Appendix D
Air Quality Worksheets

ESA

Santa Susana Field Laboratory
Air Quality Appendix Sections & List of Tables

Air Quality Appendix Sections

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Santa Susana Field Laboratory
Acronyms

Acronym	Definition
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalents
EKCAPCD	Eastern Kern County Air Pollution Control District
EMFAC	EMission FACtors model developed by the California Air Resources Board.
GBVAB	Great Basin Valleys Air Basin
gr	grams
Haz	Hazardous Waste Disposal Location
HP	Horse Power
kWh	kilowatt hour
lbs	pounds
LF	Load Factor
M&M	Monitoring and Maintenance
MDAB	Mojave Desert Air Basin
MDAQMD	Mojave Desert Air Quality Management District
MT	Metric Tons
MWh	megowatt hour
N_2O	Nitrogen dioxide
NEPAB	Northeast Plateau Air Basin
Non-Haz	Non-Hazardous Waste Disposal Location
NOP	Notice of Preparation
NOx	Nitrogen oxides
PM_{10}	Particulate matter with a diameter of 10 microns or smaller
$PM_{2.5}$	Particulate matter with a diameter of 2.5 microns or smaller
Rad	Radiological Waste Disposal Location
ROC	Reactive Organic Compounds
RP	Responsible Party
SACVAB	Sacramento Valley Air Basin
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SCCAB	South Central Coast Air Basin
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Controld District
SOx	Sulfur oxides
SSAB	Salton Sea Air Basin
Tier 3	EPA Standard for emissions from offroad vehicle engines.
VCAPCD	Ventura County Air Pollution Control District
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

Santa Susana Field Laboratory
Air Quality Appendix
Section 1
Factors Consistent with All sections

Santa Susana Field Laboratory
Existing Conditions

Offsite Exhaust Emission Factors

Table 1-1: Emission Factors for Commuter Trips

	Emission Factors (gr/mile)									
	Exhaust								Fugitive	
	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4	PM10	PM2.5
Commuter Trips (offsite)	0.022	0.084	0.892	0.003	0.002	0.002	301.999	0.012	N/A	N/A
Commuter Trips (onsite)	0.056	0.111	1.356	0.003	0.005	0.004	556.107	0.022		
	Emission Factors (lbs/mile)									
Commuter Trips (offsite)	4.80E-05	1.85E-04	0.002	6.68E-06	3.97E-06	3.66E-06	0.666	2.64E-05	7.948E-04	1.951E-04
Commuter Trips (onsite)	1.23E-04	2.46E-04	0.003	6.68E-06	1.08E-05	9.90E-06	1.226	4.86E-05	7.948E-04	1.951E-04

Assumptions - 453.6 grams per pound

Sources - Emission facotrs for vehicle exhaust were taken from EMFAC2014 model (v1.07). Aggregated speeds for offsite and 15 mph for onsite.
(See "EMFAC2014 Emission Rates for Commuter Vehicles", Section 8 of Appendix D or Appendix E of this DEIR, for full EMFAC modeling details)

- Emission factors for offsite vehicle fugitive dust derived from AP42 - 13.2.1 - Paved Roads

Reintrained Road Dust Emission Factors (Paved Roads):

E = k(sL)^0.91xW^1.02

E_{PM10} = k*(0.1)^0.91*497^1.02

= 0.0022 * 0.123 * 2.936

= 7.95E-04 PM10

$E_{PM2.5}$ = 0.00054 * 0.123 * 2.936

= 1.95E-04 PM2.5

k	0.0022	PM10 - particle size multiplier (lbs/VMT)
k	0.00054	PM2.5 - particle size multiplier (lbs/VMT)
sL	0.1	road surace silt loading grams per square meter (g/m^2)
w	2.88	average

- Emission factors for onsite vehicle fugitive dust taken from Table 1-8

Note: For the purposes of this appendix, if a Table is listd as "*Table #-#* " (Table 1-1 for example) it assumes it is from this appendix. If the Table is from another source, the source is listed with the table. For example, " *Table 3.4 of Appendix D of the CalEEMod User Guide*"

Santa Susana Field Laboratory
Initial Clean-up - Unmitigated

Onsite Exhaust Emission Factors

Table 1-2: Emission Factors for Offroad Equipment (Unadjusted Fleet)

