

APPENDIX E

Air Quality and Greenhouse Gases Supporting Information

Blocks and Emissions Calculations

Air Quality Calculations

Prescribed Burn Calculations

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Air Quality Calculations

Prescribed Burn Calculations

EQUIPMENT EMISSIONS													
		Combustion Exhaust Emissions (tons/year)					Emissions (metric tons/year)			CO2e Emissions (metric tons/year)			Total CO2e (metric tons/year)
		CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4	CO2	N2O	CH4	
Baseline (2017)	Subtotal	0.50	0.15	0.16	1.74	0.21	59.3	0.95	2.03	59.3	251	57.0	366.8
	All MAs	0.01	0.00	0.00	0.10	0.01	0.28	0.00	0.00	0.28	0.36	0.11	0.7
	MA-20	0.30	0.09	0.07	0.90	0.11	35.7	0.361	0.654	35.7	95.6	18.3	149.6
	MA-21	0.01	0.00	0.00	0.00	0.00	0.98	0.01	0.02	0.98	3.24	0.59	4.8
	MA-22	0.01	0.00	0.00	0.15	0.02	2.37	0.037	0.069	2.37	9.93	1.92	14.2
BFFIP Actions (2022)	MA-23	0.18	0.03	0.06	1.55	0.18	41.61	0.590	1.058	41.61	156.30	29.62	227.5
	MA-24	0.46	0.13	0.06	3.74	0.43	78.8	1.22	2.20	78.8	323	61.7	463.9
	MA-25	0.00	0.00	0.00	0.02	0.00	0.25	0.00	0.00	0.25	0.60	0.12	1.0
	MA-26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
	MA-27	0.01	0.00	0.04	0.02	0.00	1.80	0.002	0.003	1.80	0.41	0.09	2.3
	Subtotal	0.97	0.26	0.24	6.48	0.76	162	2.23	4.02	162	590	112.5	864.1
	Net Total	0.47	0.11	0.08	4.75	0.55	102.5	1.280	1.983	102.5	339	55.5	497.3
	Threshold		10	10	15	10							1,100
	Average Daily Emissions (lb/day)												
	Total	1.28	0.31	0.22	13.0	1.51							
	Threshold		54	54	82	54							

ALL EMISSIONS

		Emissions (tons/year)					Emissions (metric tons/year)			CO2e Emissions (metric tons/year)			Total CO2e (metric tons/year)
		CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4	CO2	N2O	CH4	CO2e
Baseline (2017)	Subtotal	2.52	0.27	0.27	2.15	0.57	140	0.95	2.17	140	251	60.8	451.0
	All MAs	4.14	0.25	0.22	0.94	0.74	164	0.00	0.29	164	0.36	7.98	172.8
	MA-20	0.30	0.09	0.07	0.90	0.11	35.7	0.36	0.65	35.7	95.6	18.3	149.6
	MA-21	0.01	0.00	0.00	0.00	0.00	0.982	0.01	0.02	0.982	3.24	0.59	4.8
	MA-22	0.01	0.00	0.00	0.15	0.02	2.37	0.04	0.07	2.37	9.93	1.92	14.2
BFFIP Actions (2022)	MA-23	249.48	4.59	0.66	24.15	19.28	1,274	0.59	11.5	1,274	156.30	322	1752.5
	MA-24	433.56	11.35	1.16	42.94	33.63	2,217	1.22	20.3	2,217	323	567	3107.7
	MA-25	0.00	0.00	0.00	0.02	0.00	0.25	0.00	0.00	0.25	0.60	0.12	1.0
	MA-26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0
	MA-27	0.01	0.00	0.04	0.02	0.00	1.80	0.00	0.00	1.80	0.41	0.09	2.3
	Subtotal	687.50	16.28	2.16	69.12	53.79	3,697	2.23	32.8	3,697	590	918	5204.8
	Net Total	684.98	16.01	1.89	66.98	53.22	3,557	1.280	30.6	3,557	339	857	4753.9
	Threshold		10	10	15	10							1,100
	Average Daily Emissions (lb/day)												
	Total	7506.58	175.50	20.73	733.98	583.26							
	Threshold		54	54	82	54							
	Exceed?		Yes	No	Yes	Yes							
	Percent		325%	38%	895%	1080%							

Note: CalFire determines the start of the official fire season each year based on weather conditions. Fire season typically starts between mid-May and early- June and extends into mid-November. Set project duration to 6 months (180 days)

Gas	GWFP 100-Year
CO2	1
N2O	265
CH4	28

Source: IPCC 2013

http://www.ghgprotocol.org/sites/default/files/ghgp/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_1.pdf

EQUIPMENT EMISSIONS									
		Combustion Exhaust Emissions (pounds/day)					Emissions (pounds/day)		
		CO	ROG	NOx	PM10	PM2.5	CO	ROG	NOx
Baseline (2017)	Subtotal	5.52	1.60	1.76	19.05	2.26	27.66	2.91	2.93
	All MAs	0.07	0.01	0.05	1.07	0.11	45.33	2.75	2.43
	MA-20	3.29	0.99	0.82	9.85	1.19	3.29	0.99	0.82
	MA-21	0.08	0.02	0.02	0.04	0.01	0.08	0.02	0.02
	MA-22	0.07	0.01	0.01	1.67	0.19	0.07	0.01	0.01
BFFIP Actions (2022)	MA-23	1.94	0.35	0.63	17.02	2.02	2733.99	50.27	7.21
	MA-24	5.05	1.42	0.70	41.02	4.73	4751.35	124.33	12.76
	MA-25	0.01	0.00	0.00	0.20	0.02	0.01	0.00	0.00
	MA-26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	MA-27	0.11	0.04	0.42	0.18	0.05	0.11	0.04	0.42
	Subtotal	10.62	2.84	2.65	71.06	8.32	7534.24	178.41	23.66
	Net Total	5.10	1.25	0.89	52.01	6.06	7506.58	175.50	20.73
	Threshold		54	54	82	54		54	54
	Emissions (pounds/day)								
	CO	ROG	NOx	PM10	PM2.5				
Baseline (2017)	Subtotal	27.66	2.91	2.93	23.55	6.21			
	All MAs	45.33	2.75	2.43	10.27	8.11			
	MA-20	3.29	0.99	0.82	9.85	1.19			
	MA-21	0.08	0.02	0.02	0.04	0.01			
	MA-22	0.07	0.01	0.01	1.67	0.19			
BFFIP Actions (2022)	MA-23	2733.99	50.27	7.21	264.69	211.34			
	MA-24	4751.35	124.33	12.76	470.61	368.56			
	MA-25	0.01	0.00	0.00	0.20	0.02			
	MA-26	0.00	0.00	0.00	0.00	0.00			
	MA-27	0.11	0.04	0.42	0.18	0.05			
	Subtotal	7534.24	178.41	23.66	757.53	589.47			
	Net Total	7506.58	175.50	20.73	733.98	583.26			
	Threshold		54	54	82	54			

EMFAC2014 (v1.0.7) Emissions Inventory
Region Type: County
Region: Marin
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
Marin	2017	LDT1	Aggregater	15	DSL	8.182689	4.55074E-06	5.18072E-06	1.90445E-05	8.78187E-06	0.006061554	3.36123E-06	3.21583E-06
Marin	2017	LDT2	Aggregater	15	DSL	105.0809	1.17271E-05	1.33506E-05	0.000100361	1.44002E-05	0.076550674	1.78353E-06	1.70637E-06
Marin	2017	LHD1	Aggregater	15	DSL	10203.43	0.00397959	0.004530499	0.016508879	0.038730536	7.973045233	0.000695943	0.000665837
Marin	2017	T6 Public	Aggregater	15	DSL	201.5804	4.13247E-05	4.7045E-05	0.000112981	0.001808281	0.384872175	1.03363E-05	9.88917E-06
Marin	2017	LDA	Aggregater	40	GAS	204368.8	0.003982467	0.005536073	0.198237624	0.018619446	59.17189458	0.000324493	0.000298656
Marin	2017	LDT1	Aggregater	15	GAS	9027.185	0.001236855	0.001709607	0.029236899	0.002554181	6.469793205	7.37074E-05	6.78768E-05
Marin	2017	LDT2	Aggregater	15	GAS	38929.12	0.002647895	0.003799359	0.069596277	0.007778184	31.96023085	0.000189651	0.000174449
Marin	2017	LHD1	Aggregater	15	GAS	14799.06	0.002964419	0.004312087	0.048173994	0.009911738	15.64658565	7.57631E-05	6.96746E-05

EMFAC2014 (v1.0.7) Emissions Inventory
Region Type: County
Region: Marin
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2011 Categories
Units: miles/day for VMT, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
Marin	2022	LDT1	Aggregater	15	DSL	5.943238	2.31695E-06	2.6377E-06	1.09317E-05	4.29974E-06	0.003882101	1.58497E-06	1.5164E-06
Marin	2022	LDT2	Aggregater	15	DSL	101.4979	1.10265E-05	1.2553E-05	0.000107149	1.14415E-05	0.066825709	1.19936E-06	1.14747E-06
Marin	2022	LHD1	Aggregater	15	DSL	9333.849	0.003406197	0.003877728	0.014508025	0.023258077	6.98468143	0.000479198	0.000458468
Marin	2022	T6 Public	Aggregater	15	DSL	234.3424	3.96271E-05	4.51125E-05	0.000139296	0.001465245	0.430253696	6.48889E-06	6.20818E-06
Marin	2022	LDA	Aggregater	40	GAS	205997.9	0.001974084	0.002878455	0.132652846	0.011178422	51.45607877	0.000329615	0.000303077
Marin	2022	LDT1	Aggregater	15	GAS	7899.859	0.0004819	0.000702334	0.014162348	0.001243756	4.929156989	5.20403E-05	4.78532E-05
Marin	2022	LDT2	Aggregater	15	GAS	38531.74	0.001553883	0.002266822	0.045288225	0.004349563	27.12728469	0.00020258	0.000186268
Marin	2022	LHD1	Aggregater	15	GAS	10426.32	0.001442325	0.002104637	0.023867757	0.005296201	10.83188102	4.67638E-05	4.29976E-05

Exhaust Emission Factors

2017 Emission Factors (lb/mile)									
Vehicle Class	Fuel	ROG	CO	NOx	CO2	PM10	PM2.5	CH4	N2O
LDT1	Gasoline	0.000274029	0.006477523	0.000565886	1.433402	1.63301E-05	1.50383E-05	0.221586767	0.047081747
LDT2	Gasoline	0.000136037	0.003575538	0.000399607	1.64197	9.74342E-06	8.9624E-06	0.110002734	0.033247344
LHD1	Gasoline	0.000400623	0.006510413	0.001339509	2.114538	1.02389E-05	9.41608E-06	0.323953636	0.111447154
T6 Public	Diesel	0.000410007	0.001120949	0.017941034	3.818547	0.000102553	9.81163E-05	0.038215502	0.003626609
LDA	Gasoline	3.89733E-05	0.001939999	0.000182214	0.57907	3.17556E-06	2.92272E-06	0.031514825	0.015160216
EMFAC2014 Conversion Factors for Diesel Exhaust Emissions									
ROG	CH4								
1.266	0.059								

EMFAC2014 Conversion Factors for Gasoline Exhaust Emissions, Running and Idle Exhaust, Catalyst, 2004 and newer model	
ROG	CH4
0.742	0.3

N2O emissions for all gasoline vehicles are 4.16% of NOx and for all diesel vehicles are 0.3316 g/gallon fuel

2022 Emission Factors (lb/mile)									
Vehicle Class	Fuel	ROG	CO	NOx	CO2	PM10	PM2.5	CH4	N2O
LDT1	Gasoline	0.000122002	0.003585469	0.000314881	1.24791	1.3175E-05	1.2115E-05	0.098653955	0.02619807
LDT2	Gasoline	8.06547E-05	0.002350697	0.000225765	1.408049	1.0515E-05	9.66828E-06	0.065219443	0.018783664
LHD1	Gasoline	0.00027667	0.004578366	0.001015929	2.077795	8.97034E-06	8.2479E-06	0.223722334	0.084525283
T6 Public	Diesel	0.000338199	0.001188824	0.012505163	3.672009	5.53795E-05	5.29839E-05	0.031522454	0.003119596
LDA	Gasoline	1.91661E-05	0.001287905	0.000108529	0.499579	3.20018E-06	2.94252E-06	0.015498159	0.009029653

Activities	Uncontrolled Emission Factor PM10 Units		Controlled Emission Factor PM10 Units		Uncontrolled Emission Factor PM2.5 Units		Controlled Emission Factor PM2.5 Units		Source	Notes
Paved Roads - Passenger Vehicle/ATV/Mower Traffic	0.0028	lb/VMT			0.00068	lb/VMT			AP-42, Section 13.2.1 Paved Roads	With Precipitation
	0.0029	lb/VMT			0.00071	lb/VMT				Without Precipitation
Paved Roads - Heavy/Medium Truck Traffic	0.008	lb/VMT			0.0020	lb/VMT			AP-42, Section 13.2.1 Paved Roads	With Precipitation
	0.0082	lb/VMT			0.0020	lb/VMT				Without Precipitation
Paved Roads - Fire/Water Truck Traffic	0.026	lb/VMT			0.0065	lb/VMT			AP-42, Section 13.2.1 Paved Roads	With Precipitation
	0.028	lb/VMT			0.0068	lb/VMT				Without Precipitation
Unpaved Roads - Passenger Vehicle/ATV/Mower Traffic	0.694	lb/VMT	0.520	lb/VMT	0.069	lb/VMT	0.0520	lb/VMT	AP-42, Section 13.2.2 Unpaved Roads	With Precipitation
	0.855	lb/VMT			0.086	lb/VMT				Without Precipitation
Unpaved Roads - Heavy/Medium Truck Traffic	1.352	lb/VMT	1.014	lb/VMT	0.134	lb/VMT	0.100	lb/VMT	AP-42, Section 13.2.2 Unpaved Roads	With Precipitation
	1.355	lb/VMT			0.135	lb/VMT				Without Precipitation
Unpaved Roads - Fire/Water Truck Traffic	1.880	lb/VMT	1.410	lb/VMT	0.188	lb/VMT	0.141	lb/VMT	AP-42, Section 13.2.2 Unpaved Roads	With Precipitation
	2.318	lb/VMT			0.232	lb/VMT				Without Precipitation

Paved Roads Emission Factor Assumptions

- 0.0022 PM10 k Constant
- 0.00054 PM2.5 k Constant
- 1.8 ton Passenger Vehicle
- 5.0 ton Medium truck
- 17 ton Heavy truck (average full/empty)
- 0.7 silt content

Unpaved Roads Emission Factor Assumptions

- 1.5 PM10 k Constant
- 0.15 PM2.5 k Constant
- 1.8 ton Passenger Vehicle
- 5.0 ton Medium truck
- 17 ton Heavy truck (average full/empty)
- 8.3 silt content
- 0.8 moisture content
- 15 speed
- 69 Days of Measurable Precipitation

Controlled Emission Factors assume 25 percent control efficiency

Periodic watering and vehicle speed control (BAAQMD Basic Emission Reduction Measures)

Driptorch Emission Factor Calculations

Diesel Emission Factor (lb/10 ³ gal)								Heating value (MMBtu/10 ³ gal)
CO	ROG	NOx	SOx	TOTAL PM	CO2	N2O	CH4	133.489
126.81	46.72115	588.68649	38.71181	41.38159	21892.196			
Gas Emission Factor (lb/10 ³ gal)								Heating value (MMBtu/10 ³ gal)
CO	ROG	NOx	SOx	TOTAL PM	CO2	N2O	CH4	118.227
117.04	248.2767	192.71001	9.931068	11.8227	18206.958			
diesel/30 Emission Factor (lb/10 ³ gal)								Heating value (MMBtu/10 ³ gal)
CO	ROG	NOx	SOx	TOTAL PM	CO2	N2O	CH4	118.227
123.88	107.18782	469.893546	30.0775874	32.513923	20786.6246	0	0	

Emission factors obtained from USEPA 1996 AP-42

Mix of fuel (70/30) from CAL FIRE 2016

Heating value obtained from California Department of Energy 2014

Block Definition

Block	Vehicle/Equipment Type	Notes	Fuel	Vehicles/ Equipment per acre or event	Hours per unit	Unit
A	Light Duty Automobile paved road (d)	<3,700 lbs, Ford Ranger	gasoline	1	0.067	mile
B	Heavy truck on unpaved road (a)	8,501 to 10,000 pounds, Ford F450	gasoline	1	0.067	mile
C	Heavy truck on paved road (a)	8,501 to 10,000 pounds, Ford F450	gasoline	1	0.067	mile
D	Water truck on unpaved road (a)	14,001 to 33,000 pounds; Peterbilt water truck, 2200 gallon capacity	diesel	1	0.067	mile
E	Water truck on paved road (a)	14,001 to 33,000 pounds; Peterbilt water truck, 2200 gallon capacity	diesel	1	0.067	mile
F	Van/Medium truck on unpaved road (a)	5,000 to 8,500 pounds; Ford F250, F350, Chevy 2500, Ford E350 Van	gasoline	1	0.067	mile
G	Van/Medium truck on paved road (a)	5,000 to 8,500 pounds; Ford F250, F350, Chevy 2500, Ford E350 Van	gasoline	1	0.067	mile
H	Type III Fire Engine Truck on unpaved road (a)	International, 500 gallon capacity, 14,001 to 33,000 pounds	diesel	1	0.067	mile
I	Type III Fire Engine Truck on paved road (a)	International, 500 gallon capacity, 14,001 to 33,000 pounds	diesel	1	0.067	mile
J	Type IV fire engine on unpaved road (a)	14,001 to 33,000 pounds	diesel	1	0.067	mile
K	Type IV fire engine on paved road (a)	14,001 to 33,000 pounds	diesel	1	0.067	mile
L	ATV on unpaved road (a)	Polaris Ranger 4x4, Kawasaki 300 4x4, <3,750 pounds, 4-stroke, gasoline powered, 30 hp	gasoline	1	0.067	mile
M	Heavy equipment unpaved road		diesel	1	0.067	mile
N	Heavy equipment paved road		diesel	1	0.067	mile
O	Generator	2,500 watts for electric fence, assumes full load needed (e)	diesel	1		gallon
P	Chainsaw (c)	HP 2.49	gasoline	1	55	acre
Q	Chipper	HP 83	diesel	1	0.125	acre
R	Skid Steer Loader	HP 65	diesel	1	2.6	acre
S	Backhoe		diesel	1	2.6	acre
T	Excavator		diesel	1	2.6	acre
U	Driptorch (prescribed burn ignition)	0.1315 gallons/acre of fuel mixture	gasoline and diesel mix	1		gallon
V	Propane torch	150 pound/acre of fuel, 4.86 pounds/gallon	propane	1		gallon

- (a) Speed assumed to be 15 mph
Based on equipment covering 3 acres in 8 hours of operation from Heavy Equipment tab of
- (b) "WPHIP assumptions 07Apr2014" spreadsheet
From fuelbreak construction tab of "WPHIP
- (c) assumptions 07Apr2014" spreadsheet
- (d) Speed assumed to be 40 mph
- (e) Absolute generators 2018

BFFIP - Baseline Conditions (2017) Block
Source Data

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Light Duty Automobile (LDA, gasoline)	1	1	0.0019	0.0000	0.0002	0.0000	0.0000	0.5791	0.0152	0.0315
Light Duty Auto on Paved Road	1	1				0.0029	0.0007			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Heavy Truck (LHD1, gasoline)	1	1	0.0065	0.0004	0.0013	0.0000	0.0000	2.1145	0.1114	0.3240
Heavy Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Heavy Truck (LHD1, gasoline)	1	1	0.0065	0.0004	0.0013	0.0000	0.0000	2.1145	0.1114	0.3240
Heavy Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Water Truck (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Water Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Water Truck (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Water Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Van/Medium Truck (LDT2, gasoline)	1	1	0.0036	0.0001	0.0004	0.0000	0.0000	1.6420	0.0332	0.1100
Van/Medium Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Van/Medium Truck (LDT2, gasoline)	1	1	0.0036	0.0001	0.0004	0.0000	0.0000	1.6420	0.0332	0.1100
Van/Medium Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Type III Fire Engine Truck (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Type III Fire Engine on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Type III Fire Engine Truck (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Type III Fire Engine on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Type IV Fire Truck (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Type IV Fire Truck on Unpaved Road	1	1				2.3183	0.2318			

Unit Emissions

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2		N2O		CH4	
							PM10	PM2.5						
Light Duty Automobile (LDA, gasoline)	0.0019		0.0000		0.0002		0.0000	0.0000	0.5791		0.0152		0.0315	
Light Duty Auto on Paved Road							0.0029	0.0007						
Total Emissions	0.0019		0.0000		0.0002		0.0029	0.0007	0.5791		0.0152		0.0315	

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2		N2O		CH4	
							PM10	PM2.5						
Heavy Truck (LHD1, gasoline)	0.0065		0.0004		0.0013		0.0000	0.0000	2.1145		0.1114		0.3240	
Heavy Truck on Unpaved Road							1.3547	0.1355						
Total Emissions	0.0065		0.0004		0.0013		1.3547	0.1355	2.1145		0.1114		0.3240	

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2		N2O		CH4	
							PM10	PM2.5						
Heavy Truck (LHD1, gasoline)	0.0065		0.0004		0.0013		0.0000	0.0000	2.1145		0.1114		0.3240	
Heavy Truck on Paved Road							0.0082	0.0020						
Total Emissions	0.0065		0.0004		0.0013		0.0082	0.0020	2.1145		0.1114		0.3240	

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2		N2O		CH4	
							PM10	PM2.5						
Water Truck (T6, diesel)	0.0011		0.0004		0.0179		0.0001	0.0001	3.8185		0.0036		0.0382	
Water Truck on Unpaved Road							2.3183	0.2318						
Total Emissions	0.0011		0.0004		0.0179		2.3184	0.2319	3.8185		0.0036		0.0382	

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2		N2O		CH4	
							PM10	PM2.5						
Water Truck (T6, diesel)	0.0011		0.0004		0.0179		0.0001	0.0001	3.8185		0.0036		0.0382	
Water Truck on Paved Road							0.0278	0.0068						
Total Emissions	0.0011		0.0004		0.0179		0.0279	0.0069	3.8185		0.0036		0.0382	

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2		N2O		CH4	
							PM10	PM2.5						
Van/Medium Truck (LDT2, gasoline)	0.0036		0.0001		0.0004		0.0000	0.0000	1.6420		0.0332		0.1100	
Van/Medium Truck on Unpaved Road							1.3547	0.1355						
Total Emissions	0.0036		0.0001		0.0004		1.3547	0.1355	1.6420		0.0332		0.1100	

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2		N2O		CH4	
							PM10	PM2.5						
Van/Medium Truck (LDT2, gasoline)	0.0036		0.0001		0.0004		0.0000	0.0000	1.6420		0.0332		0.1100	
Van/Medium Truck on Paved Road							0.0082	0.0020						
Total Emissions	0.0036		0.0001		0.0004		0.0082	0.0020	1.6420		0.0332		0.1100	

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2		N2O		CH4	
							PM10	PM2.5						
Type III Fire Engine Truck (T6, diesel)	0.0011		0.0004		0.0179		0.0001	0.0001	3.8185		0.0036		0.0382	
Type III Fire Engine on Unpaved Road							2.3183	0.2318						
Total Emissions	0.0011		0.0004		0.0179		2.3184	0.2319	3.8185		0.0036		0.0382	

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2		N2O		CH4	
							PM10	PM2.5						
Type III Fire Engine Truck (T6, diesel)	0.0011		0.0004		0.0179		0.0001	0.0001	3.8185		0.0036		0.0382	
Type III Fire Engine on Paved Road							0.0278	0.0068						
Total Emissions	0.0011		0.0004		0.0179		0.0279	0.0069	3.8185		0.0036		0.0382	

