00	0.00	1.8	2.2	2.3	0.1	0.1
Pole Installation	1	heavy duty - Bell 214B	Operation	7	9.33	9	1850	613.0	1.2	7.0	1.4	0.7	0.2	0.35	2.04	0.42	0.20	0.06	11.2	64.9	13.4	6.2	1.8
Total														**3.111**	**3.33**	**3.89**	**0.46**	**0.10**	**58.4**	**87.6**	**72.8**	**10.8**	**2.5**

Notes

Emission factors were obtained from the *FOCA Guidance on Determination of Helicopter Emissions, Edition 1, March 2009*

Emission factors for Bell 214B (singe engine @ 1,850 shp) were derived from the emission factors for the Bell 412 (twin engines @ 1,800 shp each)

LTO = Landing and take-off cycle

Each day of 10-hour helicopter operations assumes 3 LTOs at 13/5 minutes each. The remaining time is assumed to be operational (no idle time has been assumed).

Jet Fuel assumed to contain an average 0.054% wt. sulfur per the FAA's Aviation Emissions, Impacts & Mitigation: a Primer, dated January 2015