	Emission Factors (g/bhp-hr)							
	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4
Rubber Tired Dozers	0.736	7.995	2.729	0.005	0.395	0.364	509.462	0.154
Concrete/Industrial Saws	0.620	4.432	3.620	0.006	0.333	0.333	568.300	0.055
Tractors/Loaders/Backhoes	0.538	5.142	3.811	0.005	0.396	0.364	511.346	0.154
Graders	0.398	5.663	1.459	0.005	0.184	0.169	511.696	0.154
Excavators	0.358	4.081	3.158	0.005	0.201	0.185	506.495	0.153
Scrapers	0.684	8.109	2.840	0.005	0.367	0.338	502.255	0.151
street sweepers	0.783	6.454	4.059	0.005	0.571	0.525	508.357	0.153
cranes	0.623	7.381	2.582	0.005	0.335	0.308	507.155	0.153
impact chisels	Electric/battery powered N/A for emissions							
Forklifts	0.723	6.222	4.023	0.005	0.520	0.479	505.583	0.153

Table 1-3: Emission Factors for Offroad Equipment (Adjusted to Tier 3 Compliance)

	Adjusted Emission Factors (g/bhp-hr)								HP	LF
	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4		
Rubber Tired Dozers	0.120	2.320	2.600	0.005	0.088	0.088	509.462	0.154	247	0.40
Concrete/Industrial Saws	0.120	2.740	3.700	0.006	0.192	0.192	568.300	0.055	81	0.73
Tractors/Loaders/Backhoes	0.120	2.740	3.700	0.005	0.192	0.192	511.346	0.154	97	0.37
Graders	0.120	2.320	2.600	0.005	0.088	0.088	511.696	0.154	187	0.41
Excavators	0.120	2.320	3.700	0.005	0.192	0.192	506.495	0.153	158	0.38
Scrapers	0.120	2.320	2.600	0.005	0.088	0.088	502.255	0.151	367	0.48
street sweepers	0.120	2.740	3.700	0.005	0.192	0.192	508.357	0.153	64	0.46
cranes	0.120	2.320	2.600	0.005	0.088	0.088	507.155	0.153	236	0.29
impact chisels	Electric/battery powered N/A for emissions									
Forklifts	0.120	2.740	3.700	0.005	0.192	0.192	505.583	0.153	89	0.20

Table 1-4: Emission Factors for Onroad Vehicles (Onsite)

	Emission Factors (g/mile)							
	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4/N_2O
Water Truck	0.751	19.116	4.646	0.016	0.082	0.078	3125.871	156.294
Haul Truck	0.751	19.116	4.646	0.016	0.082	0.078	3125.871	156.294
Onsite Worker Transport	0.056	0.111	1.356	0.003	0.005	0.004	556.107	27.805
	Emission Factors (g/min)							
Haul Truck	0.027	0.707	0.097	0.001	0.002	0.002	112.84	5.642

Onsite Exhaust Emission Factors

Sources:

- Equipment type taken from Table 3-16 in the PD.
- Quantity of each equipment type was provided by DTSC based on current onsite operations.
- Emission factors for unmitigated onsite construction equipment taken from Table 3.4 of Appendix D of the CalEEMod user guide (BREEZE software, a Division of Trinity Consultants, 2016). 2016 emission factors were used as a conservative estimate for all years as equipment is not anticipated to be changed out unless it breaks. Therefore even though construction could last for 18 years, there is the potential that the same equipment in use at the beginning of the project would be in use at the end of the project.
- Emissions for water truck and Haul trucks taken from EMFAC 2014 for Ventura County for Heavy Heavy Duty Trucks at 15 mph. (See "EMFAC2014 Emission Rates for Haul Trucks", Section 8 of Appendix D of this EIR, for full EMFAC modeling details)
- Emission factors for onsite worker transport trips are from EMFAC2014 for Ventura County for LDA vehicles traveling 15 mph. (See

  (See "EMFAC2014 Emission Rates for Commuter Vehicles", Section 8 of Appendix D of this EIR, for full EMFAC modeling details)
- Horsepower and load factors taken as the average for each equipment type from Table 3.3 of Appendix D of the CalEEMod User's Guide (BREEZE software, a Division of Trinity Consultants, 2016).
- Tier 4 final Emissions are taken from Table 3.5 of Appendix D of the CalEEMod User Guide (BREEZE software, a Division of Trinity Consultants, 2016). Tier 4 is an EPA standard for emissions of offroad vehicle engines.