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2		N2O		CH4	
							PM10	PM2.5						
Type IV Fire Truck (T6, diesel)	0.0011		0.0004		0.0179		0.0001	0.0001	3.8185		0.0036		0.0382	
Type IV Fire Truck on Unpaved Road							2.3183	0.2318						
Total Emissions	0.0011		0.0004		0.0179		2.3184	0.2319	3.8185		0.0036		0.0382	

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Type IV Fire Truck (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Type IV Fire Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Active	Trip Distance Miles per Vehi. Hour/Acre	Emission Factor (lb/mile) (f)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
ATV	1	1.00	0.0688	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road						0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Heavy Equipment (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Heavy Equipment on Unpaved Road	1	1				0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Heavy Equipment (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Heavy Equipment on Paved Road	1	1				0.0029	0.0007			

Equipment Type	Number Active	Fuel rate gal/hr (j)	Emission Factor (lb/10 ³ gal) (d)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Generator	1	2	126.8146	46.7212	588.6865	41.3816	41.3816	21892.1960	0.0000	0.0000

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	Emission Factor (g/hp-hr) (f)					
					CO	ROG	NOx	PM10	PM2.5	CH4
Chainsaw	1	2	0.50	55	13.1870	7.2911	0.1172	0.0207	0.0207	0.4532

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	Emission Factor (g/hp-hr) (f)					
					CO	ROG	NOx	PM10	PM2.5	CH4
Chipper	1	83	0.73	0	1.7798	0.2713	2.0510	0.1437	0.1437	0.0245

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	Emission Factor (g/hp-hr) (c)					
					CO	ROG	NOx	PM10	PM2.5	CH4
Skid Steer Loader	1	65	0.37	3	3.3186	0.2550	3.2862	0.1770	0.1620	0.1530

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	Emission Factor (g/hp-hr) (c)					
					CO	ROG	NOx	PM10	PM2.5	CH4
Excavator	1	97	0.37	3	3.7818	0.5000	4.8087	0.3620	0.3330	0.1540

Activity	Number Active	Fuel Rate gal/ac (g)	Emission Factor (lb/10 ³ gal) (d) (e)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Drip Torch (70 % diesel/30 % gas)	1	0.13	126.8146	46.7212	588.6865	41.3816	41.3816	21892.1960	0.0000	0.0000

Vehicle Type	Unit Emissions (lbs/mile)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Type IV Fire Truck (T6, diesel)	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Type IV Fire Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0011	0.0004	0.0179	0.0279	0.0069	3.8185	0.0036	0.0382

Vehicle Type	Unit Emissions (lb/mile)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
ATV	0.0688	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
				0.8554	0.0855			
Total Emissions	0.0688	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002

Vehicle Type	Unit Emissions (lbs/mile)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Heavy Equipment (T6, diesel)	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Heavy Equipment on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0011	0.0004	0.0179	0.8555	0.0856	3.8185	0.0036	0.0382

Vehicle Type	Unit Emissions (lbs/mile)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Heavy Equipment (T6, diesel)	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Heavy Equipment on Paved Road				0.0029	0.0007			
Total Emissions	0.0011	0.0004	0.0179	0.0030	0.0008	3.8185	0.0036	0.0382

Equipment Type	Unit Emissions (lb/hour)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Generator	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000
Total Emissions	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000

Equipment Type	Unit Emissions (lb/acre)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Brush cutter/chainsaw	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684
Total Emissions	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684

Equipment Type	Unit Emissions (lb/acre)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
chipper	0.0297	0.0045	0.0342	0.0024	0.0024	4.7911	0.0000	0.0004
Total Emissions	0.0297	0.0045	0.0342	0.0024	0.0024	4.7911	0.0000	0.0004

Equipment Type	Unit Emissions (lb/acre)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Skid Steer Loader	0.4575	0.0352	0.4530	0.0244	0.0223	68.6955	0.0000	0.0211
Total Emissions	0.4575	0.0352	0.4530	0.0244	0.0223	68.6955	0.0000	0.0211

Equipment Type	Unit Emissions (lb/acre)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Backhoe/Excavator	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317
Total Emissions	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317

Equipment Type	Unit Emissions (lb/gallon)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Drip Torch	0.1268	0.0467	0.5887	0.0414	0.0414	21.8922	0.0000	0.0000
Total Emissions	0.1268	0.0467	0.5887	0.0414	0.0414	21.8922	0.0000	0.0000

Activity	Number Active	Fuel Rate gal/ac (h)	Emission Factor (lb/10 ³ gal) (d)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Propane Torch	1	31	7.5000	1.0000	13.0000	0.7000	0.7000	12500.0000	0.9000	0.2000

Notes: (a) Emission factors of vehicle exhaust emissions were calculated based on emission data derived from EMFAC2014 Web Data Tool.
(b) Emission factors of vehicle fugitive dust emissions from unpaved roads were derived based on EPA AP-42.
(c) Emission factors and load factors of equipment obtained from Appendix D of CalEEMod User's Guide.
(d) Emission factors obtained from EPA AP-42.
(e) Fuel consumption obtained from CAL FIRE 2016
(f) Offroad
(g) Fuel consumption obtained from Stevens 1997
(h) Fuel consumption obtained from Wildung 2001
(i) Percent PM2.5 and PM10 assumed to be 100%
(j) Diesel services 2017

Equipment Type	Unit Emissions (lb/gallon)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Propane Torch	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002
Total Emissions	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002

BFFIP - Baseline Conditions (2017)

Source Data

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	1	1	0.0019	0.0000	0.0002	0.0000	0.0000	0.5791	0.0152	0.0315
Light Duty Auto on Paved Road	1	1				0.0029	0.0007			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0065	0.0004	0.0013	0.0000	0.0000	2.1145	0.1114	0.3240
Heavy Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0065	0.0004	0.0013	0.0000	0.0000	2.1145	0.1114	0.3240
Heavy Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Water Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Water Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0036	0.0001	0.0004	0.0000	0.0000	1.6420	0.0332	0.1100
Van/Medium Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0036	0.0001	0.0004	0.0000	0.0000	1.6420	0.0332	0.1100
Van/Medium Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Type III Fire Engine on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Type III Fire Engine on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Type IV Fire Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Type IV Fire Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Active	Trip Distance Miles per Vehi. Hour/Acre	CO	ROG	NOx	Emission Factor (lb/mile) (f)		CO2	N2O	CH4
						PM10	PM2.5			
ATV	1	1.00	0.0688	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road						0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Heavy Equipment on Unpaved Road	1	1				0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Heavy Equipment on Paved Road	1	1				0.0029	0.0007			

Equipment Type	Number Active	Fuel rate gal/hr (j)	CO	ROG	NOx	Emission Factor (lb*10 ⁻³ /gal) (d)		CO2	N2O	CH4
						PM10	PM2.5			
Generator	1	2	126.8146	46.7212	588.6865	41.3816	41.3816	21892.1960	0.0000	0.0000

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
								PM10	PM2.5			

Unit Emissions

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	0.0019	0.0000	0.0002	0.0000	0.0000	0.5791	0.0152	0.0315
Light Duty Auto on Paved Road				0.0029	0.0007			
Total Emissions	0.0019	0.0000	0.0002	0.0029	0.0007	0.5791	0.0152	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0065	0.0004	0.0013	0.0000	0.0000	2.1145	0.1114	0.3240
Heavy Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0065	0.0004	0.0013	1.3547	0.1355	2.1145	0.1114	0.3240

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0065	0.0004	0.0013	0.0000	0.0000	2.1145	0.1114	0.3240
Heavy Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0065	0.0004	0.0013	0.0082	0.0020	2.1145	0.1114	0.3240

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Water Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0011	0.0004	0.0179	2.3184	0.2319	3.8185	0.0036	0.0382

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Water Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0011	0.0004	0.0179	0.0279	0.0069	3.8185	0.0036	0.0382

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	0.0036	0.0001	0.0004	0.0000	0.0000	1.6420	0.0332	0.1100
Van/Medium Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0036	0.0001	0.0004	1.3547	0.1355	1.6420	0.0332	0.1100

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	0.0036	0.0001	0.0004	0.0000	0.0000	1.6420	0.0332	0.1100
Van/Medium Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0036	0.0001	0.0004	0.0082	0.0020	1.6420	0.0332	0.1100

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Type III Fire Engine on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0011	0.0004	0.0179	2.3184	0.2319	3.8185	0.0036	0.0382

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Type III Fire Engine on Paved Road				0.0278	0.0068			
Total Emissions	0.0011	0.0004	0.0179	0.0279	0.0069	3.8185	0.0036	0.0382

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Type IV Fire Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0011	0.0004	0.0179	2.3184	0.2319	3.8185	0.0036	0.0382

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Type IV Fire Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0011	0.0004	0.0179	0.0279	0.0069	3.8185	0.0036	0.0382

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
ATV	0.0688	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0688	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Equipment (T6, diesel)	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Heavy Equipment on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0011	0.0004	0.0179	0.8555	0.0856	3.8185	0.0036	0.0382

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Equipment (T6, diesel)	0.0011	0.0004	0.0179	0.0001	0.0001	3.8185	0.0036	0.0382
Heavy Equipment on Paved Road				0.0029	0.0007			
Total Emissions	0.0011	0.0004	0.0179	0.0030	0.0008	3.8185	0.0036	0.0382

Equipment Type	Unit Emissions (lb/hour)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Generator	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000
Total Emissions	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000

Chainsaw	1	2	0.50	55	13.1870	7.2911	0.1172	0.0207	0.0207	35.6435	0.0391	0.4532
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Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
Chipper	1	83	0.73	0	1.7798	0.2713	2.0510	0.1437	0.1437	286.9439		0.1700

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
Skid Steer Loader	1	65	0.37	3	3.3186	0.2550	3.2862	0.1770	0.1620	498.3256		0.1530

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
Excavator	1	97	0.37	3	3.7818	0.5000	4.8087	0.3620	0.3330	529.7952		0.1540

Activity	Number Active	Fuel Rate gal/ac (g)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d) (e)		CO2	N2O	CH4
Drip Torch (70 % diesel/30 % gas)	1	0.13	123.8836	107.1878	468.8935	32.5139	32.5139	20786.6246	0.0000	0.0000

Activity	Number Active	Fuel Rate gal/ac (h)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d)		CO2	N2O	CH4
Propane Torch	1	31	7.5000	1.0000	13.0000	0.7000	0.7000	12500.0000	0.9000	0.2000

Notes: (a) Emission factors of vehicle exhaust emissions were calculated based on emission data derived from EMFAC2014 Web Data Tool.
(b) Emission factors of vehicle fugitive dust emissions from unpaved roads were derived based on EPA AP-42.
(c) Emission factors and load factors of equipment obtained from Appendix D of CalEEMod User's Guide.
(d) Emission factors obtained from EPA AP-42.
(e) Fuel consumption obtained from CAL FIRE 2016
(f) Offroad
(g) Fuel consumption obtained from Stevens 1997
(h) Fuel consumption obtained from Wildung 2001
(i) Percent PM2.5 and PM10 assumed to be 100%
(j) Diesel services 2017

Chainsaw	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684
Total Emissions	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
Chipper	0.0297	0.0045	0.0342	0.0024	0.0024	4.7911	0.0000	0.0028
Total Emissions	0.0297	0.0045	0.0342	0.0024	0.0024	4.7911	0.0000	0.0028

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
Skid Steer Loader	0.4575	0.0352	0.4530	0.0244	0.0223	68.6955	0.0000	0.0211
Total Emissions	0.4575	0.0352	0.4530	0.0244	0.0223	68.6955	0.0000	0.0211

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
Excavator	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317
Total Emissions	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
Drip Torch	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000
Total Emissions	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
Propane Torch	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002
Total Emissions	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002

Chainsaw	238.36	0.2372	0.1312	0.0021	0.0004	0.0004	0.6413	0.0007	0.0082
Total Emissions		0.2372	0.1312	0.0021	0.0004	0.0004	0.6413	0.0007	0.0082

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Chipper	125.86	0.0019	0.0003	0.0022	0.0002	0.0002	0.3015	0.0000	0.0002
Total Emissions		0.0019	0.0003	0.0022	0.0002	0.0002	0.3015	0.0000	0.0002

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Skid Steer Loader	585.10	0.1338	0.0103	0.1325	0.0071	0.0065	20.0969	0.0000	0.0062
Total Emissions		0.1338	0.0103	0.1325	0.0071	0.0065	20.0969	0.0000	0.0062

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Excavator	12.40	0.0048	0.0006	0.0061	0.0005	0.0004	0.6757	0.0000	0.0002
Total Emissions		0.0048	0.0006	0.0061	0.0005	0.0004	0.6757	0.0000	0.0002

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Drip Torch	9.34	0.0006	0.0005	0.0022	0.0002	0.0002	0.0971	0.0000	0.0000
Total Emissions		0.0006	0.0005	0.0022	0.0002	0.0002	0.0971	0.0000	0.0000

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Propane Torch	23.69	0.0001	0.0000	0.0002	0.0000	0.0000	0.1481	0.0000	0.0000
Total Emissions		0.0001	0.0000	0.0002	0.0000	0.0000	0.1481	0.0000	0.0000

		CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
		0.5038	0.1457	0.1606	1.7385	0.2063	59.2944	0.9453	2.0345
Total Emissions		0.5038	0.1457	0.1606	1.7385	0.2063	59.2944	0.9453	2.0345
	Exhaust				0.0085	0.0079			
	Fugitive (Paved)				0.1747	0.0429			
	Fugitive (Unpaved)				1.5552	0.1555			

BFFIP (2022) Block
Source Data

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Light Duty Automobile (LDA, gasoline)	1	1	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road	1	1				0.0029	0.0007			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road	1	1				2.3183	0.2318			

Unit Emissions

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2	N2O	CH4
	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	CO2	N2O	CH4		
Light Duty Automobile (LDA, gasoline)	0.0013	0.0000	0.0001	0.0000	0.0000	0.0000	0.4996	0.0090	0.0155		
Light Duty Auto on Paved Road	0.0029	0.0007									
Total Emissions	0.0013	0.0000	0.0001	0.0029	0.0007	0.4996	0.0090	0.0155			

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2	N2O	CH4
	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	CO2	N2O	CH4		
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	0.0000	2.0778	0.0845	0.2237		
Heavy Truck on Unpaved Road	1.3547	0.1355									
Total Emissions	0.0046	0.0003	0.0010	1.3547	0.1355	2.0778	0.0845	0.2237			

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2	N2O	CH4
	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	CO2	N2O	CH4		
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	0.0000	2.0778	0.0845	0.2237		
Heavy Truck on Paved Road	0.0082	0.0020									
Total Emissions	0.0046	0.0003	0.0010	0.0082	0.0020	2.0778	0.0845	0.2237			

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2	N2O	CH4
	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	CO2	N2O	CH4		
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	0.0001	3.6720	0.0031	0.0315		
Water Truck on Unpaved Road	2.3183	0.2318									
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315			

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2	N2O	CH4
	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	CO2	N2O	CH4		
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	0.0001	3.6720	0.0031	0.0315		
Water Truck on Paved Road	0.0278	0.0068									
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315			

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2	N2O	CH4
	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	CO2	N2O	CH4		
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	0.0000	1.4080	0.0188	0.0652		
Van/Medium Truck on Unpaved Road	1.3547	0.1355									
Total Emissions	0.0024	0.0001	0.0002	1.3547	0.1355	1.4080	0.0188	0.0652			

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2	N2O	CH4
	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	CO2	N2O	CH4		
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	0.0000	1.4080	0.0188	0.0652		
Van/Medium Truck on Paved Road	0.0082	0.0020									
Total Emissions	0.0024	0.0001	0.0002	0.0082	0.0020	1.4080	0.0188	0.0652			

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2	N2O	CH4
	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	CO2	N2O	CH4		
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	0.0001	3.6720	0.0031	0.0315		
Type III Fire Engine on Unpaved Road	2.3183	0.2318									
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315			

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2	N2O	CH4
	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	CO2	N2O	CH4		
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	0.0001	3.6720	0.0031	0.0315		
Type III Fire Engine on Paved Road	0.0278	0.0068									
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315			

Vehicle Type	CO		ROG		NOx		Unit Emissions (lbs/mile)		CO2	N2O	CH4
	PM10	PM2.5	PM10	PM2.5	PM10	PM2.5	CO2	N2O	CH4		
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	0.0001	3.6720	0.0031	0.0315		
Type IV Fire Truck on Unpaved Road	2.3183	0.2318									
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Active	Trip Distance Miles per Vehi. Hour/Acre	Emission Factor (lb/mile) (f)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
ATV	1	1.00	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road						0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road	1	1				0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	Emission Factors (lb/mile) (a) (b)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road	1	1				0.0029	0.0007			

Equipment Type	Number Active	Fuel rate gal/hr (j)	Emission Factor (lb/10 ³ gal) (d)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Generator	1	2	126.8146	46.7212	588.6865	41.3816	41.3816	21892.1960	0.0000	0.0000

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	Emission Factor (g/hp-hr) (f)					
					CO	ROG	NOx	PM10	PM2.5	CH4
Chainsaw	1	2	0.50	55	13.1870	7.2911	0.1172	0.0207	0.0207	0.0391
					286.9435					0.4532

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	Emission Factor (g/hp-hr) (f)					
					CO	ROG	NOx	PM10	PM2.5	CH4
Chipper	1	83	0.73	0	1.7413	0.1659	1.3670	0.0728	0.0728	0.0150
					286.9439					

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	Emission Factor (g/hp-hr) (c)					
					CO	ROG	NOx	PM10	PM2.5	CH4
Skid Steer Loader	1	65	0.37	3	3.2704	0.1640	2.1892	0.0810	0.0750	0.1530
					472.4321					

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	Emission Factor (g/hp-hr) (c)					
					CO	ROG	NOx	PM10	PM2.5	CH4
Excavator	1	97	0.37	3	3.7818	0.5000	4.8087	0.3620	0.3330	0.1540
					529.7952					

Activity	Number Active	Fuel Rate gal/ac (g)	Emission Factor (lb/10 ³ gal) (d) (e)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Drip Torch (70 % diesel/30 % gas)	1	0.13	123.8836	107.1878	469.8935	32.5139	32.5139	20786.6246	0.0000	0.0000

Vehicle Type	Unit Emissions (lbs/mile)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	Unit Emissions (lb/mile)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
ATV	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
				0.8554	0.0855			
Total Emissions	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002

Vehicle Type	Unit Emissions (lbs/mile)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0012	0.0003	0.0125	0.8554	0.0856	3.6720	0.0031	0.0315

Vehicle Type	Unit Emissions (lbs/mile)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road				0.0029	0.0007			
Total Emissions	0.0012	0.0003	0.0125	0.0030	0.0008	3.6720	0.0031	0.0315

Equipment Type	Unit Emissions (lb/hour)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Generator	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000
Total Emissions	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000

Equipment Type	Unit Emissions (lb/acre)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Brush outter/chainsaw	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684
Total Emissions	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684

Equipment Type	Unit Emissions (lb/acre)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
chipper	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003
Total Emissions	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003

Equipment Type	Unit Emissions (lb/acre)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Skid Steer Loader	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211
Total Emissions	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211

Equipment Type	Unit Emissions (lb/acre)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Backhoe/Excavator	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317
Total Emissions	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317

Equipment Type	Unit Emissions (lb/gallon)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Drip Torch	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000
Total Emissions	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000

Activity	Number Active	Fuel Rate gal/ac (h)	Emission Factor (lb/10 ³ gal) (d)							
			CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Propane Torch	1	31	7.5000	1.0000	13.0000	0.7000	0.7000	12500.0000	0.9000	0.2000

Notes: (a) Emission factors of vehicle exhaust emissions were calculated based on emission data derived from EMFAC2014 Web Data Tool.
(b) Emission factors of vehicle fugitive dust emissions from unpaved roads were derived based on EPA AP-42.
(c) Emission factors and load factors of equipment obtained from Appendix D of CalEEMod User's Guide.
(d) Emission factors obtained from EPA AP-42.
(e) Fuel consumption obtained from CAL FIRE 2016
(f) Offroad
(g) Fuel consumption obtained from Stevens 1997
(h) Fuel consumption obtained from Wildung 2001
(i) Percent PM2.5 and PM10 assumed to be 100%
(j) Diesel services 2017

Equipment Type	Unit Emissions (lb/gallon)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Propane Torch	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002
Total Emissions	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002

BFFIP (2022) Emission Template										
Source Data										
Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	1	1	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road	1	1				0.0029	0.0007			
Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road	1	1				1.3547	0.1355			
Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road	1	1				0.0082	0.0020			
Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road	1	1				2.3183	0.2318			
Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road	1	1				0.0278	0.0068			
Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road	1	1				1.3547	0.1355			
Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road	1	1				0.0082	0.0020			
Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road	1	1				2.3183	0.2318			
Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road	1	1				0.0278	0.0068			
Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road	1	1				2.3183	0.2318			
Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road	1	1				0.0278	0.0068			
Vehicle Type	Number Active	Trip Distance Miles per Vehi. Hour/Acre	CO	ROG	NOx	Emission Factor (lb/mile) (f)		CO2	N2O	CH4
						PM10	PM2.5			
ATV	1	1.00	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road						0.8554	0.0855			
Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road	1	1				0.8554	0.0855			
Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road	1	1				0.0029	0.0007			
Equipment Type	Number Active	Fuel rate gal/hr (j)	CO	ROG	NOx	Emission Factor (lb*10 ³ gal) (d)		CO2	N2O	CH4
						PM10	PM2.5			
Generator	1	2	126.8146	46.7212	588.6865	41.3816	41.3816	21892.1960	0.0000	0.0000
Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CH4
								PM10	PM2.5	

Unit Emissions								
Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road				0.0029	0.0007			
Total Emissions	0.0013	0.0000	0.0001	0.0029	0.0007	0.4996	0.0090	0.0155
Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0046	0.0003	0.0010	1.3547	0.1355	2.0778	0.0845	0.2237
Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0046	0.0003	0.0010	0.0082	0.0020	2.0778	0.0845	0.2237
Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315
Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315
Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0024	0.0001	0.0002	1.3547	0.1355	1.4080	0.0188	0.0652
Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0024	0.0001	0.0002	0.0082	0.0020	1.4080	0.0188	0.0652
Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315
Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315
Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315
Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315
Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
				PM10	PM2.5			
ATV	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0012	0.0003	0.0125	0.8554	0.0856	3.6720	0.0031	0.0315
Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road				0.0029	0.0007			
Total Emissions	0.0012	0.0003	0.0125	0.0030	0.0008	3.6720	0.0031	0.0315
Equipment Type	CO	ROG	NOx	Unit Emissions (lb/hour)		CO2	N2O	CH4
				PM10	PM2.5			
Generator	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000
Total Emissions	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000
Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
				PM10	PM2.5			

BFFIP (2022) ATV Use
Source Data

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	1	1	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road	1	1				0.0029	0.0007			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Active	Trip Distance Miles per Vehi. Hour/Acre	CO	ROG	NOx	Emission Factor (lb/mile) (f)		CO2	N2O	CH4
						PM10	PM2.5			
ATV	1	1.00	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road						0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road	1	1				0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road	1	1				0.0029	0.0007			

Equipment Type	Number Active	Fuel rate gal/hr (j)	CO	ROG	NOx	Emission Factor (lb*10 ³ gal) (d)		CO2	N2O	CH4
						PM10	PM2.5			
Generator	1	2	126.8146	46.7212	588.6865	41.3816	41.3816	21892.1960	0.0000	0.0000

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
								PM10	PM2.5			

Unit Emissions

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road				0.0029	0.0007			
Total Emissions	0.0013	0.0000	0.0001	0.0029	0.0007	0.4996	0.0090	0.0155