Santa Susana Field Laboratory
Initial Clean-up - Unmitigated

Onsite Exhaust Emissions

Table 1-5: Emissions Per Offroad Vehicle Type per 8 Hour Work Day

	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4
				(lbs/day) per Excavation Site				
Rubber Tired Dozers	0.209	4.043	4.531	0.009	0.153	0.153	887.739	0.268
Concrete/Industrial Saws	0.125	2.857	3.859	0.006	0.200	0.200	592.656	0.057
Tractors/Loaders/Backhoes	0.076	1.734	2.342	0.003	0.122	0.122	323.672	0.097
Graders	0.162	3.137	3.516	0.007	0.119	0.119	691.918	0.208
Excavators	0.127	2.457	3.918	0.005	0.203	0.203	536.331	0.162
Scrapers	0.373	7.208	8.078	0.016	0.273	0.273	1560.445	0.469
street sweepers	0.062	1.423	1.921	0.003	0.100	0.100	263.951	0.080
cranes	0.145	2.800	3.138	0.006	0.106	0.106	612.164	0.185
impact chisels	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
grapplers	0.142	2.750	4.385	0.006	0.228	0.228	600.088	0.181
Forklifts	0.038	0.860	1.162	0.002	0.060	0.060	158.719	0.048
Water Truck	0.149	3.793	0.922	0.003	0.016	0.015	620.212	31.011

Equations

- Daily emssions = (Emission Factor X Horse power X Load Factor X Quantity X Hours per day) / 453.6
  - 453.6 grams per pound
  - Emission Factor, Horse Power, and Load Factor from Table 1-3.
  - 8 Hour work day (8 hour of equipment usage)
  - Quantity is assumed to be 1 for the purposes of daily emissions in Table 1-5.
- Daily emissions (Water truck) = (Emission Factor X Miles) / 453.6
  - Assumes water trucks at 90 miles per day for onsite operations (15 mph for 6 hrs per day)
- Impact Chisels are electric and therefore do not have quantifiable onsite emissions.

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Initial Clean-up - Unmitigated

Initial Clean Up Equipment Assumptions

Table 1-6: Initial Clean-up Equipment Assumptions

Equipment List	Area IV	O_2 Plant	DOE Demo	Boeing TTF	DOE RMHF/ HWMF
Rubber Tired Dozers	1.5	1.5	0	1	2
Concrete/Industrial Saws	0	0	0.1	0	0
Tractors/Loaders/Backhoes	2.5	2.5	3	1.5	3
Graders	0.75	0.75	0	0.75	1.5
Excavators	1.00	1.00	2.00	1	2
Scrapers	0	0	0	0	0
cranes	0	0	0.25	0	0
impact chisels	0	0	0.5	0	0
grapplers	0	0	0	0	0
Forklifts	1	1	0	1	2
Water Truck	1	1	1	1	2
Haul Trucks (3 years)	76	9	3	3	5
Workers	10	10	23	8	20

* All Boeing activities removed from Initial Clean-up Activities

Table 1-7: Scaling for daily truck trips

	Years	Total Trucks	Haul Trucks	% of Total	Scale to 96 trucks per day	
Area IV	3	34247	44	0.795998	76	69% of the trips are hazardous, the remainder are radiological.
O2 Plant	3	3695	5	0.085882	9	80% of the trips are hazardous the remainder are non-hazardous.
DOE - Demo	2	788	2	0.027473	3	
Boeing - Demo	1	752	0	0	0	No longer part of Initial Clean-up. Truck trips zeroed out to maintain 96 trucks per day over the whole site
TTF - Boeing	0.5	26	2	0.036259	3	
Post Closure - DOE	30	0	0	0	0	
Post Closure - NASA	30	0	0	0	0	
Totals	30	0	55		96	

Sources:
- Equipment type, number of workers, and total haul trucks taken from Table 3-16 in the PD.
- Quantity of each equipment type was provided by DTSC based on current onsite operations.

Equations
- Haul trucks for each program were scaled from the average daily truck trips to a maximum of 96 daily trips for the whole site.
  Air Quality Thresholds are based on daily emissions, therefore 96 haul trucks were used as that is the maximum number of trucks that will access the site per day.
- Average daily trips for the initial projects is equal to 53. Scaled to have a minimum of one truck per day for each phase. (See Table 1-7).
  Haul trucks per day for the initial clean-up were determined by dividing the total number of trucks by the number of years of the activity then by 260 days per year.