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0046	0.0003	0.0010	1.3547	0.1355	2.0778	0.0845	0.2237

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0046	0.0003	0.0010	0.0082	0.0020	2.0778	0.0845	0.2237

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0024	0.0001	0.0002	1.3547	0.1355	1.4080	0.0188	0.0652

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0024	0.0001	0.0002	0.0082	0.0020	1.4080	0.0188	0.0652

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
ATV	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0012	0.0003	0.0125	0.8554	0.0856	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbsmile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road				0.0029	0.0007			
Total Emissions	0.0012	0.0003	0.0125	0.0030	0.0008	3.6720	0.0031	0.0315

Equipment Type	Unit Emissions (lb/hour)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Generator	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000
Total Emissions	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000

Chainsaw	1	2	0.50	55	13.1870	7.2911	0.1172	0.0207	0.0207	35.6435	0.0391	0.4532
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Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
Chipper	1	83	0.73	0	1.7413	0.1659	1.3670	0.0728	0.0728	286.9439		0.0150

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
Skid Steer Loader	1	65	0.37	3	3.2704	0.1640	2.1882	0.0810	0.0750	472.4321		0.1530

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
Excavator	1	97	0.37	3	3.7818	0.5000	4.8087	0.3620	0.3330	529.7952		0.1540

Activity	Number Active	Fuel Rate gal/ac (g)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d) (e)		CO2	N2O	CH4
Drip Torch (70 % diesel/30 % gas)	1	0.13	123.8836	107.1878	469.8935	32.5139	32.5139	20786.6246	0.0000	0.0000

Activity	Number Active	Fuel Rate gal/ac (h)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d)		CO2	N2O	CH4
Propane Torch	1	31	7.5000	1.0000	13.0000	0.7000	0.7000	12500.0000	0.9000	0.2000

Notes: (a) Emission factors of vehicle exhaust emissions were calculated based on emission data derived from EMFAC2014 Web Data Tool.
(b) Emission factors of vehicle fugitive dust emissions from unpaved roads were derived based on EPA AP-42.
(c) Emission factors and load factors of equipment obtained from Appendix D of CalEEMod User's Guide.
(d) Emission factors obtained from EPA AP-42.
(e) Fuel consumption obtained from CAL FIRE 2016
(f) Offroad
(g) Fuel consumption obtained from Stevens 1997
(h) Fuel consumption obtained from Wildung 2001
(i) Percent PM2.5 and PM10 assumed to be 100%
(j) Diesel services 2017

Chainsaw	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684
Total Emissions	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
Chipper	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003
Total Emissions	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
Skid Steer Loader	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211
Total Emissions	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
Excavator	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317
Total Emissions	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
Drip Torch	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000
Total Emissions	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
Propane Torch	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002
Total Emissions	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002

Chainsaw	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Chipper		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Skid Steer Loader		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Excavator		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Drip Torch	16.32	0.0010	0.0009	0.0038	0.0003	0.0003	0.1696	0.0000	0.0000
Total Emissions		0.0010	0.0009	0.0038	0.0003	0.0003	0.1696	0.0000	0.0000

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Propane Torch		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
				PM10	PM2.5			
Total Emissions	0.0063	0.0011	0.0042	0.0074	0.0100	0.2836	0.0013	0.0038
	0.0063	0.0011	0.0042	0.0003	0.0003	0.2836	0.0013	0.0038
				0.0002	0.0001			
				0.0959	0.0097			

Exhaust

Fugitive (Paved)

Fugitive (Unpaved)

BFFIP (2022) MA-20
Source Data

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle				Emission Factors (lb/mile) (a) (b)		CO ₂	N ₂ O	CH ₄
			CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Light Duty Automobile (LDA, gasoline)	1	1	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road	1	1				0.0029	0.0007			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle				Emission Factors (lb/mile) (a) (b)		CO ₂	N ₂ O	CH ₄
			CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle				Emission Factors (lb/mile) (a) (b)		CO ₂	N ₂ O	CH ₄
			CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle				Emission Factors (lb/mile) (a) (b)		CO ₂	N ₂ O	CH ₄
			CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle				Emission Factors (lb/mile) (a) (b)		CO ₂	N ₂ O	CH ₄
			CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle				Emission Factors (lb/mile) (a) (b)		CO ₂	N ₂ O	CH ₄
			CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle				Emission Factors (lb/mile) (a) (b)		CO ₂	N ₂ O	CH ₄
			CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle				Emission Factors (lb/mile) (a) (b)		CO ₂	N ₂ O	CH ₄
			CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle				Emission Factors (lb/mile) (a) (b)		CO ₂	N ₂ O	CH ₄
			CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle				Emission Factors (lb/mile) (a) (b)		CO ₂	N ₂ O	CH ₄
			CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle				Emission Factors (lb/mile) (a) (b)		CO ₂	N ₂ O	CH ₄
			CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Active	Trip Distance Miles per Vehi. Hour/Acre				Emission Factor (lb/mile) (f)		CO ₂	N ₂ O	CH ₄
			CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
ATV	1	1.00	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road						0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle				Emission Factors (lb/mile) (a) (b)		CO ₂	N ₂ O	CH ₄
			CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road	1	1				0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle				Emission Factors (lb/mile) (a) (b)		CO ₂	N ₂ O	CH ₄
			CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road	1	1				0.0029	0.0007			

Equipment Type	Number Active	Fuel rate gal/hr (j)				Emission Factor (lb/10 ³ gal) (d)		CO ₂	N ₂ O	CH ₄
			CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Generator	1	2	126.8146	46.7212	588.6865	41.3816	41.3816	21892.1960	0.0000	0.0000

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre				Emission Factor (g/hp-hr) (f)		CO ₂	N ₂ O	CH ₄
					CO	ROG	NO _x	PM ₁₀	PM _{2.5}			

Unit Emissions

Vehicle Type				Unit Emissions (lbs/mile)		CO ₂	N ₂ O	CH ₄
	CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Light Duty Automobile (LDA, gasoline)	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road				0.0029	0.0007			
Total Emissions	0.0013	0.0000	0.0001	0.0029	0.0007	0.4996	0.0090	0.0155

Vehicle Type				Unit Emissions (lbs/mile)		CO ₂	N ₂ O	CH ₄
	CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0046	0.0003	0.0010	1.3547	0.1355	2.0778	0.0845	0.2237

Vehicle Type				Unit Emissions (lbs/mile)		CO ₂	N ₂ O	CH ₄
	CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0046	0.0003	0.0010	0.0082	0.0020	2.0778	0.0845	0.2237

Vehicle Type				Unit Emissions (lbs/mile)		CO ₂	N ₂ O	CH ₄
	CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type				Unit Emissions (lbs/mile)		CO ₂	N ₂ O	CH ₄
	CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type				Unit Emissions (lbs/mile)		CO ₂	N ₂ O	CH ₄
	CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0024	0.0001	0.0002	1.3547	0.1355	1.4080	0.0188	0.0652

Vehicle Type				Unit Emissions (lbs/mile)		CO ₂	N ₂ O	CH ₄
	CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0024	0.0001	0.0002	0.0082	0.0020	1.4080	0.0188	0.0652

Vehicle Type				Unit Emissions (lbs/mile)		CO ₂	N ₂ O	CH ₄
	CO	ROG	NO _x	PM ₁₀	PM _{2.5}			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315

Chainsaw	1	2	0.50	55	13.1870	7.2911	0.1172	0.0207	0.0207	35.6435	0.0381	0.4532
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Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/HP-hr) (f)		CO2	N2O	CH4
Chipper	1	83	0.73	0	1.7413	0.1659	1.3670	0.0728	0.0728	286.9439		0.0150

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/HP-hr) (f)		CO2	N2O	CH4
Skid Steer Loader	1	65	0.37	3	3.2704	0.1640	2.1882	0.0810	0.0750	472.4321		0.1530

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/HP-hr) (f)		CO2	N2O	CH4
Excavator	1	97	0.37	3	3.7818	0.5000	4.8087	0.3620	0.3330	529.7952		0.1540

Activity	Number Active	Fuel Rate gal/ac (g)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d) (e)		CO2	N2O	CH4
Drip Torch (70 % diesel/30 % gas)	1	0.13	123.8836	107.1878	469.8935	32.5139	32.5139	20786.6246	0.0000	0.0000

Activity	Number Active	Fuel Rate gal/ac (h)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d)		CO2	N2O	CH4
Propane Torch	1	31	7.5000	1.0000	13.0000	0.7000	0.7000	12500.0000	0.9000	0.2000

Notes: (a) Emission factors of vehicle exhaust emissions were calculated based on emission data derived from EMFAC2014 Web Data Tool.
(b) Emission factors of vehicle fugitive dust emissions from unpaved roads were derived based on EPA AP-42.
(c) Emission factors and load factors of equipment obtained from Appendix D of CalEEMod User's Guide.
(d) Emission factors obtained from EPA AP-42.
(e) Fuel consumption obtained from CAL FIRE 2016
(f) Offroad
(g) Fuel consumption obtained from Stevens 1997
(h) Fuel consumption obtained from Wildung 2001
(i) Percent PM2.5 and PM10 assumed to be 100%
(j) Diesel services 2017

Chainsaw	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684
Total Emissions	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
Chipper	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003
Total Emissions	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
Skid Steer Loader	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211
Total Emissions	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
Excavator	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317
Total Emissions	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
Drip Torch	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000
Total Emissions	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
Propane Torch	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002
Total Emissions	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002

Chainsaw	153.00	0.1523	0.0842	0.0014	0.0002	0.0002	0.4116	0.0005	0.0052
Total Emissions		0.1523	0.0842	0.0014	0.0002	0.0002	0.4116	0.0005	0.0052

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Chipper	153.00	0.0022	0.0002	0.0017	0.0001	0.0001	0.3665	0.0000	0.0000
Total Emissions		0.0022	0.0002	0.0017	0.0001	0.0001	0.3665	0.0000	0.0000

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Skid Steer Loader	417.00	0.0940	0.0047	0.0629	0.0023	0.0022	13.5788	0.0000	0.0044
Total Emissions		0.0940	0.0047	0.0629	0.0023	0.0022	13.5788	0.0000	0.0044

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Excavator		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Drip Torch		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Propane Torch		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
	0.3000	0.0900	0.0747	0.8992	0.1087	35.6961	0.3607	0.6536
Total Emissions								

Exhaust
Fugitive (Paved)
Fugitive (Unpaved)

0.3000	0.0900	0.0747	0.0028	0.0026	35.6961	0.3607	0.6536
			0.1132	0.0278			
			0.7832	0.0783			

BFFIP (2022) MA-21
Source Data

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	1	1	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road	1	1				0.0029	0.0007			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
VanMedium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
VanMedium Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
VanMedium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
VanMedium Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Active	Trip Distance Miles per Vehi. Hour/Acre	CO	ROG	NOx	Emission Factor (lb/mile) (f)		CO2	N2O	CH4
						PM10	PM2.5			
ATV	1	1.00	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road						0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road	1	1				0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road	1	1				0.0029	0.0007			

Equipment Type	Number Active	Fuel rate gal/hr (j)	CO	ROG	NOx	Emission Factor (lb*10 ³ /gal) (d)		CO2	N2O	CH4
						PM10	PM2.5			
Generator	1	2	126.8146	46.7212	588.6865	41.3816	41.3816	21892.1960	0.0000	0.0000

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/HP-hr) (f)		CO2	N2O	CH4
								PM10	PM2.5			

Unit Emissions

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road				0.0029	0.0007			
Total Emissions	0.0013	0.0000	0.0001	0.0029	0.0007	0.4996	0.0090	0.0155

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0046	0.0003	0.0010	1.3547	0.1355	2.0778	0.0845	0.2237

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0046	0.0003	0.0010	0.0082	0.0020	2.0778	0.0845	0.2237

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
VanMedium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
VanMedium Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0024	0.0001	0.0002	1.3547	0.1355	1.4080	0.0188	0.0652

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
VanMedium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
VanMedium Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0024	0.0001	0.0002	0.0082	0.0020	1.4080	0.0188	0.0652

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
ATV	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0012	0.0003	0.0125	0.8554	0.0856	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road				0.0029	0.0007			
Total Emissions	0.0012	0.0003	0.0125	0.0030	0.0008	3.6720	0.0031	0.0315

Equipment Type	Unit Emissions (lb/hour)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Generator	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000
Total Emissions	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000

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Source Data

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	1	1	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road	1	1				0.0029	0.0007			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Active	Trip Distance Miles per Vehi. Hour/Acre	CO	ROG	NOx	Emission Factor (lb/mile) (f)		CO2	N2O	CH4
						PM10	PM2.5			
ATV	1	1.00	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road						0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road	1	1				0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road	1	1				0.0029	0.0007			

Equipment Type	Number Active	Fuel rate gal/hr (j)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d)		CO2	N2O	CH4
						PM10	PM2.5			
Generator	1	2	126.8146	46.7212	588.6865	41.3816	41.3816	21892.1960	0.0000	0.0000

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
								PM10	PM2.5			

Unit Emissions

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road				0.0029	0.0007			
Total Emissions	0.0013	0.0000	0.0001	0.0029	0.0007	0.4996	0.0090	0.0155

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0046	0.0003	0.0010	1.3547	0.1355	2.0778	0.0845	0.2237

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0046	0.0003	0.0010	0.0082	0.0020	2.0778	0.0845	0.2237

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0024	0.0001	0.0002	1.3547	0.1355	1.4080	0.0188	0.0652

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0024	0.0001	0.0002	0.0082	0.0020	1.4080	0.0188	0.0652

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
ATV	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0012	0.0003	0.0125	0.8554	0.0856	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road				0.0029	0.0007			
Total Emissions	0.0012	0.0003	0.0125	0.0030	0.0008	3.6720	0.0031	0.0315

Equipment Type	Unit Emissions (lb/hour)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Generator	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000
Total Emissions	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000

Chainsaw	1	2	0.50	55	13.1870	7.2911	0.1172	0.0207	0.0207	35.6435	0.0391	0.4532
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Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/tp-hr) (f)		CO2	N2O	CH4
								PM10	PM2.5			
Chipper	1	83	0.73	0	1.7413	0.1659	1.3670	0.0728	0.0728	286.9439		0.0150

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/tp-hr) (f)		CO2	N2O	CH4
								PM10	PM2.5			
Skid Steer Loader	1	65	0.37	3	3.2704	0.1640	2.1882	0.0810	0.0750	472.4321		0.1530

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/tp-hr) (f)		CO2	N2O	CH4
								PM10	PM2.5			
Excavator	1	97	0.37	3	3.7818	0.5000	4.8087	0.3620	0.3330	529.7952		0.1540

Activity	Number Active	Fuel Rate gal/ac (g)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d) (e)		CO2	N2O	CH4
						PM10	PM2.5			
Drip Torch (70 % diesel/30 % gas)	1	0.13	123.8836	107.1878	469.8935	32.5139	32.5139	20786.6246	0.0000	0.0000

Activity	Number Active	Fuel Rate gal/ac (h)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d)		CO2	N2O	CH4
						PM10	PM2.5			
Propane Torch	1	31	7.5000	1.0000	13.0000	0.7000	0.7000	12500.0000	0.9000	0.2000

Notes: (a) Emission factors of vehicle exhaust emissions were calculated based on emission data derived from EMFAC2014 Web Data Tool.

(b) Emission factors of vehicle fugitive dust emissions from unpaved roads were derived based on EPA AP-42.

(c) Emission factors and load factors of equipment obtained from Appendix D of CalEEMod User's Guide.

(d) Emission factors obtained from EPA AP-42.

(e) Fuel consumption obtained from CAL FIRE 2016

(f) Offroad

(g) Fuel consumption obtained from Stevens 1997

(h) Fuel consumption obtained from Wildung 2001

(i) Percent PM2.5 and PM10 assumed to be 100%

(j) Diesel services 2017

Chainsaw	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684
Total Emissions	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
				PM10	PM2.5			
Chipper	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003
Total Emissions	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
				PM10	PM2.5			
Skid Steer Loader	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211
Total Emissions	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
				PM10	PM2.5			
Excavator	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317
Total Emissions	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
				PM10	PM2.5			
Drip Torch	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000
Total Emissions	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
				PM10	PM2.5			
Propane Torch	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002
Total Emissions	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002

Chainsaw	1.24	0.0012	0.0007	0.0000	0.0000	0.0000	0.0033	0.0000	0.0000
Total Emissions		0.0012	0.0007	0.0000	0.0000	0.0000	0.0033	0.0000	0.0000

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
					PM10	PM2.5			
Chipper	1.24	0.0000	0.0000	0.0000	0.0000	0.0000	0.0030	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0030	0.0000	0.0000

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
					PM10	PM2.5			
Skid Steer Loader		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
					PM10	PM2.5			
Excavator		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
					PM10	PM2.5			
Drip Torch		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
					PM10	PM2.5			
Propane Torch	38.12	0.0001	0.0000	0.0002	0.0000	0.0000	0.2382	0.0000	0.0000
Total Emissions		0.0001	0.0000	0.0002	0.0000	0.0000	0.2382	0.0000	0.0000

	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
				PM10	PM2.5			
Total Emissions	0.0067	0.0008	0.0007	0.1528	0.0170	2.3654	0.0375	0.0686

Exhaust	0.0067	0.0008	0.0007	0.0000	0.0000	2.3654	0.0375	0.0686
Fugitive (Paved)				0.0114	0.0028			
Fugitive (Unpaved)				0.1413	0.0141			

BFFIP (2022) MA-23

Source Data

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	1	1	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road	1	1				0.0029	0.0007			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Active	Trip Distance Miles per Vehi. Hour/Acre	CO	ROG	NOx	Emission Factor (lb/mile) (f)		CO2	N2O	CH4
						PM10	PM2.5			
ATV	1	1.00	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road						0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road	1	1				0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road	1	1				0.0029	0.0007			

Equipment Type	Number Active	Fuel rate gal/hr (j)	CO	ROG	NOx	Emission Factor (lb*10 ⁻³ gal) (d)		CO2	N2O	CH4
						PM10	PM2.5			
Generator	1	2	126.8146	46.7212	588.6865	41.3816	41.3816	21892.1960	0.0000	0.0000

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (lb/hp-hr) (f)		CO2	N2O	CH4
								PM10	PM2.5			

Unit Emissions

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road				0.0029	0.0007			
Total Emissions	0.0013	0.0000	0.0001	0.0029	0.0007	0.4996	0.0090	0.0155

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0046	0.0003	0.0010	1.3547	0.1355	2.0778	0.0845	0.2237

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0046	0.0003	0.0010	0.0082	0.0020	2.0778	0.0845	0.2237

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0024	0.0001	0.0002	1.3547	0.1355	1.4080	0.0188	0.0652

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0024	0.0001	0.0002	0.0082	0.0020	1.4080	0.0188	0.0652

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
ATV	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0012	0.0003	0.0125	0.8554	0.0856	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road				0.0029	0.0007			
Total Emissions	0.0012	0.0003	0.0125	0.0030	0.0008	3.6720	0.0031	0.0315

Equipment Type	Unit Emissions (lb/hour)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Generator	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000
Total Emissions	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000

Chainsaw	1	2	0.50	55	13.1870	7.2911	0.1172	0.0207	0.0207	35.6435	0.0391	0.4532
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Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
								PM10	PM2.5			
Chipper	1	83	0.73	0	1.7413	0.1659	1.3670	0.0728	0.0728	286.9439		0.0150

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
								PM10	PM2.5			
Skid Steer Loader	1	65	0.37	3	3.2704	0.1640	2.1882	0.0810	0.0750	472.4321		0.1530

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
								PM10	PM2.5			
Excavator	1	97	0.37	3	3.7818	0.5000	4.8087	0.3620	0.3330	529.7952		0.1540

Activity	Number Active	Fuel Rate gal/ac (g)	CO	ROG	NOx	Emission Factor (lb*10 ⁻³ gal) (d) (e)		CO2	N2O	CH4
						PM10	PM2.5			
Drip Torch (70 % diesel/30 % gas)	1	0.13	123.8836	107.1878	468.8935	32.5139	32.5139	20786.6246	0.0000	0.0000

Activity	Number Active	Fuel Rate gal/ac (h)	CO	ROG	NOx	Emission Factor (lb*10 ⁻³ gal) (d)		CO2	N2O	CH4
						PM10	PM2.5			
Propane Torch	1	31	7.5000	1.0000	13.0000	0.7000	0.7000	12500.0000	0.9000	0.2000

Notes: (a) Emission factors of vehicle exhaust emissions were calculated based on emission data derived from EMFAC2014 Web Data Tool.
(b) Emission factors of vehicle fugitive dust emissions from unpaved roads were derived based on EPA AP-42.
(c) Emission factors and load factors of equipment obtained from Appendix D of CalEEMod User's Guide.
(d) Emission factors obtained from EPA AP-42.
(e) Fuel consumption obtained from CAL FIRE 2016
(f) Offroad
(g) Fuel consumption obtained from Stevens 1997
(h) Fuel consumption obtained from Wildung 2001
(i) Percent PM2.5 and PM10 assumed to be 100%
(j) Diesel services 2017

Chainsaw	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684
Total Emissions	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
				PM10	PM2.5			
Chipper	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003
Total Emissions	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
				PM10	PM2.5			
Skid Steer Loader	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211
Total Emissions	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
				PM10	PM2.5			
Excavator	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317
Total Emissions	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
				PM10	PM2.5			
Drip Torch	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000
Total Emissions	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
				PM10	PM2.5			
Propane Torch	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002
Total Emissions	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002

Chainsaw	48.00	0.0478	0.0264	0.0004	0.0001	0.0001	0.1291	0.0001	0.0016
Total Emissions		0.0478	0.0264	0.0004	0.0001	0.0001	0.1291	0.0001	0.0016

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
					PM10	PM2.5			
Chipper	48.00	0.0007	0.0001	0.0005	0.0000	0.0000	0.1150	0.0000	0.0000
Total Emissions		0.0007	0.0001	0.0005	0.0000	0.0000	0.1150	0.0000	0.0000

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
					PM10	PM2.5			
Skid Steer Loader	112.00	0.0252	0.0013	0.0169	0.0006	0.0006	3.6471	0.0000	0.0012
Total Emissions		0.0252	0.0013	0.0169	0.0006	0.0006	3.6471	0.0000	0.0012

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
					PM10	PM2.5			
Excavator	48.00	0.0187	0.0025	0.0237	0.0018	0.0016	2.6157	0.0000	0.0008
Total Emissions		0.0187	0.0025	0.0237	0.0018	0.0016	2.6157	0.0000	0.0008

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
					PM10	PM2.5			
Drip Torch	5.26	0.0003	0.0003	0.0012	0.0001	0.0001	0.0547	0.0000	0.0000
Total Emissions		0.0003	0.0003	0.0012	0.0001	0.0001	0.0547	0.0000	0.0000

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
					PM10	PM2.5			
Propane Torch		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
				PM10	PM2.5			
Total Emissions	0.1770	0.0320	0.0575	1.5530	0.1847	41.6137	0.5898	1.0579
	0.1770	0.0320	0.0575	0.0028	0.0026	41.6137	0.5898	1.0579
Exhaust								
Fugitive (Paved)				0.1857	0.0456			
Fugitive (Unpaved)				1.3644	0.1364			

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Source Data

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	1	1	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road	1	1				0.0029	0.0007			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Active	Trip Distance Miles per Vehi. Hour/Acre	CO	ROG	NOx	Emission Factor (lb/mile) (f)		CO2	N2O	CH4
						PM10	PM2.5			
ATV	1	1.00	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road						0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road	1	1				0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road	1	1				0.0029	0.0007			