Santa Susana Field Laboratory
Initial Clean-up - Unmitigated

Onsite Fugitive Dust Emission Factors

Table 1-8 Emission Factors For Fugitive Dust

	PM10	PM2.5	Units
Scraper/Grader	1.543	0.167	lbs/VMT
Dozer/Excavator	0.753	0.414	lbs/hr
Truck Loading	1.11E-04	1.68E-05	lbs/ton
Mechanical Demolition	1.11E-04	1.68E-05	lbs/ton
Debris Loading	0.020	0.003	lbs/ton
Unpaved Road Haul	0.876	0.088	lbs/VMT
Paved Road - Haul	0.007	0.002	lbs/VMT
Paved Road Commute	7.9E-04	2.0E-04	lbs/VMT

Fugitive emissions from scrapers/graders:

PM_{10} = $(0.051 \times (S)^{2.0}) \times F_{PM10}$
= $(0.051 \times (7.1)^{2.0}) \times 0.6$
= 1.543 lbs/VMT

$PM_{2.5}$ = $(0.04 \times (S)^{2.5}) \times F_{PM2.5}$
= $(0.04 \times (7.1)^{2.5}) \times 0.031$
= 0.167 lbs/VMT

S = mean vehicle speed (mph) Default = 7.1
F_{PM10} = PM_{10} scaling factor default of 0.6
$F_{PM2.5}$ = $PM_{2.5}$ scaling factor default of 0.031

Fugitive emissions from Dozers and Excavators:

PM_{10} = $((C_{PM15} \times s^{1.5})/M^{1.4}) \times F_{PM10}$
= $((1 \times 6.9^{1.5})/7.9^{1.4}) \times 0.75$
= 0.753 lbs/hr
= $((5.7 \times 6.9^{1.2})/7.9^{1.3}) \times 0.105$

C_{PM15} = arbitary coefficient used by AP-42 = 1
s = material silt content = 6.9 %
M = material moisture content = 7.9%
F_{PM10} = PM_{10} scaling factor default of 0.75
$F_{PM2.5}$ = $PM_{2.5}$ scaling factor default of 0.105

Fugitive emissions from truck loading

PM_{10} = $k \times (0.0032) \times ((U/5)^{1.3}/(M/2)^{1.4})$
= $0.35 \times (0.0032) \times ((5.82/5)^{1.3}/(12/2)^{1.4})$
= 1.11E-04 lbs/ton

$PM_{2.5}$ = $k \times (0.0032) \times ((U/5)^{1.3}/(M/2)^{1.4})$
= $0.053 \times (0.0032) \times ((5.82/5)^{1.3}/(12/2)^{1.4})$
= 1.68E-05 lbs/ton

k = particle size (PM10 = 0.35, PM2.5 = 0.053)
U= wind speed (miles - hour) = 5.82
M = Material moisture content = 12%

Fugitive Emissions from Mechanical Demolition

PM_{10} = $k \times (0.0032) \times ((U/5)^{1.3}/(M/2)^{1.4})$
= $0.35 \times (0.0032) \times ((5.82/5)^{1.3}/(12/2)^{1.4})$
= 1.11E-04 lbs/ton

$PM_{2.5}$ = $k \times (0.0032) \times ((U/5)^{1.3}/(M/2)^{1.4})$
= $0.053 \times (0.0032) \times ((5.82/5)^{1.3}/(12/2)^{1.4})$
= 1.68E-05 lbs/ton

k = particle size (PM10 = 0.35, PM2.5 = 0.053)
U= wind speed (miles - hour) = 5.82
M = Material moisture content = 12%

Fugitive Emissions from Debris Loading

PM_{10} = $k \times EF_{L\text{-}TSP}$
= 0.35×0.058
= 0.020 lbs/ton

$PM_{2.5}$ = $k \times EF_{L\text{-}TSP}$
= 0.053×0.058
= 0.003 lbs/ton

k = particle size (PM10 = 0.35, PM2.5 = 0.053)
$EF_{L\text{-}TSP}$ = default value = 0.058 lbs/ton

Santa Susana Field Laboratory
Initial Clean-up - Unmitigated

Onsite Fugitive Emissions

Equations

- Emissons for graders and scrapers = Emission factor x(((Acres / blade width of 12 ft) x 43,560 sqft per acre) / 5,280 ft per mile)
  - Acres are based on table provided on page 8 of CalEEMod Appendix A. (BREEZE software, a Division of Trinity Consultants, 2016).

    scrapers 1 acers/8hr day (conservately uses 1 acre for both because of the type of activities)
  - Emissions include a 63% reduction for required fugitive dust control measures based on VCAPCD regulations and a 69% reduction based on mitigation.
  - Emission factor taken from Table 1-8.
- Emissions for dozers/excavators = # equipment x hours of operation x emission factor
  - Number of dozers and excavators taken from Table 1-6.
  - 8 hours per day
  - Emission factor taken from Table 1-8.
- Emissions for truck loading (soils) = emission factor * tons of material
  - Emission factor taken from Table 1-8.
- Emissions for Excavation truck loading = EF x Tons
  - Tons of soil = tons per truck (Assumed 23) times 2 times the number of trucks (From Table 1-6). Twice the number of trucks is used to account for potential import and unloading of backfill.
- Emissions for Mechanical demolition and debris loading = Emission Factor (lbs/ton) X tons of debris
  - Assumes 23 tons per truck
  - Emission factor taken from Table 1-8.
  - Tons of soil = tons per truck (Assumed 23) times the number of trucks (From Table 1-6).
- Emissions for fugitive dust from unpaved or paved roads = Number of Miles x Number of Trucks x Emission Factor for PM10/PM2.5
  - Equations and constants for unpaved roads taken from EPA's AP-42 13.2.2 Unpaved Roads
  - Equations and constants for Paved roads taken from AP42 - 13.2.1 - Paved Roads
  - Emissions for unpaved roads include a 63% reduction for required fugitive dust control measures based on VCAPCD regulations and a 69% reduction based on mitigation.
  - Assumes 3/4 of haul routes are paved.
  - Emission factor taken from Table 1-8.

Santa Susana Field Laboratory
Initial Clean-up - Unmitigated

Reintrained Road Dust

Reintrained Road Dust for haul trucks (onsite - unpaved)

		E=k(s/12)^a(W/3)^b				E	?	size-specific emission factor (lbs/VMT)
E_{PM10} =	1.5*(6.9/12)^0.9*(W/3)^0.45					s	6.9	surface material silt content (%)
=	1.5	*	0.607716545	*	2.5963811	W	25	mean vehicle weight (tons) - Haul Trucks
=	2.367	lbs/VMT	(Uncontrolled) - Haul				2.88	mean vehicle weight (tons) - Commute Vehicle
=	0.876	lbs/VMT	(63% reduction from watering 3x per day) - Haul			k	1.5	constant (lb/VMT)
=	1.5	*	0.607716545	*		a	0.9	constant
=	0.088	lbs/VMT	(63% reduction from watering 3x per day) - Haul			k	0.15	constant (lb/VMT)
						a	0.9	constant

Reintrained Road Dust Emission Factors (Paved Roads):

E =	k(sL)^0.91xW^1.02					k	0.0022	PM10 - particle size multiplier (lbs/VMT)
E_{PM10} =	k*(0.1)^0.91*497^1.02					k	0.00054	PM2.5 - particle size multiplier (lbs/VMT)
=	0.0022	*	0.123	*	26.662	sL	0.1	road surace silt loading (g/m^2)
=	0.007	PM10				w	25.00	average weight in tons of the vehicles traveling the road
$E_{PM2.5}$ =	0.00054	*	0.123	*	26.662			
=	0.002	PM2.5						

Santa Susana Field Laboratory
Initial Clean-up - Unmitigated

Offsite Exhaust Emission Factors

Table 1-9: Mileage and Emission Factors for Haul Trucks (offsite)

Emission Factors (lbs/mile criteria pollutants; MT/mile GHGs)

		Exhaust								Fugitive	
Haul Truck Emission Factors		ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4	PM10	PM2.5
	< 55 mph	4.7E-04	0.013	0.002	3.5E-05	1.1E-04	1.1E-04	0.002	9.1E-05	0.007	0.002
	55 mph	2.0E-04	0.010	0.001	3.5E-05	1.2E-04	1.1E-04	0.001	7.4E-05		