Equipment Type	Number Active	Fuel rate gal/hr (g)	CO	ROG	NOx	Emission Factor (lb*10 ³ gal) (d)		CO2	N2O	CH4
						PM10	PM2.5			
Generator	1	2	126.8146	46.7212	588.6865	41.3816	41.3816	21892.1960	0.0000	0.0000

Equipment Type	Number Active	Rated HP	Load Factor (d)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
								PM10	PM2.5			

Unit Emissions

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road				0.0029	0.0007			
Total Emissions	0.0013	0.0000	0.0001	0.0029	0.0007	0.4996	0.0090	0.0155

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0046	0.0003	0.0010	1.3547	0.1355	2.0778	0.0845	0.2237

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0046	0.0003	0.0010	0.0082	0.0020	2.0778	0.0845	0.2237

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0024	0.0001	0.0002	1.3547	0.1355	1.4080	0.0188	0.0652

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0024	0.0001	0.0002	0.0082	0.0020	1.4080	0.0188	0.0652

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
ATV	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0012	0.0003	0.0125	0.8554	0.0856	3.6720	0.0031	0.0315

Vehicle Type	Unit Emissions (lbs/mile)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road				0.0029	0.0007			
Total Emissions	0.0012	0.0003	0.0125	0.0030	0.0008	3.6720	0.0031	0.0315

Chainsaw	1	2	0.50	55	13.1870	7.2911	0.1172	0.0207	0.0207	35.6435	0.0391	0.4532
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Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
Chipper	1	83	0.73	0	1.7413	0.1659	1.3670	0.0728	0.0728	286.9439		0.0150

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
Skid Steer Loader	1	65	0.37	3	3.2704	0.1640	2.1882	0.0810	0.0750	472.4321		0.1530

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
Excavator	1	97	0.37	3	3.7818	0.5000	4.8087	0.3620	0.3330	529.7952		0.1540

Activity	Number Active	Fuel Rate gal/ac (g)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d) (e)		CO2	N2O	CH4
Drip Torch (70 % diesel/30 % gas)	1	0.13	123.8836	107.1878	468.8935	32.5139	32.5139	20786.6246	0.0000	0.0000

Activity	Number Active	Fuel Rate gal/ac (h)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d)		CO2	N2O	CH4
Propane Torch	1	31	7.5000	1.0000	13.0000	0.7000	0.7000	12500.0000	0.9000	0.2000

Notes: (a) Emission factors of vehicle exhaust emissions were calculated based on emission data derived from EMFAC2014 Web Data Tool.
(b) Emission factors of vehicle fugitive dust emissions from unpaved roads were derived based on EPA AP-42.
(c) Emission factors and load factors of equipment obtained from Appendix D of CalEEMod User's Guide.
(d) Emission factors obtained from EPA AP-42.
(e) Fuel consumption obtained from CAL FIRE 2016
(f) Offroad
(g) Fuel consumption obtained from Stevens 1997
(h) Fuel consumption obtained from Wildung 2001
(i) Percent PM2.5 and PM10 assumed to be 100%
(j) Diesel services 2017

Chainsaw	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684
Total Emissions	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
Chipper	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003
Total Emissions	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
Skid Steer Loader	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211
Total Emissions	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
Excavator	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317
Total Emissions	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
Drip Torch	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000
Total Emissions	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
Propane Torch	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002
Total Emissions	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002

Chainsaw	223.00	0.2220	0.1227	0.0020	0.0003	0.0003	0.5999	0.0007	0.0076
Total Emissions		0.2220	0.1227	0.0020	0.0003	0.0003	0.5999	0.0007	0.0076

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Chipper		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Skid Steer Loader	287.00	0.0647	0.0032	0.0433	0.0016	0.0015	9.3456	0.0000	0.0030
Total Emissions		0.0647	0.0032	0.0433	0.0016	0.0015	9.3456	0.0000	0.0030

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Excavator		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Drip Torch	14.80	0.0009	0.0008	0.0035	0.0002	0.0002	0.1538	0.0000	0.0000
Total Emissions		0.0009	0.0008	0.0035	0.0002	0.0002	0.1538	0.0000	0.0000

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Propane Torch		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
				PM10	PM2.5			
Total Emissions	0.4606	0.1295	0.0639	3.7428	0.4315	78.8341	1.2202	2.2049
	0.4606	0.1295	0.0639	0.0026	0.0025	78.8341	1.2202	2.2049
Exhaust								
Fugitive (Paved)				0.3780	0.0928			
Fugitive (Unpaved)				3.3622	0.3362			

BFFIP (2022) MA-25
Source Data

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	1	1	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road	1	1				0.0029	0.0007			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road	1	1				1.3547	0.1355			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road	1	1				0.0082	0.0020			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road	1	1				2.3183	0.2318			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road	1	1				0.0278	0.0068			

Vehicle Type	Number Active	Trip Distance Miles per Vehi. Hour/Acre	CO	ROG	NOx	Emission Factor (lb/mile) (f)		CO2	N2O	CH4
						PM10	PM2.5			
ATV	1	1.00	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road						0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road	1	1				0.8554	0.0855			

Vehicle Type	Number Per Day	Trip Distance Miles per Vehicle	CO	ROG	NOx	Emission Factors (lb/mile) (a) (b)		CO2	N2O	CH4
						PM10	PM2.5			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road	1	1				0.0029	0.0007			

Equipment Type	Number Active	Fuel rate gal/hr (j)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d)		CO2	N2O	CH4
						PM10	PM2.5			
Generator	1	2	126.8146	46.7212	588.6865	41.3816	41.3816	21892.1960	0.0000	0.0000

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/tp-hr) (f)		CO2	N2O	CH4
								PM10	PM2.5			

Unit Emissions

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Light Duty Automobile (LDA, gasoline)	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road				0.0029	0.0007			
Total Emissions	0.0013	0.0000	0.0001	0.0029	0.0007	0.4996	0.0090	0.0155

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0046	0.0003	0.0010	1.3547	0.1355	2.0778	0.0845	0.2237

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0046	0.0003	0.0010	0.0082	0.0020	2.0778	0.0845	0.2237

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0024	0.0001	0.0002	1.3547	0.1355	1.4080	0.0188	0.0652

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0024	0.0001	0.0002	0.0082	0.0020	1.4080	0.0188	0.0652

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
ATV	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0012	0.0003	0.0125	0.8554	0.0856	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lbs/mile)		CO2	N2O	CH4
				PM10	PM2.5			
Heavy Equipment (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road				0.0029	0.0007			
Total Emissions	0.0012	0.0003	0.0125	0.0030	0.0008	3.6720	0.0031	0.0315

Equipment Type	Unit Emissions (lb/hour)							
	CO	ROG	NOx	PM10	PM2.5	CO2	N2O	CH4
Generator	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000
Total Emissions	0.2029	0.0748	0.9419	0.0662	0.0662	35.0275	0.0000	0.0000

Chainsaw	1	2	0.50	55	13.1870	7.2911	0.1172	0.0207	0.0207	35.6435	0.0381	0.4532
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Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
								PM10	PM2.5			
Chipper	1	83	0.73	0	1.7413	0.1659	1.3670	0.0728	0.0728	286.9439		0.0150

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (c)		CO2	N2O	CH4
								PM10	PM2.5			
Skid Steer Loader	1	65	0.37	3	3.2704	0.1640	2.1882	0.0810	0.0750	472.4321		0.1530

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (c)		CO2	N2O	CH4
								PM10	PM2.5			
Excavator	1	97	0.37	3	3.7818	0.5000	4.8087	0.3620	0.3330	529.7952		0.1540

Activity	Number Active	Fuel Rate gal/ac (g)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d) (e)		CO2	N2O	CH4
						PM10	PM2.5			
Drip Torch (70 % diesel/30 % gas)	1	0.13	123.8836	107.1878	469.8935	32.5139	32.5139	20786.6246	0.0000	0.0000

Activity	Number Active	Fuel Rate gal/ac (h)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d)		CO2	N2O	CH4
						PM10	PM2.5			
Propane Torch	1	31	7.5000	1.0000	13.0000	0.7000	0.7000	12500.0000	0.9000	0.2000

Notes: (a) Emission factors of vehicle exhaust emissions were calculated based on emission data derived from EMFAC2014 Web Data Tool.
(b) Emission factors of vehicle fugitive dust emissions from unpaved roads were derived based on EPA AP-42.
(c) Emission factors and load factors of equipment obtained from Appendix D of CalEEMod User's Guide.
(d) Emission factors obtained from EPA AP-42.
(e) Fuel consumption obtained from CAL FIRE 2016
(f) Offroad
(g) Fuel consumption obtained from Stevens 1997
(h) Fuel consumption obtained from Wildung 2001
(i) Percent PM2.5 and PM10 assumed to be 100%
(j) Diesel services 2017

Chainsaw	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684
Total Emissions	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
				PM10	PM2.5			
Chipper	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003
Total Emissions	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
				PM10	PM2.5			
Skid Steer Loader	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211
Total Emissions	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
				PM10	PM2.5			
Excavator	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317
Total Emissions	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
				PM10	PM2.5			
Drip Torch	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000
Total Emissions	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
				PM10	PM2.5			
Propane Torch	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002
Total Emissions	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002

Chainsaw	0.60	0.0006	0.0003	0.0000	0.0000	0.0000	0.0016	0.0000	0.0000
Total Emissions		0.0006	0.0003	0.0000	0.0000	0.0000	0.0016	0.0000	0.0000

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
					PM10	PM2.5			
Chipper	0.60	0.0000	0.0000	0.0000	0.0000	0.0000	0.0014	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0014	0.0000	0.0000

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
					PM10	PM2.5			
Skid Steer Loader		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
					PM10	PM2.5			
Excavator		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
					PM10	PM2.5			
Drip Torch		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
					PM10	PM2.5			
Propane Torch	18.52	0.0001	0.0000	0.0001	0.0000	0.0000	0.1157	0.0000	0.0000
Total Emissions		0.0001	0.0000	0.0001	0.0000	0.0000	0.1157	0.0000	0.0000

	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
				PM10	PM2.5			
Total Emissions	0.0010	0.0003	0.0002	0.0184	0.0019	0.2499	0.0023	0.0044
	0.0010	0.0003	0.0002	0.0000	0.0000	0.2499	0.0023	0.0044
Exhaust				0.0007	0.0002			
Fugitive (Paved)				0.0177	0.0018			
Fugitive (Unpaved)								

BFFIP (2022) MA-27 Source Data										
<i>Vehicle Type</i>	<i>Number Per Day</i>	<i>Trip Distance Miles per Vehicle</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factors (lb/mile) (a) (b)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
						<i>PM10</i>	<i>PM2.5</i>			
Light Duty Automobile (LDA, gasoline)	1	1	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road	1	1				0.0029	0.0007			

<i>Vehicle Type</i>	<i>Number Per Day</i>	<i>Trip Distance Miles per Vehicle</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factors (lb/mile) (a) (b)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
						<i>PM10</i>	<i>PM2.5</i>			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road	1	1				1.3547	0.1355			

<i>Vehicle Type</i>	<i>Number Per Day</i>	<i>Trip Distance Miles per Vehicle</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factors (lb/mile) (a) (b)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
						<i>PM10</i>	<i>PM2.5</i>			
Heavy Truck (LHD1, gasoline)	1	1	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road	1	1				0.0082	0.0020			

<i>Vehicle Type</i>	<i>Number Per Day</i>	<i>Trip Distance Miles per Vehicle</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factors (lb/mile) (a) (b)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
						<i>PM10</i>	<i>PM2.5</i>			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road	1	1				2.3183	0.2318			

<i>Vehicle Type</i>	<i>Number Per Day</i>	<i>Trip Distance Miles per Vehicle</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factors (lb/mile) (a) (b)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
						<i>PM10</i>	<i>PM2.5</i>			
Water Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road	1	1				0.0278	0.0068			

<i>Vehicle Type</i>	<i>Number Per Day</i>	<i>Trip Distance Miles per Vehicle</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factors (lb/mile) (a) (b)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
						<i>PM10</i>	<i>PM2.5</i>			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road	1	1				1.3547	0.1355			

<i>Vehicle Type</i>	<i>Number Per Day</i>	<i>Trip Distance Miles per Vehicle</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factors (lb/mile) (a) (b)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
						<i>PM10</i>	<i>PM2.5</i>			
Van/Medium Truck (LDT2, gasoline)	1	1	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road	1	1				0.0082	0.0020			

<i>Vehicle Type</i>	<i>Number Per Day</i>	<i>Trip Distance Miles per Vehicle</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factors (lb/mile) (a) (b)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
						<i>PM10</i>	<i>PM2.5</i>			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road	1	1				2.3183	0.2318			

<i>Vehicle Type</i>	<i>Number Per Day</i>	<i>Trip Distance Miles per Vehicle</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factors (lb/mile) (a) (b)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
						<i>PM10</i>	<i>PM2.5</i>			
Type III Fire Engine Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road	1	1				0.0278	0.0068			

<i>Vehicle Type</i>	<i>Number Per Day</i>	<i>Trip Distance Miles per Vehicle</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factors (lb/mile) (a) (b)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
						<i>PM10</i>	<i>PM2.5</i>			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road	1	1				2.3183	0.2318			

<i>Vehicle Type</i>	<i>Number Per Day</i>	<i>Trip Distance Miles per Vehicle</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factors (lb/mile) (a) (b)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
						<i>PM10</i>	<i>PM2.5</i>			
Type IV Fire Truck (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road	1	1				0.0278	0.0068			

<i>Vehicle Type</i>	<i>Number Active</i>	<i>Trip Distance Miles per Vehi. Hour/Acre</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factor (lb/mile) (f)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
						<i>PM10</i>	<i>PM2.5</i>			
ATV	1	1.00	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road						0.8554	0.0855			

<i>Vehicle Type</i>	<i>Number Per Day</i>	<i>Trip Distance Miles per Vehicle</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factors (lb/mile) (a) (b)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
						<i>PM10</i>	<i>PM2.5</i>			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Unpaved Road	1	1				0.8554	0.0855			

<i>Vehicle Type</i>	<i>Number Per Day</i>	<i>Trip Distance Miles per Vehicle</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factors (lb/mile) (a) (b)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
						<i>PM10</i>	<i>PM2.5</i>			
Heavy Equipment (T6, diesel)	1	1	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Heavy Equipment on Paved Road	1	1				0.0029	0.0007			

<i>Equipment Type</i>	<i>Number Active</i>	<i>Fuel rate gal/hr (g)</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factor (lb*10⁻³ gal) (d)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
						<i>PM10</i>	<i>PM2.5</i>			
Generator	1	2	126.8146	46.7212	588.6865	41.3816	41.3816	21892.1960	0.0000	0.0000

<i>Equipment Type</i>	<i>Number Active</i>	<i>Rated HP</i>	<i>Load Factor (c)</i>	<i>Hour/Acre</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Emission Factor (g/hp-hr) (f)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
								<i>PM10</i>	<i>PM2.5</i>			

<i>Vehicle Type</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Unit Emissions (lbs/mile)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
				<i>PM10</i>	<i>PM2.5</i>			
Light Duty Automobile (LDA, gasoline)	0.0013	0.0000	0.0001	0.0000	0.0000	0.4996	0.0090	0.0155
Light Duty Auto on Paved Road				0.0029	0.0007			
Total Emissions	0.0013	0.0000	0.0001	0.0029	0.0007	0.4996	0.0090	0.0155

<i>Vehicle Type</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Unit Emissions (lbs/mile)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
				<i>PM10</i>	<i>PM2.5</i>			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0046	0.0003	0.0010	1.3547	0.1355	2.0778	0.0845	0.2237

<i>Vehicle Type</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Unit Emissions (lbs/mile)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
				<i>PM10</i>	<i>PM2.5</i>			
Heavy Truck (LHD1, gasoline)	0.0046	0.0003	0.0010	0.0000	0.0000	2.0778	0.0845	0.2237
Heavy Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0046	0.0003	0.0010	0.0082	0.0020	2.0778	0.0845	0.2237

<i>Vehicle Type</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Unit Emissions (lbs/mile)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
				<i>PM10</i>	<i>PM2.5</i>			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

<i>Vehicle Type</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Unit Emissions (lbs/mile)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
				<i>PM10</i>	<i>PM2.5</i>			
Water Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Water Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

<i>Vehicle Type</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Unit Emissions (lbs/mile)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
				<i>PM10</i>	<i>PM2.5</i>			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Unpaved Road				1.3547	0.1355			
Total Emissions	0.0024	0.0001	0.0002	1.3547	0.1355	1.4080	0.0188	0.0652

<i>Vehicle Type</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Unit Emissions (lbs/mile)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
				<i>PM10</i>	<i>PM2.5</i>			
Van/Medium Truck (LDT2, gasoline)	0.0024	0.0001	0.0002	0.0000	0.0000	1.4080	0.0188	0.0652
Van/Medium Truck on Paved Road				0.0082	0.0020			
Total Emissions	0.0024	0.0001	0.0002	0.0082	0.0020	1.4080	0.0188	0.0652

<i>Vehicle Type</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Unit Emissions (lbs/mile)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
				<i>PM10</i>	<i>PM2.5</i>			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

<i>Vehicle Type</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Unit Emissions (lbs/mile)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
				<i>PM10</i>	<i>PM2.5</i>			
Type III Fire Engine Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type III Fire Engine on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

<i>Vehicle Type</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Unit Emissions (lbs/mile)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
				<i>PM10</i>	<i>PM2.5</i>			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Unpaved Road				2.3183	0.2318			
Total Emissions	0.0012	0.0003	0.0125	2.3183	0.2319	3.6720	0.0031	0.0315

<i>Vehicle Type</i>	<i>CO</i>	<i>ROG</i>	<i>NOx</i>	<i>Unit Emissions (lbs/mile)</i>		<i>CO2</i>	<i>N2O</i>	<i>CH4</i>
				<i>PM10</i>	<i>PM2.5</i>			
Type IV Fire Truck (T6, diesel)	0.0012	0.0003	0.0125	0.0001	0.0001	3.6720	0.0031	0.0315
Type IV Fire Truck on Paved Road				0.0278	0.0068			
Total Emissions	0.0012	0.0003	0.0125	0.0278	0.0069	3.6720	0.0031	0.0315

Vehicle Type	CO	ROG	NOx	Unit Emissions (lb/mile)		CO2	N2O	CH4
				PM10	PM2.5			
ATV	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002
ATV on Unpaved Road				0.8554	0.0855			
Total Emissions	0.0687	0.0030	0.0017	0.0001	0.0001	0.2533	0.0008	0.0002

Chainsaw	1	2	0.50	55	13.1870	7.2911	0.1172	0.0207	0.0207	35.6435	0.0391	0.4532
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Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (f)		CO2	N2O	CH4
Chipper	1	83	0.73	0	1.7413	0.1659	1.3670	0.0728	0.0728	286.9439		0.0150

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (c)		CO2	N2O	CH4
Skid Steer Loader	1	65	0.37	3	3.2704	0.1640	2.1882	0.0810	0.0750	472.4321		0.1530

Equipment Type	Number Active	Rated HP	Load Factor (c)	Hour/Acre	CO	ROG	NOx	Emission Factor (g/hp-hr) (c)		CO2	N2O	CH4
Excavator	1	97	0.37	3	3.7818	0.5000	4.8087	0.3620	0.3330	529.7952		0.1540

Activity	Number Active	Fuel Rate gal/ac (g)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d) (e)		CO2	N2O	CH4
Drip Torch (70 % diesel/30 % gas)	1	0.13	123.8836	107.1878	468.8935	32.5139	32.5139	20786.6246	0.0000	0.0000

Activity	Number Active	Fuel Rate gal/ac (h)	CO	ROG	NOx	Emission Factor (lb/10 ³ gal) (d)		CO2	N2O	CH4
Propane Torch	1	31	7.5000	1.0000	13.0000	0.7000	0.7000	12500.0000	0.9000	0.2000

Notes: (a) Emission factors of vehicle exhaust emissions were calculated based on emission data derived from EMFAC2014 Web Data Tool.
(b) Emission factors of vehicle fugitive dust emissions from unpaved roads were derived based on EPA AP-42.
(c) Emission factors and load factors of equipment obtained from Appendix D of CalEEMod User's Guide.
(d) Emission factors obtained from EPA AP-42.
(e) Fuel consumption obtained from CAL FIRE 2016
(f) Offroad
(g) Fuel consumption obtained from Stevens 1997
(h) Fuel consumption obtained from Wildung 2001
(i) Percent PM2.5 and PM10 assumed to be 100%
(j) Diesel services 2017

Chainsaw	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684
Total Emissions	1.9907	1.1007	0.0177	0.0031	0.0031	5.3807	0.0059	0.0684

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
Chipper	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003
Total Emissions	0.0291	0.0028	0.0228	0.0012	0.0012	4.7911	0.0000	0.0003

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
Skid Steer Loader	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211
Total Emissions	0.4508	0.0226	0.3018	0.0112	0.0103	65.1261	0.0000	0.0211

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/acre)		CO2	N2O	CH4
Excavator	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317
Total Emissions	0.7780	0.1029	0.9892	0.0745	0.0685	108.9888	0.0000	0.0317

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
Drip Torch	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000
Total Emissions	0.1239	0.1072	0.4699	0.0325	0.0325	20.7866	0.0000	0.0000

Equipment Type	CO	ROG	NOx	Unit Emissions (lb/gallon)		CO2	N2O	CH4
Propane Torch	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002
Total Emissions	0.0075	0.0010	0.0130	0.0007	0.0007	12.5000	0.0009	0.0002

Chainsaw	0.90	0.0009	0.0005	0.0000	0.0000	0.0000	0.0024	0.0000	0.0000
Total Emissions		0.0009	0.0005	0.0000	0.0000	0.0000	0.0024	0.0000	0.0000

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Chipper	0.90	0.0000	0.0000	0.0000	0.0000	0.0000	0.0022	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0022	0.0000	0.0000

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Skid Steer Loader	4.20	0.0009	0.0000	0.0006	0.0000	0.0000	0.1368	0.0000	0.0000
Total Emissions		0.0009	0.0000	0.0006	0.0000	0.0000	0.1368	0.0000	0.0000

Equipment Type	Unit acres/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Excavator		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Drip Torch		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Emissions		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Equipment Type	Unit gal/year	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
Propane Torch	27.78	0.0001	0.0000	0.0002	0.0000	0.0000	0.1736	0.0000	0.0000
Total Emissions		0.0001	0.0000	0.0002	0.0000	0.0000	0.1736	0.0000	0.0000

	CO	ROG	NOx	Emissions (tons/year)		CO2	N2O	CH4
	PM10	PM2.5						
Total Emissions	0.0103	0.0036	0.0386	0.0167	0.0041	1.8014	0.0015	0.0034
Exhaust	0.0103	0.0036	0.0386	0.0027	0.0027	1.8014	0.0015	0.0034
Fugitive (Paved)				0.0003	0.0001			
Fugitive (Unpaved)				0.0137	0.0014			