Distance (by speed)		Total	<55	55
Boeing	Non-Haz	115	7.3	107.7
	Haz	291	7.3	283.7
	Rad	698	7.3	690.7
DOE	Non-Haz	125	7.3	117.7
	Haz	228	7.3	220.7
	Rad	337	7.3	329.7
NASA	Non-Haz	98	7.3	90.7
	Haz	324	7.3	316.7
	Rad	698	7.3	690.7

Reintrained Road Dust Emission Factors:

$E = k(sL)^{0.91} \times W^{1.02}$

E_{PM10} = k*(0.1)^0.91*497^1.02

= 0.0022 * 0.123 * 26.662

= 0.007 PM10

$E_{PM2.5}$ = 0.00054 * 0.123 * 26.662

= 0.002 PM2.5

E	?	particulate emissions (lbs/VMT)
k	0.0022	PM10 - particle size multiplier (lbs/VMT)
k	0.00054	PM2.5 - particle size multiplier (lbs/VMT)
sL	0.1	road surace silt loading grams per square meter (g/m^2)
w	25	average weight in tons of the vehicles traveling the road (tons)

Table 1-10: Weighted Emission Factors and Trucks per day for Initial Clean-up

Weighted Average Haul Truck Emissions (lbs/mile - criteria pollutants; MT - GHGs)

		ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4	#/day	#/year	Activity
Boeing	Non-Haz	2.21E-04	0.011	9.36E-04	3.53E-05	1.15E-04	1.10E-04	0.002	7.54E-05			
	Haz	2.11E-04	0.011	8.86E-04	3.53E-05	1.15E-04	1.10E-04	0.001	7.48E-05	3	780	TTF
	Rad	2.07E-04	0.010	8.66E-04	3.53E-05	1.15E-04	1.10E-04	0.001	7.46E-05	0	0	Demolition
DOE	Non-Haz	2.20E-04	0.011	9.30E-04	3.53E-05	1.15E-04	1.10E-04	0.002	7.54E-05			
	Haz	2.13E-04	0.011	8.95E-04	3.53E-05	1.15E-04	1.10E-04	0.001	7.49E-05	55	14,934	Area IV & HWMF
	Rad	2.10E-04	0.010	8.81E-04	3.53E-05	1.15E-04	1.10E-04	0.001	7.48E-05	26	5,606	Area IV & RMHF
	Rad	2.10E-04	0.011	9.51E-04	3.53E-05	1.15E-04	1.10E-04	0.002	7.56E-05	3	780	Demolition
NASA	Non-Haz	2.24E-04	0.011	9.51E-04	3.53E-05	1.15E-04	1.10E-04	0.002	7.56E-05	1	260	Liquid O2
	Haz	2.10E-04	0.011	8.82E-04	3.53E-05	1.15E-04	1.10E-04	0.001	7.48E-05	8	2,080	Liquid O2
	Max	2.24E-04	0.011	9.51E-04	3.53E-05	1.15E-04	1.10E-04	0.002	7.56E-05			

Sources
- Trucks per day taken from Table 1-6
- Emission Factors taken from EMFAC2014, maximum emissions from each air district potentially crossed for 55 mph, and weighted average by distance for SCCAB and SCAB for <55MPH.
- Distance assumptions for each waste type provided by DTSC.
- Fugitive road dust taken from USEPA AP42 13.2.2 - Paved Roads

Assumptions
- 453.6 grams per pound
- Weighted average determined by distance and speed for each RP.
- Daily trucks are based on 96 trucks per day.
- Annual truck trips are based on 96 trips per day for 260 days.
- HWMF has 412 trips per year and RMHF has 824 trips per year

Santa Susana Field Laboratory
Initial Clean-up - Unmitigated

Offsite Emissions

Assumptions

- 40 miles per commute trip, either within VCAPCD or SCAQMD.
- Assumes 23 workers per day
- Assumes 2 trips per worker
- Boeing activities have been removed from initial projects.
- [1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

- For maximum emissions by air basin, the maximum distance that could be traveled through each air basin based on the potential disposal sites is used. Disposal sites are determined based on RP and type of disposal (non-hazardous, hazardous, radiological).