APPENDIX E

Air Quality and Greenhouse Gases Supporting Information

Blocks and Emissions Calculations

Air Quality Calculations

Prescribed Burn Calculations

Baseline Conditions (2017)

activity	block	2017 unit	Assumptions
<u>Fuelbreak Maintenance</u>			
van on unpaved road	F	391.02 miles	roundtrip, percent paved/unpaved on District lands, average distance
van on paved road	G	96.27 miles	roundtrip, percent paved/unpaved on District lands, average distance (Fuelbreak maintenance + Broom Removal + Dam Maintenance) * (30% of work is
chainsaw	P	123.00 acres	brushcutter/chainsaw)
chipper	Q	123.00 acres	chip the material cut down Roadside Mowing + Fuelbreak Mowing + (Fuelbreak maintenance + Broom Removal + Dam
skid steer	R	307.00 acres	Maintenance) * (70% of work is mower)
heavy equipment on unpaved road	M	266.36 miles	roundtrip, percent paved/unpaved on District lands, average distance, 70% is mower
heavy equipment on paved road	N	65.58 miles	roundtrip, percent paved/unpaved on District lands, average distance, 70% is mower
<u>EDRR</u>			
van on unpaved road	F	120.37 miles	round trip 150 miles, percent paved/unpaved on District lands
van on paved road	G	29.63 miles	round trip 150 miles, percent paved/unpaved on District lands (Patch is assumed to be "small scale", approximately 100 sq m, 25 patches a year) * (50% work
chainsaw	P	0.31 acres	assumed to be by cutting)
chipper	Q	0.31 acres	chip the material cut down (Patch is assumed to be "small scale", approximately 100 sq m, 25 patches a year) * (50% work
propane torch	V	19.06 gallon	assumed to be by flaming)
<u>Forest Stand Improvement</u>			
heavy equipment on unpaved road	M	34.60 miles	roundtrip, percent paved/unpaved on District lands, average distance, 70% mower
heavy equipment on paved road	N	8.52 miles	roundtrip, percent paved/unpaved on District lands, average distance, 70% mower
skid steer	R	5.60 acres	(70% of work is mower)
chainsaw	P	2.40 acres	(30% of work is brushcutter/chainsaw)
chipper	Q	2.40 acres	8 hrs a day, 1 day per acre, for forestry work (chip the cut down material)
excavator	T	2.40 acres	(30% of work is excavator)
crew truck travel on unpaved road	F	49.43 miles	roundtrip, percent paved/unpaved on District lands, average distance
crew truck travel on paved road	G	12.17 miles	roundtrip, percent paved/unpaved on District lands, average distance
<u>Grassland and Oak Woodland</u>			
medium truck travel unpaved	F	655.95 miles	round trip/ broom
medium truck travel paved	G	161.50 miles	round trip/ broom
van on unpaved road	F	733.90 miles	round trip/ broom + star thistle + goat grass
van on paved road	G	180.69 miles	round trip/ broom + star thistle + goat grass (Broom removal + broom maintenance + goat grass removal + star thistle removal + other
chainsaw	P	112.50 acres	removal) * (30% of work is brushcutter/chainsaw)

skid steer	R	272.50 acres	Douglas fir removal * (50%) + (Broom removal + broom maintenance + goat grass removal + star thistle removal + other removal) * (70% of work is mower)
excavator	T	10.00 acres	Douglas-Fir Thinning * (50% heavy equipment)
heavy equipment on unpaved road	M	12.56 miles	round trip/ goat grass
heavy equipment on paved road	N	3.09 miles	round trip/ goat grass
<u>Reintroduce Species</u>			50% work by hand
medium truck travel unpaved	F	2.18 miles	round trip
medium truck travel paved	G	0.54 miles	round trip
van travel unpaved	F	2.18 miles	round trip
van travel paved	G	0.54 miles	round trip
chainsaw	P	0.15 acres	(1 project, 0.6 acre) * (25% work assumed to be by cutting)
chipper	Q	0.15 acres	chip the material cut down
propane torch	V	4.63 gallon	(1 project, 0.6 acre) * (25% work assumed to be by flaming)
<u>Worker Trips</u>			
light truck/car paved	A	119161.60 miles	Same numbers as BFFIP workers, ABAG MTC 2017 mile assumptions, roundtrip
<u>Pile Burns</u>			71 acres of pile burn Baseline
drip torch	W	9.34 gallon	
Type III engine on unpaved road	H	28.29 miles	roundtrip
Type III engine on paved road	I	6.96 miles	roundtrip
ATV	L	150 miles	10 miles/hour
Total Miles		122173.92 miles	
Total Acres		961.72 acres	

All Activities MA-20 through MA-27

activity	block	Year 5 Quantity	unit	Assumptions
ATV	L		150 miles	10 miles/hour
Heavy Truck (log or vegetation)	C		29.2 miles	7.3 miles to Marin Recycling Facility, less than 5 trips a year

Pile Burns

			124 acres	pile burn
Type III engine on unpaved road	H		28.29 miles	roundtrip
Type III engine on paved road	I		6.96 miles	roundtrip
drip torch	W		16.32 gallons	

Total Miles

214.45 miles

Total Acres

0 acres

MA-20: Perform Cyclical Maintenance Throughout the Permanent Fuelbreak System with Sufficient Frequency to Maintain Design Standards

activity	block	Year 5 Quantity	unit	Assumptions
<u>Mowing and Cutting</u>				
van on unpaved road	F	801.83	mile	roundtrip, percent paved/unpaved on District lands, average distance
van on paved road	G	197.42	mile	roundtrip, percent paved/unpaved on District lands, average distance (Fuelbreak maintenance + Broom Removal + Dam Maintenance) * (30% of work is brushcutter/chainsaw)
chainsaw	P	153	acres	chip the material cut down
chipper	Q	153	acres	Roadside Mowing + Fuelbreak Mowing + (Fuelbreak maintenance + Broom Removal + Dam Maintenance) * (70% of work is mower)
skid steer	R	417	acres	roundtrip, percent paved/unpaved on District lands, average distance, 70% heavy equipment
heavy equipment on unpaved road	M	561.28	miles	roundtrip, percent paved/unpaved on District lands, average distance, 70% heavy equipment
heavy equipment on paved road	N	138.19	miles	
<u>Worker Trips</u>				
light truck/car paved	A	77470.92	miles	15 workers, ABAG MTC 2017 mile assumptions, roundtrip
Total Miles		79169.64	miles	
Total Acres		723	acres	

MA-21: Construct the Remainder of the Fuelbreak System

activity	block	Year 5 Quantity	unit	Assumptions
<u>Mowing and Cutting</u>	Fuelbreak widening would be performed as crews are in the area performing cyclical maintenance in the existing (Fuelbreak construction - prescribed burn area) * (30% of work is			
chainsaw	P	3.78 acres		brushcutter/chainsaw)
chipper	Q	3.78 acres		chip the material cut down
skid steer	R	8.82 acres		(Fuelbreak construction - prescribed burn area) * (70% of work is mower)

Worker Trips

light truck/car paved	A	2706.25 miles	15 workers, ABAG MTC 2017 mile assumptions, roundtrip
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Total Miles	2706.25 miles
Total Acres	16.38 acres

MA-22: Expand the EDRR Plan to Identify, Report and Treat New Invasions of Invasive Species

activity	block	Year 5 Quantity	unit	Assumption
van on unpaved road	F	208.63	mile	260 miles, roundtrip, percent paved/unpaved on District lands, average distance
van on paved road	G	51.37	mile	260 miles, roundtrip, percent paved/unpaved on District lands, average distance
chainsaw	P	1.24	acres	(Patch is assumed to be "small scale", approximately 100 sq m, 100 patches a year) * (50% work assumed to be by cutting)
chipper	Q	1.24	acres	chip the material cut down
propane torch	V	38.12	gallon	(Patch is assumed to be "small scale", approximately 100 sq m, 100 patches a year) * (50% work assumed to be by flaming)
<u>Worker Trips</u>				
light truck/car paved	A	7757.92	miles	3 workers, ABAG MTC 2017 mile assumptions, roundtrip
Total Miles		8017.92 miles		
Total Acres		2.47 acres		

MA-23: Improve Forest Stand Structure in the Ecosystem Restoration Zone

activity	block	Year 5 Quantity	unit	Assumptions
heavy equipment on unpaved road	M		870.07 miles	roundtrip, percent paved/unpaved on District lands, average distance, 70% mower
heavy equipment on paved road	N		214.22 miles	roundtrip, percent paved/unpaved on District lands, average distance, 70% mower
skid steer	R		112 acres	Initial and maintenance (70% of work is mower)
chainsaw	P		48 acres	Initial and maintenance (30% of work is brushcutter/chainsaw)
chipper	Q		48 acres	8 hrs a day, 1 day per acre, for initial fuels and brush removal and maintenance (chip the cut down material)
crew truck travel on unpaved road	F		1242.95 miles	roundtrip, percent paved/unpaved on District lands, average distance
crew truck travel on paved road	G		306.02 miles	roundtrip, percent paved/unpaved on District lands, average distance
excavator	T		48 acres	Initial and maintenance (30% of work is excavator)
<u>Prescribed Broadcast Burn</u>			40 acres	100 acres within 5 years
Type IV engine on unpaved road	J		36.21 miles	roundtrip
Type IV engine on paved road	K		8.91 miles	roundtrip
Type III engine on unpaved road	H		36.21 miles	roundtrip
Type III engine on paved road	I		8.91 miles	roundtrip
water truck on unpaved road	D		36.21 miles	roundtrip
water truck on paved road	E		8.91 miles	roundtrip
van on unpaved road	F		36.21 mile	roundtrip
van on paved road	G		8.91 mile	roundtrip
drip torch	U		5.26 gallons	Broadcast
<u>Worker Trips</u>				
light truck/car paved	A		126869.00 miles	15 workers, ABAG MTC 2017 mile assumptions, roundtrip
Total Miles			129682.74 miles	
Total Acres			256 acres	

MA-24: Improve Grassland and Oak Woodland in the Ecosystem Restoration Zone

activity	block	Year 5 Quantity	unit	Assumptions
medium truck travel unpaved	F	2270.02	miles	round trip/ broom
medium truck travel paved	G	558.89	miles	round trip/ broom
van on unpaved road	F	2576.04	miles	round trip/ broom + star thistle + goat grass + douglas fir removal
van on paved road	G	634.24	miles	round trip/ broom + star thistle + goat grass + douglas fir removal (Douglas fir removal * 50%) + (Broom removal + broom maintenance + goat grass removal + star thistle removal + other removal) * (30% of work is brushcutter/chainsaw)
chainsaw	P	223	acres	(Broom removal + broom maintenance + goat grass removal + star thistle removal + other removal) * (70% of work is mower)
skid steer	R	287	acres	Douglas-Fir Thinning * (50% heavy equipment)
excavator	T	100.00	acres	
heavy equipment on unpaved road	M	10.69	miles	round trip/ goat grass, 70% mower
heavy equipment on paved road	N	2.63	miles	round trip/ goat grass, 70% mower

Prescribed Broadcast Burn

		113	acres	450 acres by end of 5 years, 12 projects throughout, 3 projects in year 5
Type IV engine on unpaved road	J	18.10	miles	roundtrip, percent paved/unpaved on District lands, average distance
Type IV engine on paved road	K	4.46	miles	roundtrip, percent paved/unpaved on District lands, average distance
Type III engine on unpaved road	H	18.10	miles	roundtrip, percent paved/unpaved on District lands, average distance
Type III engine on paved road	I	4.46	miles	roundtrip, percent paved/unpaved on District lands, average distance
water truck on unpaved road	D	18.10	miles	roundtrip, percent paved/unpaved on District lands, average distance
water truck on paved road	E	4.46	miles	roundtrip, percent paved/unpaved on District lands, average distance
van on unpaved road	F	18.10	mile	roundtrip, percent paved/unpaved on District lands, average distance
van on paved road	G	4.46	mile	roundtrip, percent paved/unpaved on District lands, average distance
drip torch	U	14.80	gallons	Broadcast

Worker Trips

light truck/car paved	A	257490.67	miles	15 workers, ABAG MTC 2017 mile assumptions, roundtrip
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Total Miles

263633.41 miles

Total Acres

610.00 acres

MA-25: Re-Introduce Historic Populations of Special-Status Species

activity	block	Year 5 Quantity	unit	Assumptions (50% work by hand)
medium truck travel unpaved	F		13.08 miles	roundtrip, percent paved/unpaved on District lands, average distance
medium truck travel paved	G		3.22 miles	roundtrip, percent paved/unpaved on District lands, average distance
van travel unpaved	F		13.08 miles	roundtrip, percent paved/unpaved on District lands, average distance
van travel paved	G		3.22 miles	roundtrip, percent paved/unpaved on District lands, average distance
chainsaw	P		0.6 acres	(7 projects, 12 acres/2.4 acres a year) * (25% work assumed to be by cutting) 8 hrs a day, 1 day per acre, for habitat modification (chip the cut down material) * (chip cut material)
chipper	Q		0.6 acres	
propane torch	V		18.52 gallon	(7 projects, 12 acres/2.4 acres a year) * (25% work assumed to be by flaming)
<u>Worker Trips</u>				
light truck/car paved	A		433.00 miles	5 workers, ABAG MTC 2017 mile assumptions, roundtrip
Total Miles			465.61 miles	
Total Acres			1.2 acres	

MA-26: Develop and Implement 10-year Restoration Plans for Potrero Meadow, Sky Oaks Meadow, and Nicasio Island

activity	block	Year 5 Quantity	unit	Assumptions
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No specific activities identified.

MA-27: Conduct Experiments and Trials to Identify Suitable Methods for Control of Invasive Species

activity	block	Year 5 Quantity	unit	Assumptions
heavy truck on unpaved road	B	8.29	miles	Transport of animals
heavy truck on paved road	C	2.04	miles	Transport of animals
medium truck travel unpaved	F	8.29	miles	roundtrip, percent paved/unpaved on District lands, average distance
medium truck travel paved	G	2.04	miles	roundtrip, percent paved/unpaved on District lands, average distance
heavy equipment on unpaved road	M	5.81	miles	roundtrip, percent paved/unpaved on District lands, average distance, 70% mower
heavy equipment on paved road	N	1.43	miles	roundtrip, percent paved/unpaved on District lands, average distance, 70% mower
generator	O	80.00	hours	BAAQMD low-use engine assumption, electric fence/shepherd
skid steer	R	4.20	acres	(3 projects, 30 acres/6 acres) * (70% work assumed to be by mowing)
chainsaw	P	0.9	acres	(3 projects, 30 acres/6 acres) * (15% work assumed to be by cutting)
chipper	Q	0.9	acres	chip the cut down material
propane torch	V	27.78	gallon	(3 projects, 30 acres/6 acres) * (15% work assumed to be by flaming)

Worker Trips

light truck/car paved	A	216.50 miles	5 workers, ABAG MTC 2017 mile assumptions, roundtrip
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Total Miles

244.40 miles

Total Acres

6.00 acres

Mount Tamalpias Watershed			
SURFACE	FREQUENCY	LENGTH (feet)	LENGTH (miles)
Gravel	38	42466.3	8.0
Native	355	389447.9	73.8
Paved	123	106340.2	20.1

SURFACE	Ratio
Paved	0.20
Unpaved	0.80

County of Origin	Average Commute Distance
Sonoma	29.80
Alameda	26.60
Marin	30.20
Average	28.87

Source: ABAG MTC 2017

Project	Distance Closest (feet)	Distance Closest (miles)	Distance Furthest (feet)	Distance Furthest (miles)	Average Distance (miles)
Fuelbreak Maintenance/ Mowing	0	0	58997.75	11.17	5.585
New Fuelbreak Construction *					
Weed Removal	0	0	51625.08	9.78	4.89
WAFRZ Vegetation Removal/ Restoration	601.47	0.11	56821.66	10.76	5.435
Tree Removal	4713.08	0.89	58997.75	11.17	6.03
Prescribed Burning	601.47	0.11	58997.75	11.17	5.64
Invasive Species					
Sky Oaks Meadow					0.31
Potrero Meadow					4.36
Nicasio Island					16
Average MA-27					6.89

* Uses fuelbreak maintenance value instead

	Activity	Workers for each Activity	Person Hours per Unit	Unit	Total Maximum Units Per Year	Total Maximum Hours Per Year	Average Days Per Year (assumes 8 hour days)
MA -20	Retreat fuels in existing fuelbreaks	15	28	Acre	200	5,600	46.7
	Cyclical mowing of fine fuels	5	12	Acre	50	600	15.0
	Cyclical removal of broom in Optimized and Transitional Zones	15	12	Acre	260	3,120	26.0
	Roadside mowing	3	27	Acre	50	1,350	56.3
	Dam maintenance	5	28	Acre	50	1,400	35.0
MA -21	New fuelbreak construction	15	190	Acre	15	2,850	23.8
MA -22	Annual surveys	3	1	Mile	150	150	6.3
	Weed control treatments	3	20	Patch	100	2,000	83.3
MA -23	Reduce accumulated fuels and brush	15	170	Acre	60	10,200	85.0
	Maintenance of fuels and brush	5	80	Acre	100	8,000	200.0
MA -24	Prescribed burning	5	160	Project	2	320	8.0
	Douglas Fir thinning	15	16	Acre	200	3,200	26.7
	Prescribed burning	15	160	Project	3	480	4.0
	*Broom: Initial removal	15	200	Acre	300	60,000	500.0
	Broom: Long-term maintenance	15	12	Acre	205	2,460	20.5
	Yellow Star thistle	15	40	Acre	120	4,800	40.0
	Goat grass	15	12	Acre	35	420	3.5
	Planting	5	20	Project	3	60	1.5
MA-25	Habitat modification	5	20	Project	3	60	1.5
MA-27	Implementation	5	200	Project	3	600	15.0
Baseline (Assumes same number of workers and units worked as BFFIP)							
MA -20	Retreat fuels in existing fuelbreaks	15	28	Acre	150	4200	35.00
	Cyclical mowing of fine fuels	5	12	Acre	10	120	3.00
	Cyclical removal of broom in Optimized and Transitional Zones	15	12	Acre	240	2880	24.00
	Roadside mowing	3	27	Acre	10	270	11.25
	Dam maintenance	5	28	Acre	20	560	14.00
MA -21	New fuelbreak construction	15	190	Acre	0	0	0.00
MA -22	Annual surveys	3	1	Mile	150	150	6.25
	Weed control treatments	3	20	Patch	25	500	20.83
MA -23	Reduce accumulated fuels and brush	15	170	Acre	8	1360	11.33
	Maintenance of fuels and brush	5	80	Acre	0	0	0.00
	Prescribed burning	5	160	Project	0	0	0.00
MA -24	Douglas Fir thinning	15	16	Acre	20	320	2.67
	Prescribed burning	15	160	Project	0	0	0.00
	*Broom: Initial removal	15	200	Acre	88	17600	146.67
	Broom: Long-term maintenance	15	12	Acre	205	2460	20.50
	Yellow Star thistle	15	40	Acre	50	2000	16.67
MA-25	Goat grass	15	12	Acre	32	384	3.20
	Planting	5	20	Project	1	20	0.50
MA-27	Habitat modification	5	20	Project	0	0	0.00
	Implementation	5	200	Project	1	200	5.00

Total Hours
107,670

33,024

Total Worker Trip Miles for Baseline	119,161.60	miles
Total Worker Trip Miles for BFFIP	472,944.25	miles
Increase	2.968931686	
Total Equipment Miles for Baseline	3,012.32	miles
Total Equipment Miles for BFFIP	11,190.17	miles
Increase	2.714803147	
Total Miles for Baseline	122,173.92	miles
Total Miles for BFFIP	484,134.42	miles
Increase	2.962665895	
Total Area for Baseline	961.72	acres
Total Area for BFFIP	1,615.05	acres
Increase	0.679339307	

APPENDIX E

Air Quality and Greenhouse Gases Supporting Information

Blocks and Emissions Calculations

Air Quality Calculations

Prescribed Burn Calculations

EMISSIONS FROM PRESCRIBED BURNS

An analysis of smoke-related emissions was conducted for the proposed prescribed burns under BFFIP. This analysis addressed both broadcast prescribed burns as well as the burning of pre-piled vegetation, known as pile burning.

All wildland fires produce a suite of atmospheric pollutants (e.g. particulate matter, carbonaceous and nitrogenous species, and ozone precursors). Prescribed fires can be used to manipulate the quantity, timing and patterns of smoke emissions in order to prevent a larger wildfire that is likely to produce more smoke and under uncontrolled conditions. Unlike emissions from industry and transportation, wildland fire emissions are spatially and temporally episodic and they can impair visibility and have negative short- and long-term impacts on public health.

Wildfires and prescribed fires generate several pollutants that are regulated under the National Ambient Air Quality Standard (NAAQS). These are particulate matter (PM_{2.5}, PM₁₀), ozone, nitrogen dioxide and carbon monoxide. Health risks from smoke include increased mortality and respiratory morbidities associated with fine particulate matter (less than 2.5 microns, known as PM_{2.5}). Public health regulations for smoke typically focus on a 24-hour average of PM_{2.5}. Values that exceed 35 $\mu\text{g}/\text{m}^3$ are considered unhealthy for sensitive groups, which include pregnant women, young children, elderly individuals, smokers, and people with chronic respiratory problems such as asthma.

In addition to the NAAQS regulated pollutants, haze is a concern for Class I areas that receive more stringent air quality protection, considering haze. Impaired visibility in Class I areas mainly results from regional haze – pollutants emitted from a broad geographic area and multiple sources, which makes remediation difficult. Another non-regulated emission concern is that emissions that may not affect NAAQS compliance still can impact local communities via impaired visibility or dangerous driving conditions caused by decreased visibility.

This analysis is limited to the emissions of regulated chemicals, however it offers mitigations that can assist in acceptance of smoke by the public, reducing public vulnerability from the hazards associated with smoke emissions.

BROADCAST PRESCRIBED BURNS

The analysis of smoke emissions from broadcast prescribed fire was conducted using the First Order Fire Effects Model (FOFME6). This USDA Forest Service program was developed to predict smoke production from wildland fires, along with effects to soils and tree mortality from fires.

The model determines the regulated emissions of PM_{2.5}, PM₁₀, CO, CO₂, NO_x as well as CNH₄ based on fuel volume of the vegetation burned and the moisture of the fuels when burned.

Fuel volumes were determined by categorizing the vegetation types (the AIS Vegetation type, consistent with the National Vegetation Classification System) into those for which fuel volumes were available in the FOFEM6 model. Not every vegetation type in the watershed had a direct correlated classification, so the vegetation with the most similar fuel volumes by size class was selected. This resulted in four different forest types, five shrub types and one grass-herb type.

FOFEM Veg Type	MMWD AIS Veg Type
SAF 232 Redwood	Redwood -Upland Mixed Hardwoods
SAF 201 Interior Douglas fir	Douglas-fir Alliance Douglas-fir -California Bay Mapping Unit
SRM 906 - Broadleaf Forest	Mixed Hardwoods in Drier Woodland Douglas-fir -Mixed Hardwoods in Upland Forest Settings California Bay -Coast Live Oak California Bay -Interior Oak California Bay Pure Stands Coast Live Oak - Madrone Lower elevation Mixed Broadleaf Woodland Coast Live Oak / (Grass-Poison Oak) Coast Live Oak Alliance Madrone -California Bay -Tanoak Forest Tanoak -California Bay -Canyon Oak Higher elevation Mixed Forest
Quercus Lobata Woodland	Coast Live Oak -Riparian Valley Oak Riparian Mapping Unit Oregon Oak Alliance
SRM 921 Willow	Mixed Willow Mapping Unit
SRM 401 - Basin Big Sagebrush (moderate shrub cover)	Coyote Brush / Annual or Perennial Grasslands (open stands) Coyote Brush -Mixed Shrub / Grass
Arctostaphylos glandulosa Shrubland	Mt. Tamalpais Manzanita - Chamise - (Garraya - Leather Oak -Jepson Ceanothus) -Serpentine Leather Oak -Chamise -Mt. Tamalpais Manzanita Serpentine Chaparral
SRM 206 - Chamise Chaparral	Chamise - Serpentine Chaparral
Amelanchier alnifolia Shrubland	(French) Broom Alliance
SRM 215 Valley Grassland (Annual grassland)	Native Temperate Perennial Grasslands Upland Serpentine Grassland Grasslands on well-developed soils Grasslands with a fern or sub-shrub (golden banner) component

The moisture of fuels plays greatly influences the amount of smoke produced, with more emissions being produced from wetter fuels (due to more incomplete combustion). Air quality impacts due to fire emissions are affected even more by environmental conditions than by the amount of fuel consumed (CAL FIRE 2013). The conditions of the analysis were conservative, assuming that the prescribed burns would occur under the highest moisture typically used. The inputs assumed a duff moisture of 40%, 10-hr fuel moisture of 10%, and a 1000-hr fuel of 15%.

FOFEM requires that the acres of each vegetation type be determined, since each vegetation type as a different set of emission factors. This requires a set of assumptions since the exact locations of treatments under BFFIP is not yet known.

All treatments are assumed to be a constant proportion of vegetation types throughout the life of BFFIP. Thus a treatment might be assumed to be comprised of 80% Mixed Hardwood and 20% Douglas fir; that proportion will be assumed for all treatments in that category, even though it is there will be some variation in the vegetation types when treatments are applied in different locations at different times.

With the exception of the possible burning in dam faces, the assumed acres of each vegetation type in each treatment was based on the proportion of vegetation types within the zone to be treated. This was determined by a GIS query of the acreage of the mapped vegetation types for each zone. Each mapped vegetation type was then translated (crosswalked, correlated) to a vegetation type within FOFEM.

The zones mapped in GIS in which broadcast burning might occur are for the purposes of fuelbreak management, and ecosystem restoration, and Infrastructure. No broadcast burning is expected to occur during the implementation of the BFFIP in the Ecosystem Preservation Zone, Ecosystem/Fuel Deferred Action, Reservoir, and Other Infrastructure (except for dam faces). Broadcast burning is expected to be part of Management Actions MA-23 and MA-24.

Ecosystem Restoration	
Ecosystem Restoration / Fuels Reduction (WAFRZ)	2,629
<u>Ecosystem Restoration</u>	<u>8,261</u>
Total Acres Ecosystem Restoration Zones	10,890

The justification for the proportion of vegetation types in the treatments, and resulting acres of each vegetation type, follows.

Vegetation Types to be Burned

Broadcast burning is expected to occur in two situations, under an assumed suite of vegetation types.

Forest Stand Structure Improvement, MA-23: Broadcast burning is to occur in Forest Restoration Zones in conifer and mixed hardwood forests in order to reduce accumulated fuels and understory brush density. The combined area of the Ecosystem Restoration

Zone and Ecosystem Restoration Zone / WAFRZ is largely comprised of conifer and mixed hardwood forests; only 9 percent of the area is covered by stands of shrub and grass, while 53 percent is covered with hardwood forests, 17 percent with redwood forests, and 21 percent categorized as Douglas fir forests. The analysis of emissions is based on that proportion of vegetation in the treatment areas.

Grass and Oak Woodland Improvement, MA-24: Page 2-34 of the ADEIR states, “The District would conduct broadcast prescribed burning in grasslands and oak woodlands within the Ecosystem Restoration Zone.” It further specifies that the target is to treat grasslands and open oak woodlands. Because the BFFIP does not include shrub or coniferous forests, those vegetation types are eliminated from the analysis, even though they comprised 43 percent of the combined Ecosystem Restoration Zone. Mixed hardwood forest comprises nearly all the remaining acreage in the area to be treated, only 4% of the combined Ecosystem Restoration Zones is comprised of annual grass. The proportion of the treatment area is assumed to be split between Hardwood Forests (93%) and Annual Grasses (7%).

Acreage to be Burned

This analysis uses the maximum acres to be broadcast burned in order to assess the maximum emissions likely under the BFFIP. The maximum acres per year by types of broadcast burning follows:

Forest Stand Improvement	40.0 acs	MA-23
Douglas fir thinning, for Grass and Oak Woodland Improvement	112.5 acs	MA-24
Total acres Assumed to be Treated in a Year	152.5 acs	

Per information provided by the MMWD staff, the maximum acres of broadcast prescribed burning in any one day would be 150 acres. This is approximately the maximum size of broadcast burns in any one year. The average acreage included in a broadcast burn is 50 acres.

Forest Stand Structure Improvement - MA-23: MA-23 is aimed at treatment of SOD affected forests and forest understory. Table 2.3-2 itemized broadcast prescribed burning in the Ecosystem Restoration Zone as part of MA-23, Forest Stand Structure Improvement. The area to be treated is described in terms of Projects, rather than size. The BFFIP notes there will be a total of 5 projects throughout the life of the plan, with 0 projects in Year 1, 1 project in Years 2, 3, and 4, and 2 projects in Year 5. For the purposes of an analysis of emissions, we assume the maximum number of projects as 2. The target is to complete 100 acres of prescribed broadcast burning in 5 years. If one assumes a broadcast burn every year, the acreage to be used for analysis would be 20 acres. The 40-acre size of the burn was used for analysis.

Grass and Oak Woodland Improvement, MA-24: Under MA-24, Douglas fir thinning and removal of specified invasive species would occur. The assumed area of broadcast burning for this purpose in any one year is 112.5 acres. This is based on 450 acres

burned by end of 5 years. There are 12 projects identified throughout 5 years, with 3 projects occurring in Year 5.

RESULTS OF ANALYSIS OF BROADCAST BURNING EMISSIONS

Emissions varied greatly between the type of vegetation to be burned. Vegetation types with a deep duff layer generally produced more emissions of all types. Redwood forests produced the most, with more than twice as much as Douglas fir forests. In contrast, grass and shrubby vegetation types with little building up of fuels do not produce large quantities of emissions. The table below indicates the relative contribution to emissions. In almost every case forests produced the most emissions, and grass the least.

In forest types, approximately 90 percent of emissions are produced during the smoldering phase of combustion, for all types of monitored emissions with the exception for NOX. In shrub types a majority of emissions occur during smoldering for PM10, PM 2.5 and CH4 and CO2, but it comprises less than 20% of emissions of NOX, CO and SO2. Because almost all fuels are consumed in the flaming front of grassfires, smoldering contributed nearly nothing to emissions.

In every treatment, the volume CO2 were the highest of all types of emissions. This is true for all types of prescribed burning, whether it is from pile burning or broadcast burning, and regardless of vegetation types involved.

Total emissions were the highest for Redwood Forests, and the lowest for Annual Grass. The greatest amount of all emissions is produced during the smoldering stage, with the exception of grass, which does not tend to smolder.

The projects, as proposed, produce approximately 62 tons of PM10 particulates, 52 tons of PM2.5 particulates, 31 tons of methane, 682 tons of carbon monoxide, 3,716 tons of carbon monoxide, 1 tons of nitrous oxides, and 3 tons of sulfur dioxide.

Management Action	Emissions by pollutant (tons)						
	PM ₁₀	PM _{2.5}	CH ₄	CO	CO ₂	NO _x	SO ₂
Forest Stand Structure Improvement - MA-23 (40 acs)	22.6	19.1	11.5	249.3	1,359.0	0.6	1.0
Grass and Oak Woodland Improvement, MA-24 (112.5 acs)	39.2	33.2	19.9	433.1	2,357.0	1.1	1.7
TOTAL	61.8	52.3	31.4	682.4	3,716.0	1.9	2.7

Forest Stand Structure Improvement - MA-23: As with other treatments emissions were insignificant. While this treatment comprises only 40 acres, or less than a third of the total area to be treated, its emissions were proportionately more of the total, and in each type of emission due to the burning of forests with large volumes of duff, which does not burn efficiently and thus produces emissions at a higher rate.

Grass and Oak Woodland Improvement, MA-24: Because this treatment involves the largest area, broadcast burning results in the greatest amount of emissions. However, it

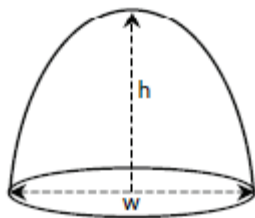
has a disproportionately low level of emissions, due to the absence of redwood forests in the treatment area.

PREDICTED EMISSIONS FROM PILE BURNING

Predicted emissions from piles of dry vegetation were calculated using “Consume” software, an industry standard for estimating the amounts of particulates, carbon dioxide, carbon monoxide, methane, and non-methane hydrocarbons (NMHC). In comparison to predicted emissions using FOFEM, Consume does not include NO_x or SO_x as outputs, but includes the non-methane hydrocarbons. Non-methane hydrocarbons are key to producing ozone (O₃) in atmosphere which can significantly affect the atmospheric photochemical chemistry and human health. Emissions from both a baseline condition and a maximum amount of biomass to be burned with piles under BFFIP were assessed

Baseline Conditions

In 2015-2016 Fiscal Year, the District was permitted to burn 434 piles in 100 acres for a total of 57 projected tons. 384 piles were categorized as conifer, and were comprised of and were comprised of cut, dried and piled forest slash and debris from Douglas fir, redwood, oak and tanoak or Douglas fir saplings. The remaining 50 piles were comprised of chaparral, and were categorized as shrub/hardwood piles for the purposes of predicting emissions. However, District records indicate that only 70 acres of pile burning was accomplished due to an excessively rainy winter. The analysis assumed 70 percent of the piles were burned assuming that all piles were uniform in dimensions and volume. The dimensions of all piles were permitted to be 4 feet high and 8 feet wide, shaped in a parabola.



Parabolic shape of piles

The analysis of emissions for the 304 piles actually burned is as follows. The composition of the 304 piles burned is assumed to maintain the same ratio of vegetation types as the permitted quantity. The resulting biomass burned was 76 tons, of the 85 tons piled (assuming a 90% consumption ratio).

The burned biomass emitted 0.6 tons of PM₁₀ and 0.5 tons of PM_{2.5}. Emissions of carbon monoxide is expected to total 2.8 tons, and carbon dioxide 126.5 tons. Emissions of methane are expected to be 0.2 tons and those of non-methane hydrocarbons are expected to be 0.01 tons.

Pile Group Name	Volume (cubic ft)	Pile Biomass (tons)	Consumed Fuel (tons)	Emissions by pollutant (tons)					
				PM ₁₀	PM _{2.5}	CO	CO ₂	CH ₄	NMHC
Conifer	26,218.66	56.12	50.51	0.39	0.34	1.92	84.03	0.14	0.11

piles									
Shrub/hdwd	3,411.35	3.06	2.75	0.02	0.02	0.10	4.58	0.01	0.01
TOTAL	29,630.01	59.18	53.26	0.41	0.36	2.02	88.61	0.15	0.12

Emissions under BFFIP

In 2016-2017 Fiscal Year, the District is permitted to burn 975 piles in 124 acres for a total of 117 projected tons; this level is expected to be the maximum that would be burned in any year of the plan horizon. The number of piles, the volume of each pile, and vegetation mix are all expected to be maintained in similar ratios/quantities throughout implementation of BFFIP. The piles were calculated as two types of vegetation: conifer, and shrub/hardwood. There are 895 piles categorized as conifer, comprised of cut, dried and piled forest slash and debris from Douglas fir, redwood, oak and tanoak, or Douglas fir saplings. There are 80 piles categorized as shrub/hardwood piles, consisting of chamise, ceanothus, tanoak, huckleberry, manzanita, and French broom. All piles are permitted to be a parabolic shape measured as 4 feet high and 5.5 feet in diameter.

Using this information, Consume calculated that the gross volume of the 975 piles with mostly coniferous fuels had 46,329 cubic feet, with a resulting total biomass of 117 tons, and 108 tons burned, assuming a 90% consumption rate. When burned, these piles produced 0.84 tons made of PM10 and 0.73 tons made of PM2.5 matter. These piles produced 4.13 tons of carbon monoxide, and 180.93 tons of carbon dioxide, 0.31 tons of methane, and 0.25 tons of non-methane hydrocarbons.

Pile Group Name	Volume (cubic ft)	Pile Biomass (tons)	Consumed Fuel (tons)	Emissions by pollutant (tons)					
				PM ₁₀	PM _{2.5}	CO	CO ₂	CH ₄	NMHC
Conifer	49,020	117.55	105.80	0.82	0.71	4.02	176.02	0.30	0.24
Shrub/hdwd	4,382	3.28	2.95	0.02	0.02	0.11	4.91	0.01	0.01
TOTAL	53,402	120.83	108.75	0.84	0.73	4.13	180.93	0.31	0.25

These amounts of all these regulated emissions, both under baseline and under BFFIP are insignificant due to the limited amount of biomass, the dry nature of the fuels (and resulting efficient combustion).

While the software, Consume, does not calculate NO or NO₂, research by Urbanski (2013) indicates that prescribed fire in northwest forests emits 2 grams per kilograms of fuel consumed, or an emission factor of 0.002. Using this formula, the calculated NO_x emitted from the piles would be 0.2175 tons (108.75 tons consumed fuel X 0.002 emission factor). Piles made from debris from conifer forests would produce 0.2116 tons, while shrub/hardwood piles would emit 0.0059 tons.

ANALYSIS OF EMISSIONS FROM BROADCAST AND PILE BURNING

The results of the analysis indicate that prescribed burns product insignificant amounts of the emissions regulated.

The results of this analysis agree with data compiled by CAL FIRE in the preparation of their environmental impact statement for their Vegetation Treatment Program (CAL FIRE 2013). Overall, prescribed fire emission account for less than 2% of TOG, ROG, NOx, SOX and particulate emissions, when compared to annual average emissions from wildfire. Compared with all other sources of emissions, prescribed burning is a tiny fraction of emissions. From

https://www.arb.ca.gov/app/emsinv/2013/emseic1_query.php?F_DIV=-4&F_YR=2012&F_SEASON=A&SP=2013&F_AREA=AB&F_AB=SF&F_DD=Y.

2012 Annual Average Emissions from Wildfires in San Francisco Bay Area Air Basin (tons)

	TOG	ROG	COT	NOX	SOX	PM	PM10	PM2_5
WILDFIRES	4.78	2.72	38.89	0.38	0.24	3.90	3.74	3.17

2012 Annual Average Emissions from Prescribed Burning in San Francisco Bay Area Air Basin (tons)

	TOG	ROG	COT	NOX	SOX	PM	PM10	PM2_5
RANGE IMPROVEMENT FOREST MANAGEMENT WEED ABATEMENT	0.02	0.01	0.17	0.01	0	0.02	0.02	0.01
	0.05	0.03	0.43	0.02	0	0.05	0.05	0.04
	0.07	0.04	0.43	0.02	0	0.06	0.06	0.06
Total	0.14	0.08	1.03	0.05	0	0.13	0.13	0.11
Total from All Sources	699.45	345.93	1152.55	313.39	24.61	208.14	123.35	47.99

Wildfires are an unpredictable component of PM2.5 pollution in California, contributing only 17,068 tons in 2005, 529,821 tons in 2008, and 53,487 tons in 2011. The wildfire emissions in 2008 represented 68% of all PM2.5 emissions in the state, and they caused notable public health impacts.

The table below from 2012 state-wide data illustrates projected annual average emission for various fuel management activities in comparison to emissions from wildfire. Overall, prescribed fire emission account for less than 1% of TOG, ROG, NOx, and SOX emissions compared to wildfires. When compared to emissions from all sources, the emissions from prescribed burning for any purpose are negligible. From

https://www.arb.ca.gov/app/emsumcat_query.php?F_YR=2015&F_DIV=0&F_SEASON=A&SP=2013&F_AREA=CA#9

Estimated Annual Average Emissions (Tons/Day) and Percent of Total State Emissions (10-yr average)

	TOG	ROG	COT	NOX	SOX	PM	PM10	PM2_5
Range Improvement	0.2	0.1	2.0	0.1	0.0	0.2	0.2	0.2

Forest Management	21.9	12.5	183.9	2.8	1.2	18.2	17.5	15.0
Weed Abatement	2.8	1.6	17.1	0.6	0.1	2.4	2.4	2.2
Weed Abatement - Tumbleweeds	0.2	0.1	1.3	0.1	0.0	0.2	0.2	0.2
Weed Abatement - Ponding/Level/Ditch Canal	0.1	0.1	0.8	0.0	0.0	0.1	0.1	0.1
Weed Abatement -Noxious Weeds	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Non-agricultural Open Burning	6.4	2.7	19.0	1.2	0.2	3.4	3.4	3.2
Wildland Fire Use	28.6	16.3	232.4	3.1	1.4	22.9	22.0	18.6
subtotal Managed Burning	60.2	33.4	456.6	7.8	3.0	47.4	45.7	39.6
Wildfires	588.2	335.1	4787.7	26.9	24.0	463.1	445.0	377.1

Total Statewide

Daily Emissions 8656.9 4048.4 11285.0 1913.8 102.5 3042.3 1912.9 784.1

MITIGATIONS

The impacts of smoke are reduced by reducing emissions, and by avoiding the reception of smoke by sensitive populations.

There are several ways to reduce emissions, either by changing the environmental conditions under which burning occurs to make combustion more efficient, reducing the total biomass to be burned.

Reducing Emissions

Because the great proportion of emissions is produced when the fire smolders (as compared to when it is actively flaming), managing the phase of burning is also a significant mitigation. This is done by managing the ignition pattern of the fire and through burning in drier conditions, while still maintaining safety.

When the use of fire is selected as the best means to accomplish management goals, there are two general types of control options for air pollutant emissions: those that reduce the total amount of emissions, and those that reduce the impact of emissions on smoke-sensitive areas. The components and quantity of emissions from prescribed burning depend in part on the types of fuels burned, their moisture content, and the temperature of combustion. The approaches fall into four categories and their applicability varies by fuel type: (1) minimize the area burned, (2) reduce the fuel loading in the area to be burned, (3) reduce the amount of fuel consumed by the fire, and (4) minimize emissions per ton of fuel consumed (EPA, 1998).

Reducing the area burned includes mechanical treatments and reduction of fuel loading, chemical treatments or burning a subset of a larger area.

Reduction of fuel loading includes mechanical fuel removal, more frequent burning or burning during a time of year when less fuel is present.

Reducing fuel consumption can decrease emissions by reducing fireline intensity, crown and foliage scorch, and cambium injury, thus reducing flora and fauna mortality. This can be accomplished by burning when there is a high fuel-moisture content using equipment that creates a mass ignition and by completing rapid mop-up. Increasing combustion efficiency can shift the majority of consumption away from the smoldering phase and into the more efficient flaming phase. This can be accomplished by burning fuels in piles or windrows, using backing fires, completing rapid mop-up and mass ignitions with a shortened fire duration (Peterson and Leenhouts, 1997).

Avoidance

Another strategy to mitigate the impact of emissions from prescribed burning is to avoid contact of concentrations of emissions with sensitive populations. Smoke exposure can be reduced by distilling monitoring and modeling tools into information that people can use to their modify behavior.

Managers should track the daily variation of emissions relative to dispersion (instead of using area burned), and quantitatively account for the smoke impacts to public health in space and time.

Land managers should also evaluate population exposure to pollutants within observed or modeled smoke plumes. Because standards to protect public health are often based on 24-hour average PM_{2.5} values and available dispersion varies substantially from day to day, daily emissions are particularly important for evaluating smoke impacts.

The National Oceanic and Atmospheric Administration (NOAA) began providing maps of smoke plume density based on satellite observations through their Hazard Mapping System (HMS) in November 2006. Predictions of surface PM_{2.5} levels are limited by difficulty in determining how much smoke has reached the surface, but these data provide an objective means of defining a potential area of influence for a particular fire.

Pt Reyes National Seashore is a Federal Mandatory Class I smoke sensitive site, which is to the northwest of the MMWD District lands. Other sensitive sites include local schools, hospitals, or senior residential care facilities. The MMWD lands have sensitive populations generally east of the watershed, in Ross, Corte Madera, Kentfield, and Mill Valley. While most of the sensitive areas are further than one mile away, schools in Ross may be most impacted if the prescribed burn were conducted under wind conditions that would direct smoke to the school.

Part of approval from the BAAQMD is a set of conditions that specifies wind direction speed, and the height to which the smoke is expected to rise. Prescribed fires will be

conducted with winds that will avoid sensitive receptors, and with unstable air conditions that ensure proper mixing and dilution of emissions produced by the prescribed fires.

Outreach and Education

Many members of the public agree with researchers and managers who have argued that tolerating short-term impacts of prescribed fires may avoid more harmful impacts.

Use BlueSky, HYSPLIT,² CALPUFF,³ or other modeling tools to spatially and temporally forecast smoke concentrations downstream from fires using daily emission and dispersion estimates (Goodrick et al. 2013).

Another important mitigation may be to quantify the size and vulnerability of the affected populations within the areas of smoke influence for the duration of the fire, possibly using census data.

The combination of advance warning and education can also increase public support for managing fire for resource objectives over time. It is important for outreach efforts to explain how forest management can mitigate smoke impacts from extreme fires not only in rural forest communities but also in downwind urban populations.

The District should consider assigning an Air Resource Advisor to prescribed burns. Air Resource Advisors, who are commonly assigned to large wildfire incident teams, can also help managers mitigate the negative health effects of prescribed fires and resource objective wildfires. Such trained specialists can facilitate public communication and prepare documents used by air quality regulators in permitting burns and considering exemptions for exceedances of air quality standards that might be caused by such fires.

Together, multiple agencies have addressed this need through the training and deployment of Air Resource Advisors who liaise with fire personnel, state agencies and communities to monitor and forecast fire and smoke conditions and impacts. This information is disseminated to help local communities mitigate smoke impacts.

In recent years, blogs, web postings, social media and radio announcements have been employed for public communication during wildfire events. Several ‘smoke blogs’ provided by health and resource management agencies have included details such as fire activity, meteorological updates, health recommendations and government contact information.

References

California Department of Forestry and Fire Protection. 2013. Vegetation Treatment Program Draft Environmental Impact Report. Sacramento, CA.

Goodrick, S.L., G.L. Achtemeier, N.K. Larkin Y. Liu, AND T.M. Strand.2013. Modelling smoke transport from wildland fires: A review. Int. J. Wildl. Fire 22(1):83–94.

Hyde Joshua C., Kara M. Yedinak, Alan F. Talhelm, Alistair M.S. Smith, David M.J. S. Bowman, Fay H. Johnston, Peter Lahm, Mark Titch, and Wade T. Tinkham. 2017. Air quality policy and fire management responses addressing smoke from wildland fires in the United States and Australia International Journal of Wildland Fire, 2017. 26. 347-363

Long, Jonathan W., Leland W. Tarnay, and Malcolm P. North. 2017. Aligning Smoke Management with Ecological and Public Health Goals. Journal of Forestry 115, available at <https://www.treesearch.fs.fed.us/pubs/53771>.

Peterson, J. and B. Leenhouts. 1997. What wildland fire conditions minimize emissions and hazardous air pollutants and can land management goals still be met? August 20. <http://www.epa.gov/ttn/faca/pbissu.html>

Urbanski, Shawn. 2013. Wildland fire emissions, carbon and climate: Emission factors. Forest Ecology and Management 317 (2014) 51-60.

U.S. Environmental Protection Agency (EPA). Interim Air Quality Policy on Wildland and Prescribed Fires. 1998. Web. 21 February 2015. <http://www.epa.gov/ttn/faca/pbdirs/firefnl.pdf>.

C:\Marin EIRs\MMWD Veg Mgt EIR\Air Quality\FOFEM projects\Broadleaf forest.prj **Project File** **Region** PacificWest

Fuel - Smoke - Soil Mortality

Cover Type SAF/SRM SRM 906 - Broadleaf Forest **Season** Fall

Fuel Load (t/ac) Natural Duff 7.50 Litter 1.80 0-1/4 0.30 1/4-1 1.20 1-3 2.25 3+ 14.00 Herb 0.52 Shrub 0.60 Foliage - Branch 0 0 **Adjustments** L T H

Moistures Dry 40 10 15 **% Rotten** 50.00 **Distribution** Even **% Consumed** 75

Output Consumed 5.00 1.80 0.30 1.20 2.25 5.32 0.52 0.36 0 0 **Soil Moist. / Type** 10 Coarse-Silt

0.60

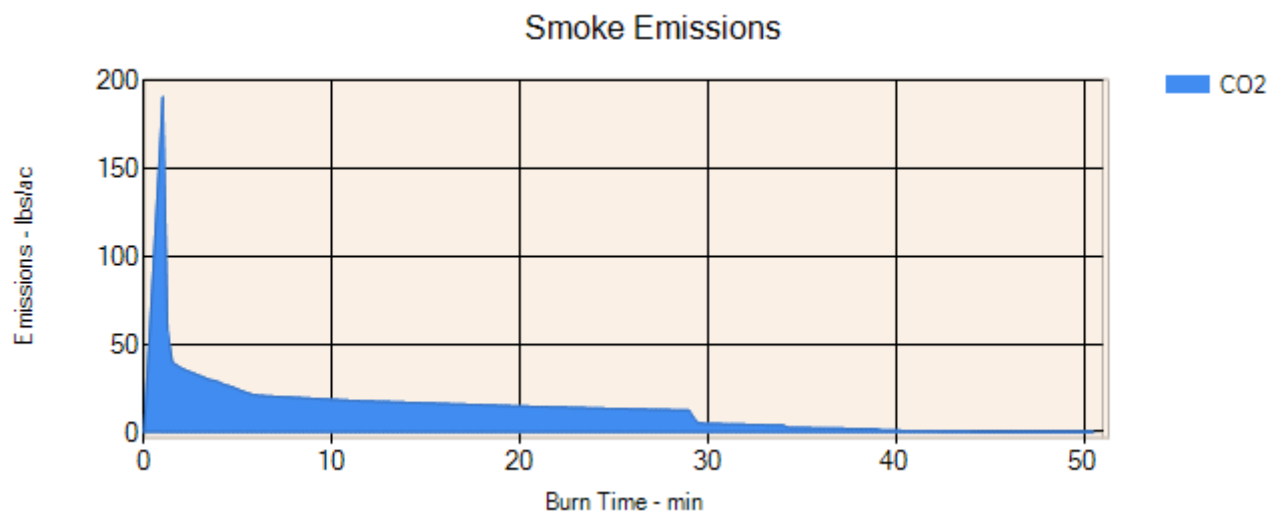
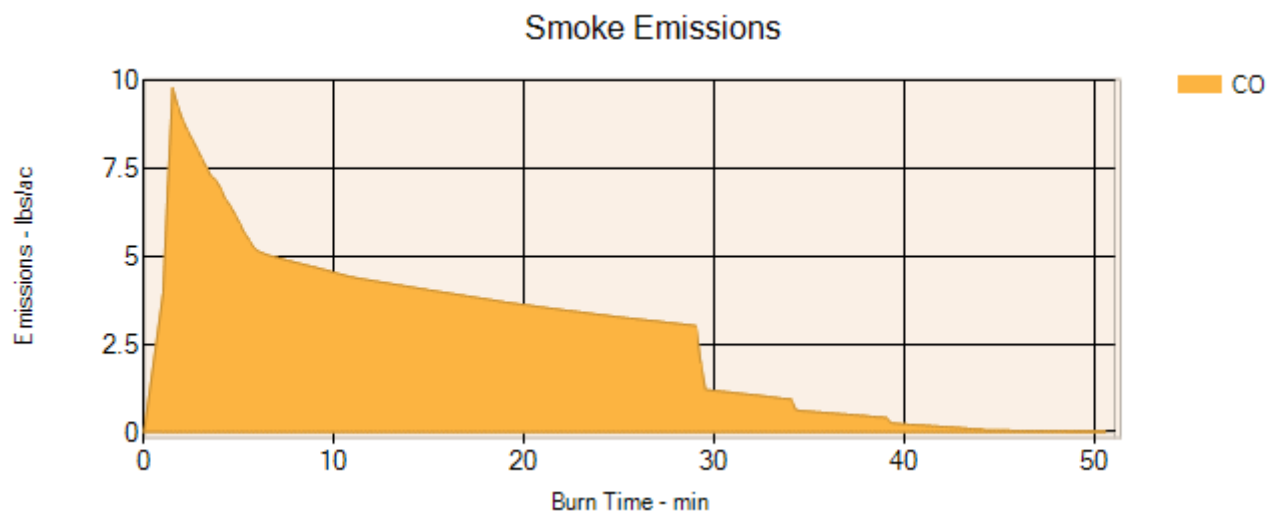
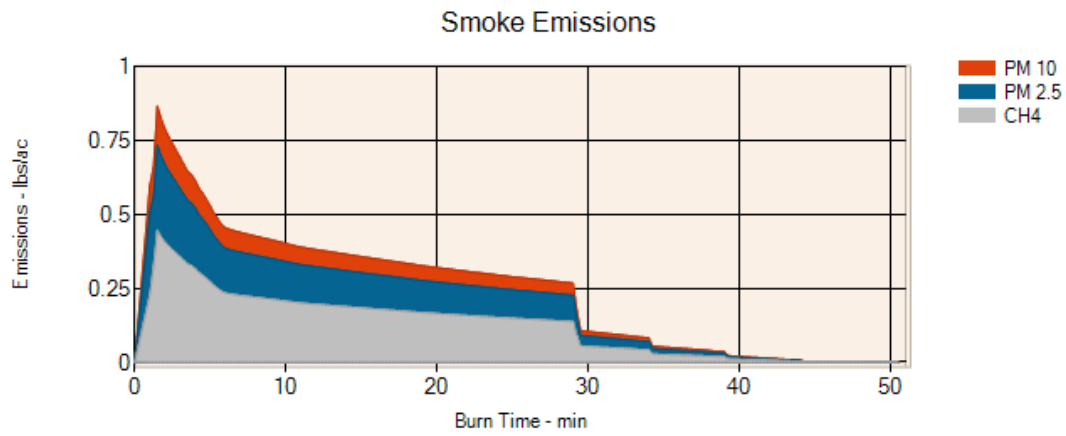
TITLE: Results of FOFEM model execution on date: 5/6/2013

FUEL EMISSIONS CALCULATIONS

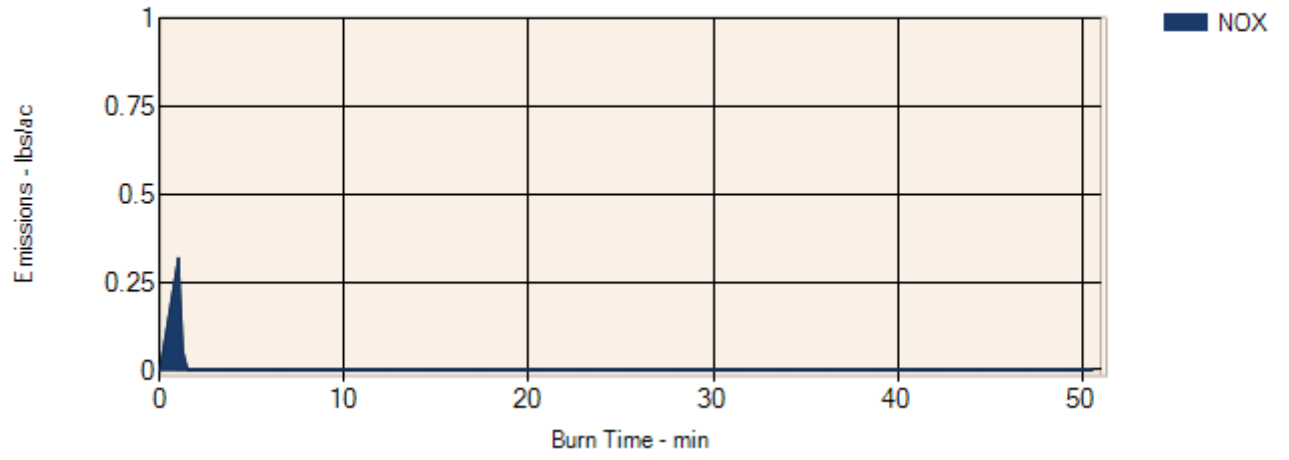
Region: PacificWest
Cover Type: SRM 906 - **Broadleaf Forest**
Fuel Type: Natural
Fuel Reference: FOFEM 111

	Emissions flaming	-- lbs/acre smoldering	total
PM 10	19	729	748
PM 2.5	16	618	634
CH 4	5	375	380
CO	41	8236	8277
CO 2	11053	33522	44575
NOX	20	0	20
SO2	6	27	33

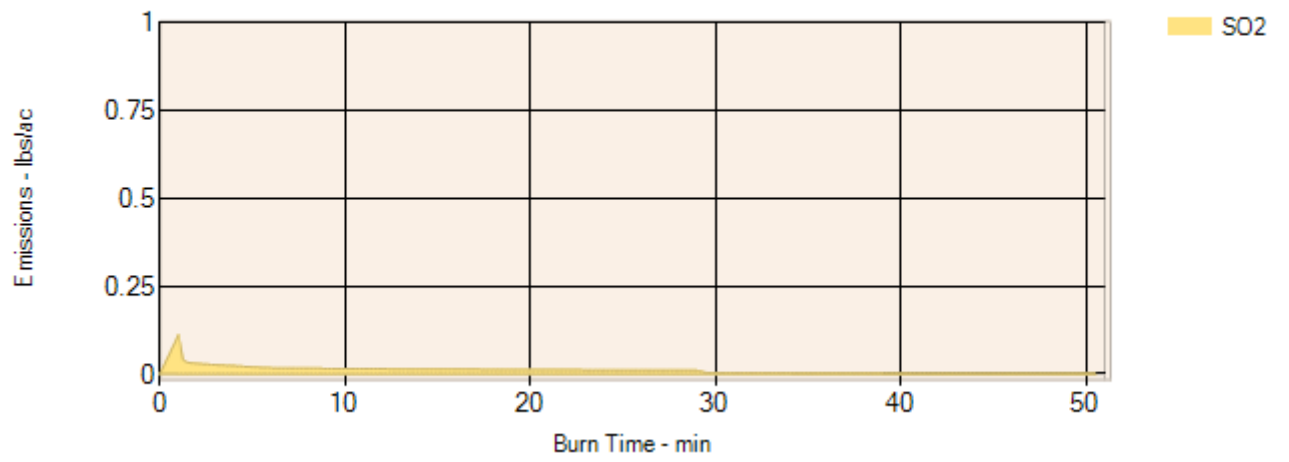
	Consumption tons/acre	Duration hour: min: sec
Flaming:	3.11	00: 01: 15
Smoldering:	13.64	00: 50: 30
Total:	16.75	
Unit Average Combustion Efficiency:	0.73	



Smoke Emissions



Smoke Emissions



C:\Marin EIRs\MMWD Veg Mgt EIR\Air Quality\FOFEM projects\Interior Douglas Fir.prj **Project File** **Region** PacificWest

Fuel - Smoke - Soil Mortality

Cover Type SAF/SRM SAF 210 - Interior Douglas fir **Season** Fall

Fuel Load (t/ac) Natural 10.00 **Depth** 1.00 **Litter** 0.60 **0-1/4** 0.23 **1/4-1** 0.67 **1-3** 0.80 **3+** 7.00 **Herb** 0.20 **Shrub** 0.35 **Foliage** 6.00 **Branch** 3.00 **% Rotten** 50.00 **Distribution** Even **% Consumed** 75

Moistures Dry 40 **10** **15** **Output** Consumed 6.67 0.60 0.23 0.67 0.80 2.50 0.20 0.21 4.50 1.13 0.94

Adjustments L T H **Soil Moist. / Type** 10 Coarse-Silt

TITLE: Results of FOFEM model execution on date: 5/13/2013

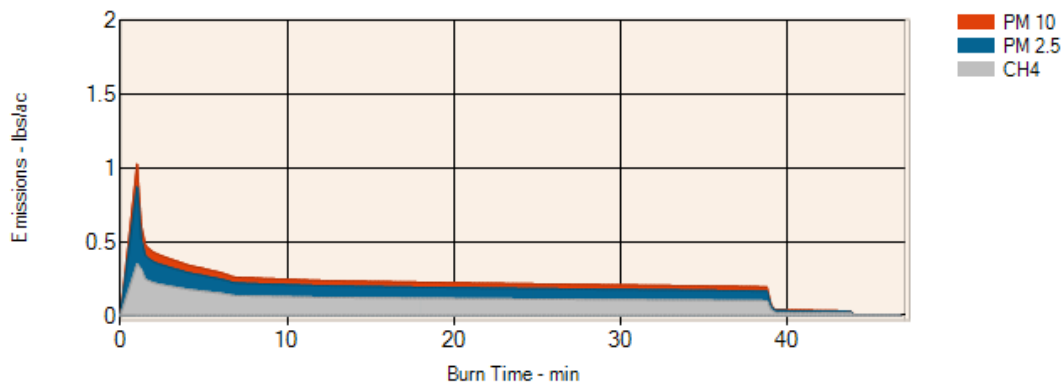
FUEL EMISSIONS CALCULATIONS

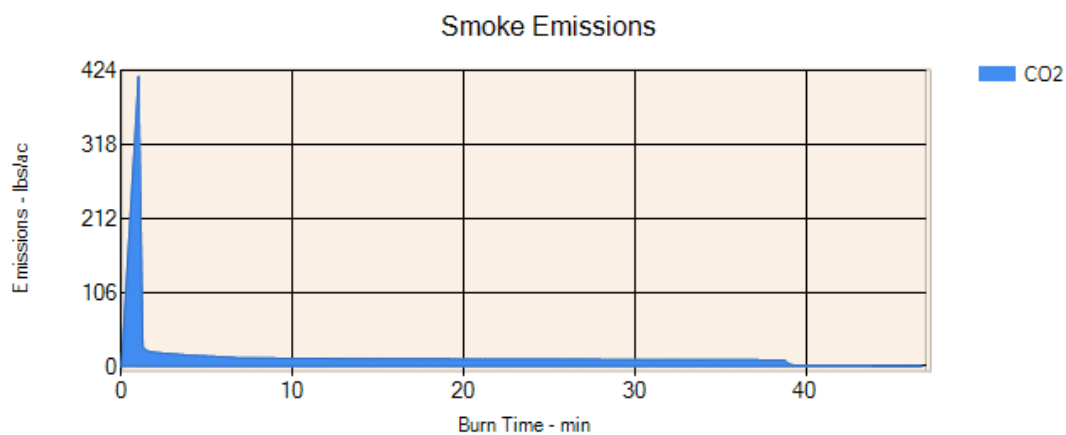
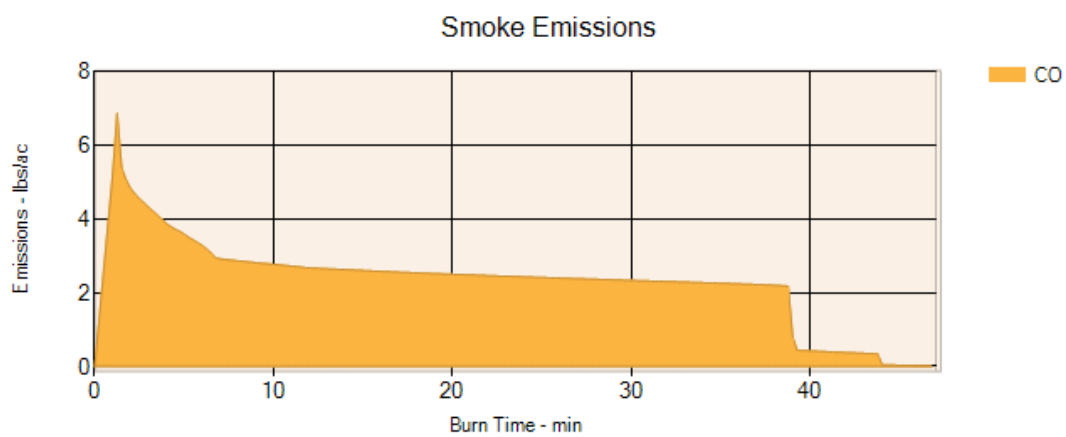
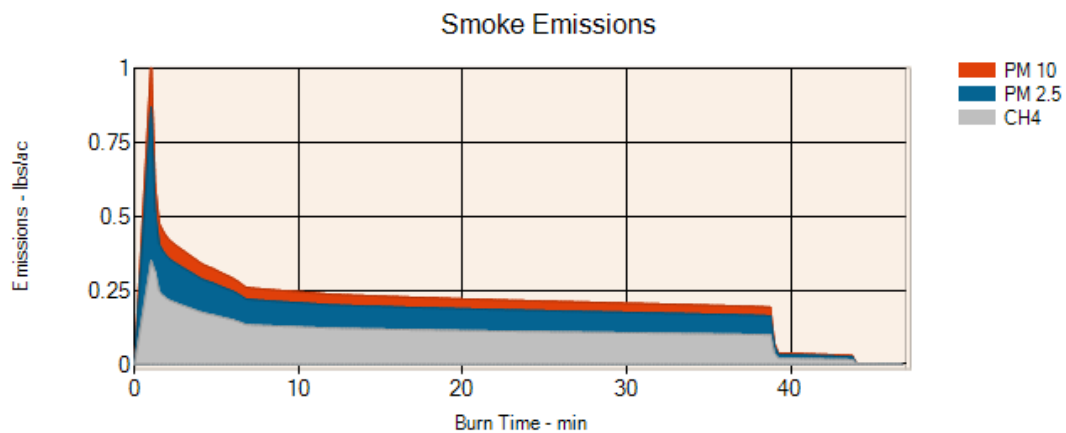
Region: PacificWest
 Cover Type: SAF 210 - Interior Douglas-fir
 Fuel Type: Natural
 Fuel Reference: FOFEM 031

	Emissions -- lbs/acre		
	flaming	smoldering	total
PM 10	41	575	616
PM 2.5	35	487	522
CH 4	11	296	307
CO	88	6496	6584
CO 2	23979	26439	50418
NOX	43	0	43
S02	13	22	35

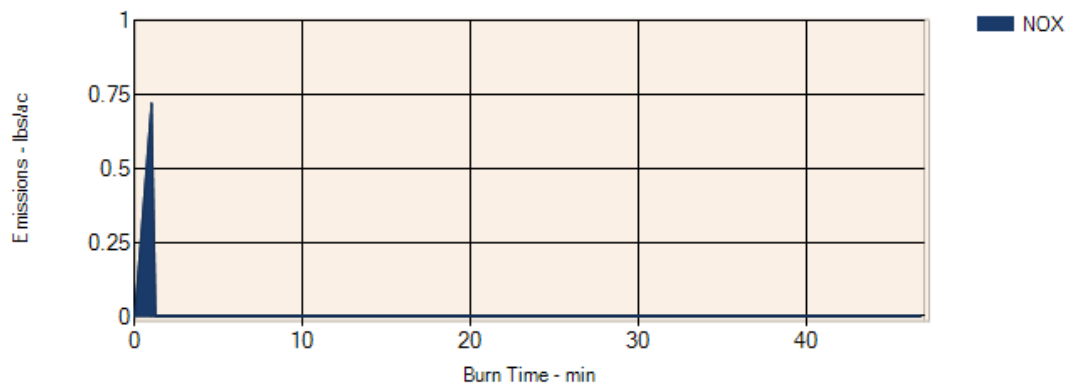
	Consumption	Duration
	tons/acre	hour: min: sec
Flaming:	6.74	00: 01: 00
Smoldering:	10.76	00: 46: 45
Total:	17.50	
Unit Average Combustion Efficiency:	0.79	

Smoke Emissions

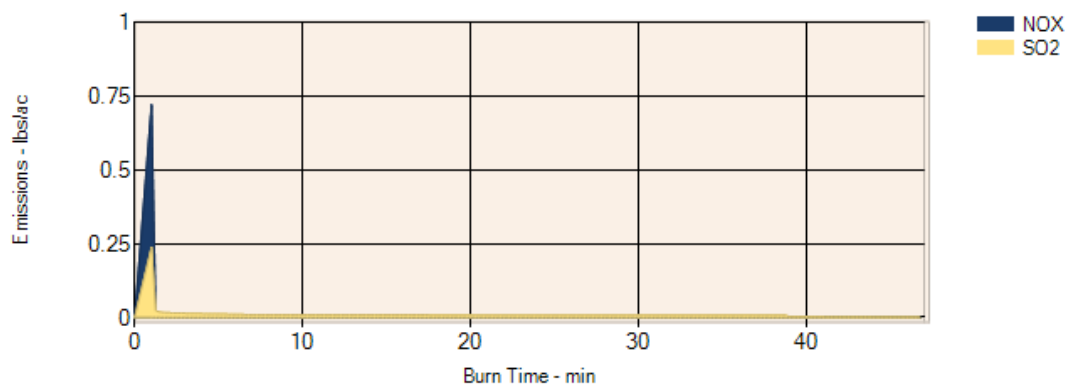




Smoke Emissions



Smoke Emissions



C:\Marin EIRs\MMWD Veg Mgt EIR\Air Quality\FOFEM projects\Chamise chaparral.prj **Project File** **Region** PacificWest

Fuel - Smoke - Soil Mortality

Cover Type SAF/SRM SAF 232 - Redwood **Season** F

Fuel Load (t/ac) Natural **Duff** 35.00 **Litter** 1.00 0.90 2.10 2.80 50.00 **Herb** 0.20 **Shrub** 0.35 **Foliage - Branch** 0 0 **Adjustments** L T H

Depth 2.00 **% Rotten** 50.00 **Distribution** Even **% Consumed** 75

Moistures Dry 40 10 15 **Soil Moist. / Type** 10 Coarse-Silt

Output Consumed 23.33 1.00 0.90 2.10 2.80 39.39 0.20 0.21 0 0 1.38

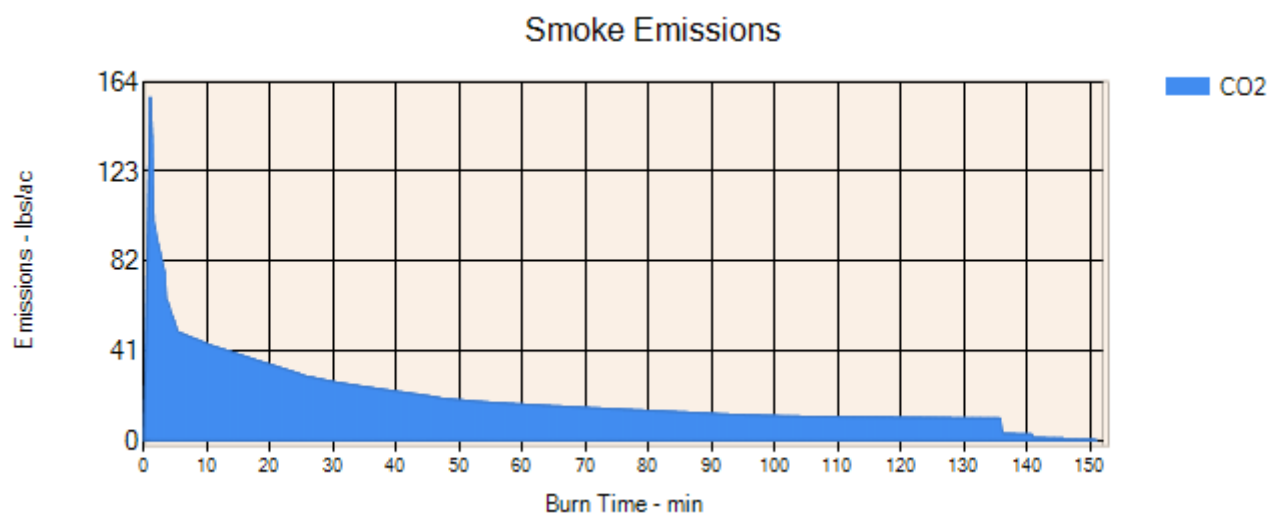
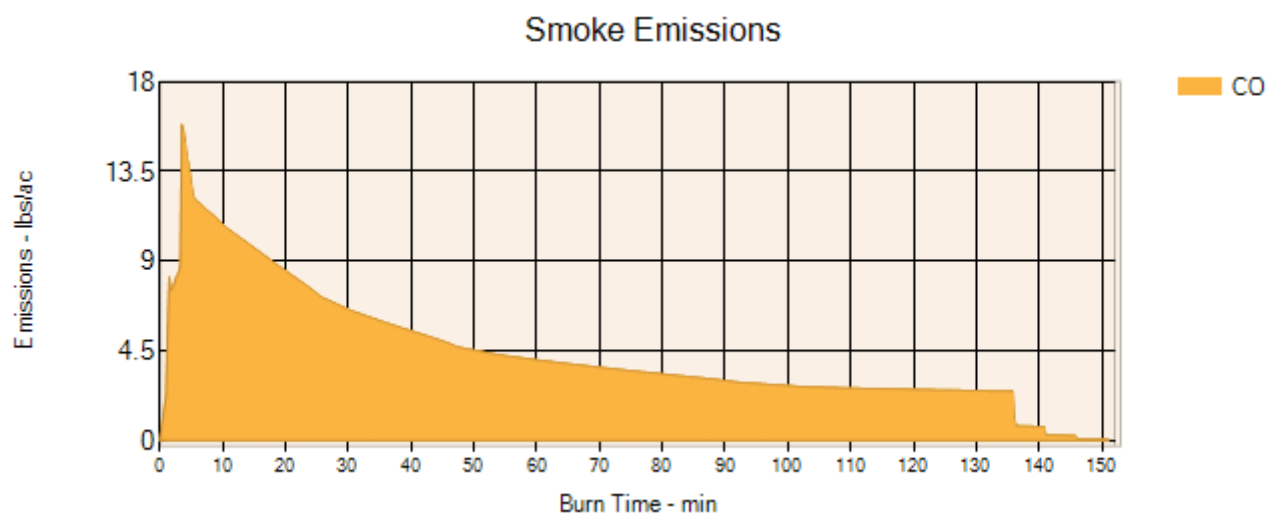
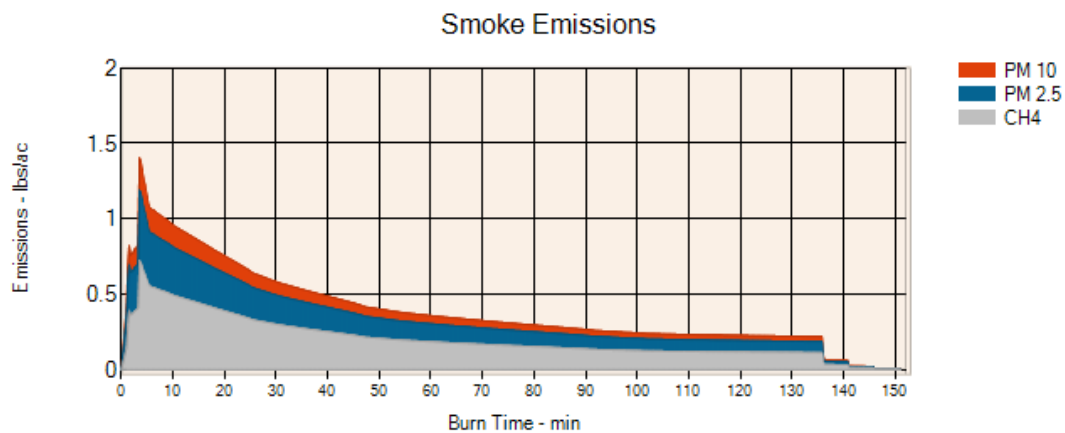
TITLE: Results of FOFEM model execution on date: 5/6/2013

FUEL EMISSIONS CALCULATIONS

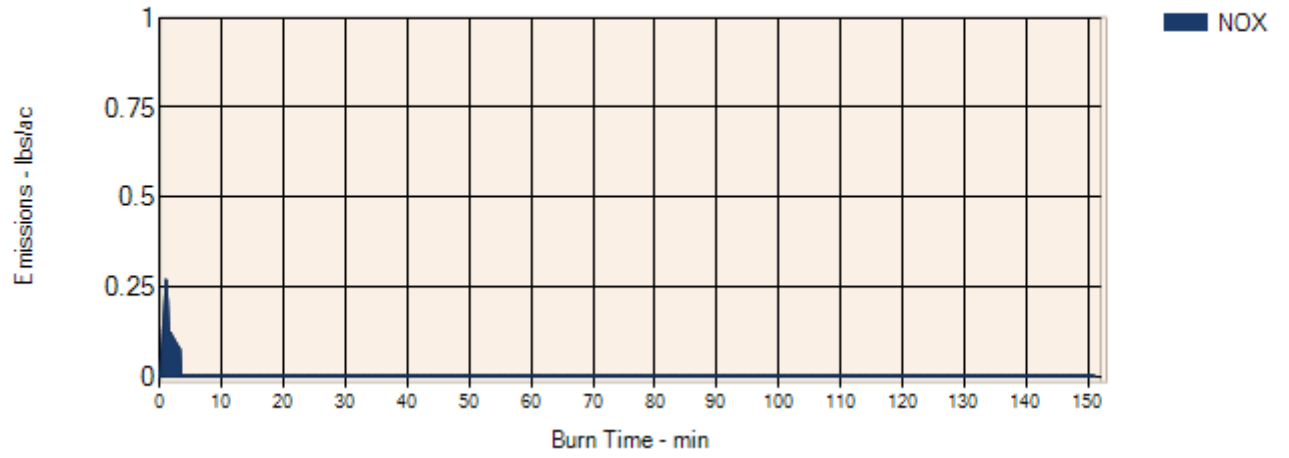
Region: PacificWest
 Cover Type: SAF 232 - **Redwood**
 Fuel Type: Natural
 Fuel Reference: FOFEM 171

	Emissions flaming	-- lbs/acre smoldering	total
PM 10	30	3475	3505
PM 2.5	26	2945	2971
CH 4	8	1789	1797
CO	64	39244	39308
CO 2	17472	159737	177209
NOX	31	0	31
S02	10	130	140

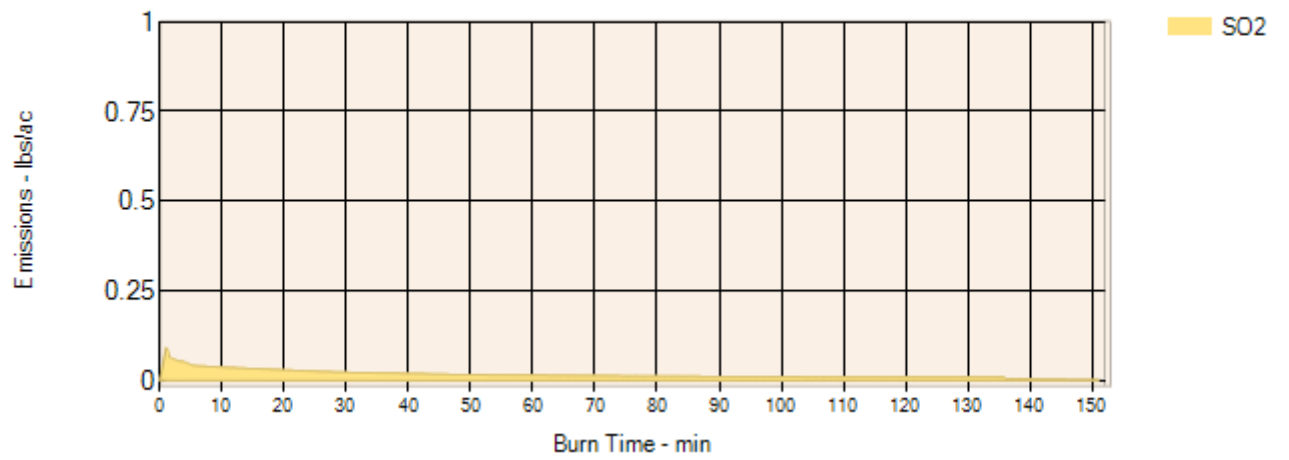
	Consumption tons/acre	Duration hour: min: sec
Flaming:	4.91	00: 03: 15
Smoldering:	65.02	02: 31: 00
Total:	69.93	
Unit Average Combustion Efficiency:	0.69	



Smoke Emissions



Smoke Emissions



File Options Help

C:\Marin EIRs\MMWD Veg Mgt EIR\Air Quality\FOFEM projects\Chamise chaparral.prj **Project File** **Region** PacificWest

Fuel - Smoke - Soil Mortality

Cover Type SAF/SRM SRM 215 - Valley Grassland (Annual Grassland) **Season** Fall

Fuel Load (t/ac) Natural **Duff** 0 **Litter** 0 **0-1/4** 0 **1/4-1** 0 **1-3** 0 **3+** 0 **Herb** 1.80 **Shrub** 0 **Foliage** 0 **Branch** 0

Depth 0 **% Rotten** 50.00 **Distribution** Even **% Consumed** 75

Moistures Dry **40** **10** **15**

Output Consumed **0** **0** **0** **0** **0** **0** **1.80** **0** **0** **0**

Soil Moist. / Type **10** Coarse-Silt

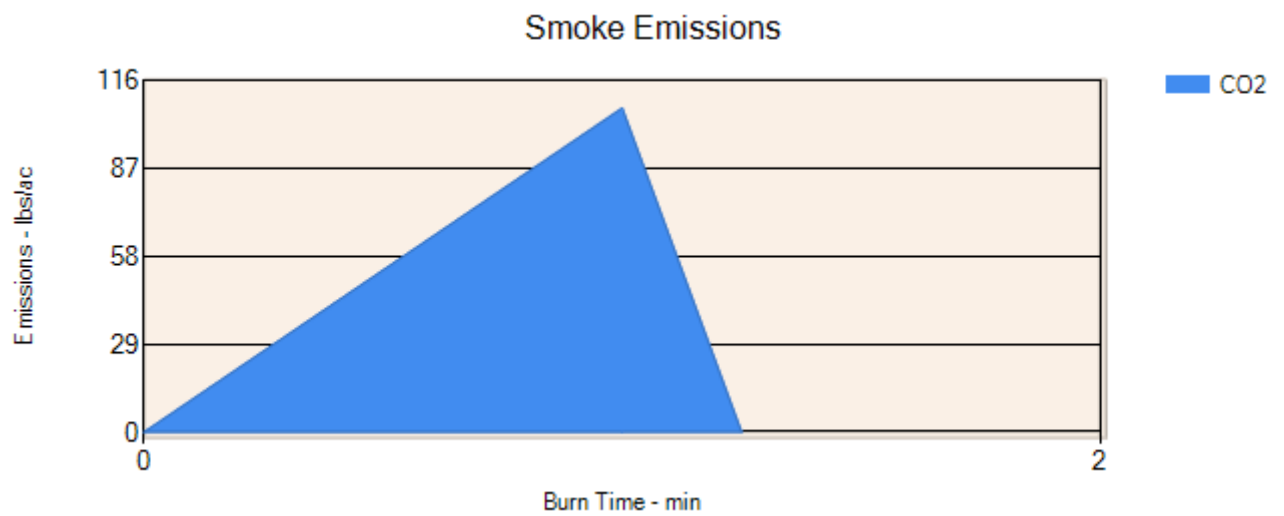
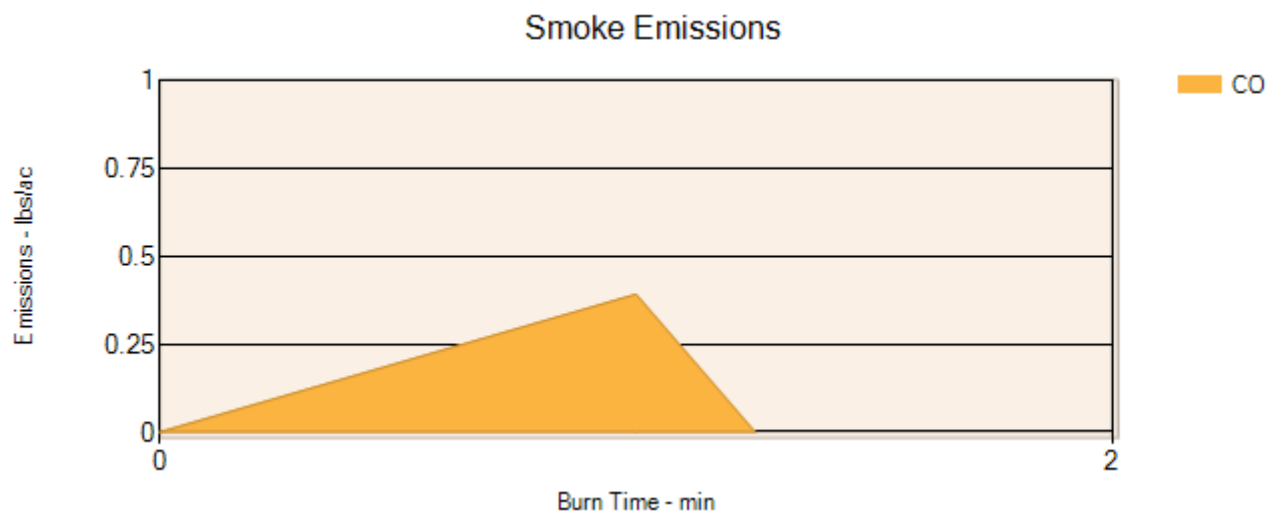
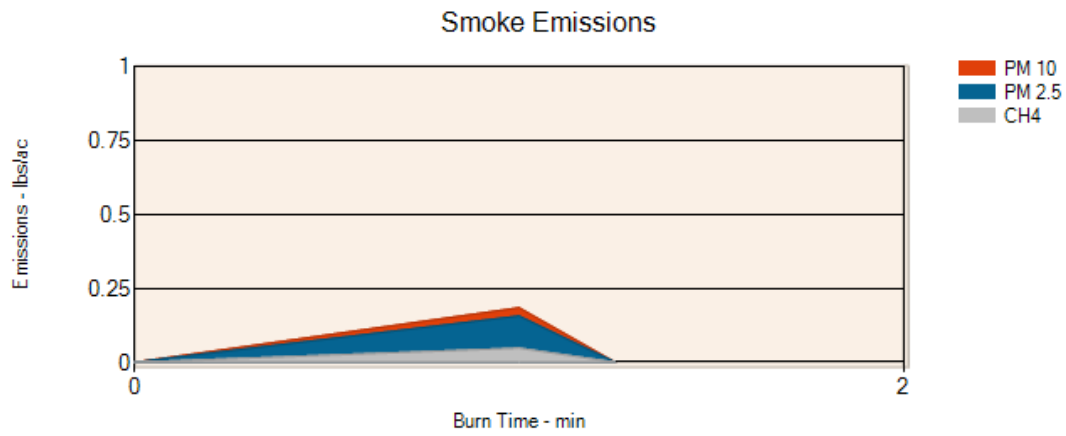
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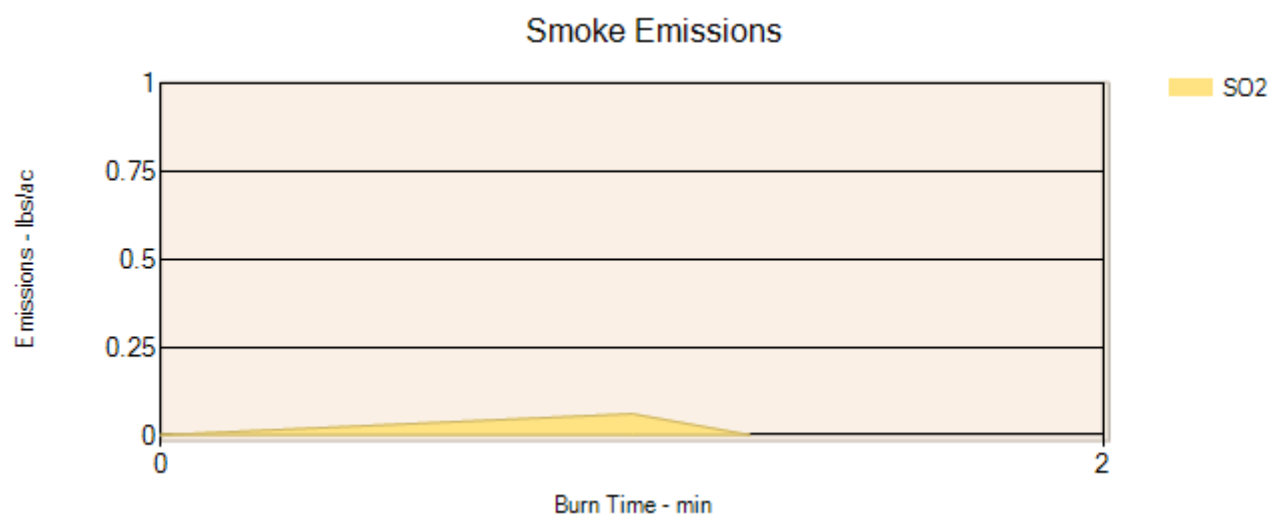
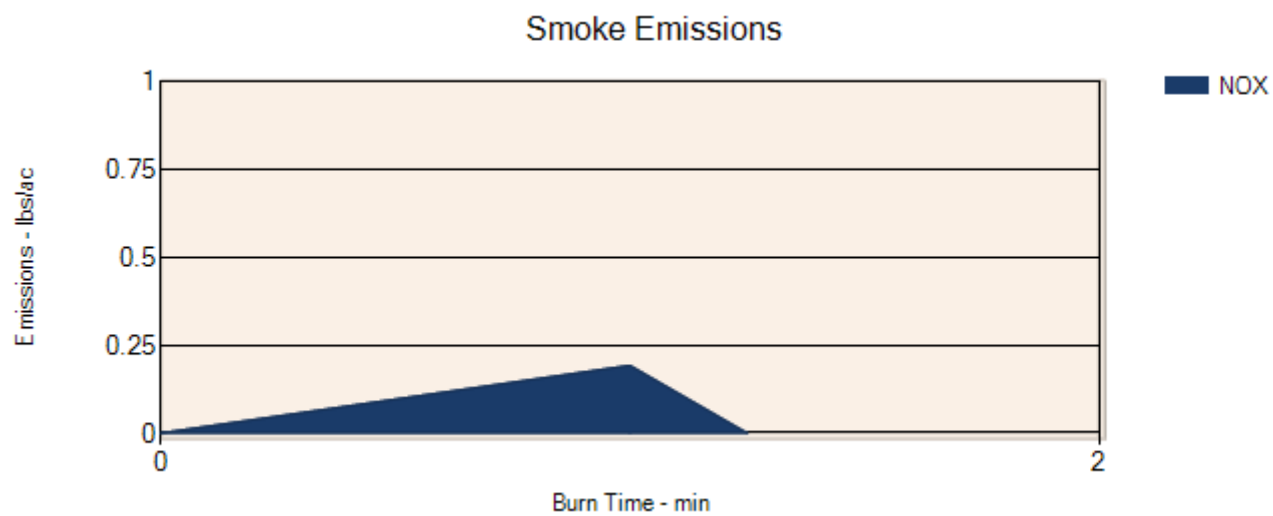
FUEL EMISSIONS CALCULATIONS

Region: PacificWest
 Cover Type: SRM 215 - **Valley Grassland (Annual Grassland)**
 Fuel Type: Natural
 Fuel Reference: Shiflet 1994

	Emissions flaming	-- lbs/acre smoldering	total
PM 10	11	0	11
PM 2.5	9	0	9
CH 4	3	0	3
CO	23	0	23
CO 2	6402	0	6402
NOX	12	0	12
S02	4	0	4

	Consumption tons/acre	Duration hour: min: sec
Flaming:	1.80	00: 01: 00
Smoldering:	0.00	00: 00: 00
Total:	1.80	
Unit Average Combustion Efficiency:	0.97	







Piled Fuels Biomass and Emissions Calculator

Last updated: 3/26/2014

1. DATA ENTRY MODE: **MANUAL (USE ONLINE FORM)**

[Start over/use batch mode] [Help]

2. MEASUREMENT SYSTEM: **ENGLISH**

Pile Group Data: (Click on Group No./Name to edit given group)

[Export inputs to text]

Group No.	Group Name	No. Piles	Pile Type	Pile Shape	Pile Dimensions	Soil %	Packing Ratio	Pile Composition	Pile Quality	Consumption	
1	Conifer	895	Hand	Paraboloid	W1: 5.5 H1: 4	N/A	N/A	Conifer	N/A	90%	[Remove]
2	Shrub/Hardwood	80	Hand	Paraboloid	W1: 5.5 H1: 4	N/A	N/A	Shrub/Hardwood	N/A	90%	[Remove]

Add more piles

Start over (clear all piles)

Pile Group Results:

[Print-friendly report] [Export results to text]

Pile Group No.	Pile Group Name	Gross Volume (cubic ft)	Adjusted* Volume (cubic ft)	Pile Biomass (tons)	Consumed Fuel (tons)	Emissions by pollutant (tons)						
						PM	PM ₁₀	PM _{2.5}	CO	CO ₂	CH ₄	NMHC
1	Conifer	42,527.35	49,020.46	117.5546	105.7992	1.1585	0.8199	0.7141	4.0189	176.0187	0.2965	0.2394
2	Shrub/Hardwood	3,801.33	4,381.72	3.2778	2.9500	0.0323	0.0229	0.0199	0.1121	4.9080	0.0083	0.0067
TOTAL		46,328.67	53,402.18	120.8324	108.7492	1.1908	0.8428	0.7341	4.1310	180.9267	0.3048	0.2461

*Adjusted volume for hand piles is corrected to account for the difference between the gross volume of a geometric shape and the actual volume of the pile. Machine pile adjusted volume of solid wood is determined by subtracting the amount that is soil from the gross volume and applying the appropriate packing ratio.



Fire and Environmental Research Applications Team
Pacific Wildland Fire Sciences Laboratory
USDA Forest Service Pacific Northwest Research Station
400 N 34th Street, Suite 201, Seattle, WA 98103 (206) 732-7800
Contact: Clint S. Wright (cwright@fs.fed.us)

We acknowledge funding from the Joint Fire Science Program under Projects JFSP 07-2-1-57 and JFSP 10-S-02-2.



Piled Fuels Biomass and Emissions Calculator Report

Pile Group Data:										
Group No.	Group Name	No. Piles	Pile Type	Pile Shape	Pile Dimensions	Soil %	Packing Ratio	Pile Composition	Pile Quality	Consumption
1	Conifer	895	Hand	Paraboloid	W1: 5.5 H1: 4	N/A	N/A	Conifer	N/A	90%
2	Shrub/Hardwood	80	Hand	Paraboloid	W1: 5.5 H1: 4	N/A	N/A	Shrub/Hardwood	N/A	90%

Pile Group Results:												
Pile Group No.	Pile Group Name	Gross Volume (cubic ft)	Adjusted* Volume (cubic ft)	Pile Biomass (tons)	Consumed Fuel (tons)	Emissions by pollutant (tons)						
						PM	PM ₁₀	PM _{2.5}	CO	CO ₂	CH ₄	NMHC
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TOTAL		46,328.67	53,402.18	120.8324	108.7492	1.1908	0.8428	0.7341	4.1310	180.9267	0.3048	0.2461

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Piled Fuels Biomass and Emissions Calculator (<https://depts.washington.edu/nwfire/piles>)
Funded by the Joint Fire Science Program under Projects JFSP 07-2-1-57 and JFSP 10-S-02-2
Developed by the Fire and Environmental Research Applications Team, Pacific Wildland Fire Sciences Laboratory
USDA Forest Service Pacific Northwest Research Station, 400 N. 34th Street, Suite 201, Seattle, WA 98103, (206) 732-7800
Report generated date: July 10, 2018