Equations

-	Commuter Trips	=	Sum of: emission factor in grams per mile (Table 1-1) divided by 453.6 (grams per pound) times miles total miles per day plus fugitive lbs per mile (Table 1-1) times number of miles for each Air District (SCAQMD, VCAPCD).
-	Haul Truck Trips	=	sum of: emission factor in grams per mile (Table 1-9) times 453.6 (grams per pound) times miles total miles per day for each type of disposal location (Non-hazardous, Hazardous, Radiological) plus the emission factors for fugitive road dust (Table 1-9) times
		=	total miels per day.
-	Total Miles	=	miles per trip times number of trips.
-	tons/year	=	lbs/day multiplied by 260 days divided by 2000 lbs per ton.
-	MT/year	=	lbs/day multiplied by 260 days per year divided by 2004.62 metric tons per pound.

Sources

- Worker Trips and Truck Trips taken from Table 1-6
- Number of Haul Trips per daty taken from Table 1-10
- Miles per waste disposal type taken from Table 1-9

Santa Susana Field Laboratory
Overall Site Clean-up - Unmitigated
Overall Site Cleanup Equipment Assumptions

Table 1-11: Overall Cleanup Equipment Assumptions

Equipment List	Boeing	DOE	NASA	M&M
Rubber Tired Dozers	2	1.5	1.5	0
Concrete/Industrial Saws	0	0	0	0
Tractors/Loaders/Backhoes	3.5	2.5	2.5	0
Graders	2	1	***1***	***0***
Excavators	2.00	1.00	1.00	0.00
Scrapers	0	0	0	0
street sweepers	1	0.5	0.5	0
cranes	0	0	0	0
impact chisels	0	0	0	0
grapplers	0	0	0	0
Forklifts	2	1	1	0
Water Truck	3	1	1	0
Daily Haul Trucks (Air Quality)	32	32	32	0
Workers	150	50	50	72
Years of Operation	12	12	12	0
Non-Haz Soil Truks	17,420	73,260	9,650	0
Haz Soil Trucks	3,520	3,200	45,400	0
Rad Soil Trucks	980	5,940	1,700	0
Total Number of Trucks	21,920	82,400	56,750	0
Maximum Annual Trucks (GHG)	7,020	7,020	6,760	0

Sources
- Equipment lists provided by DTSC
- Hauling assumes 96 trucks per day, 32 for each RP.
- Total trucks by soil type taken from Table 3-4 of the Project Description

Assumptions
- Assumes equipment operates 8 hours per day. Water truck is 90 miles per day (15 mph * 6 hr/day)
- Assumes Boeing has 3 excavation sites per day, DOE has 1 excavation site per day, NASA has one excavation site per day
- Equipment usage is the number of equipment operating a full 8 hours. Therefore, 0.75 of an equipmment or 0.5 of a piece of equipment means operation of 6 or 4 hours per day respectively.
- Maximum annual trucks assumes 80 trucks per day for 260 days per year.

Santa Susana Field Laboratory
Overall Site Cleanup - Unmitigated

Offsite Exhaust Emission Factors

Table 1-12: Weighted Emission Factors and Trucks per day for Overall Clean-up

Weighted Average Haul Truck Emissions (lbs/mile - criteria pollutants; MT - GHGs)

		ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4	Max Truks /day	Max Truks /year
Boeing	Non-Haz	2.21E-04	0.011	9.36E-04	3.53E-05	1.15E-04	1.10E-04	0.002	7.54E-05	32	5,579
	Haz	2.11E-04	0.011	8.86E-04	3.53E-05	1.15E-04	1.10E-04	0.001	7.48E-05		1,127
	Rad	2.07E-04	0.010	8.66E-04	3.53E-05	1.15E-04	1.10E-04	0.001	7.46E-05		314
DOE	Non-Haz	2.20E-04	0.011	9.30E-04	3.53E-05	1.15E-04	1.10E-04	0.002	7.54E-05	32	6,241
	Haz	2.13E-04	0.011	8.95E-04	3.53E-05	1.15E-04	1.10E-04	0.001	7.49E-05		273
	Rad	2.10E-04	0.010	8.81E-04	3.53E-05	1.15E-04	1.10E-04	0.001	7.48E-05		506
NASA	Non-Haz	2.24E-04	0.011	9.51E-04	3.53E-05	1.15E-04	1.10E-04	0.002	7.56E-05	32	1,149
	Haz	2.10E-04	0.011	8.82E-04	3.53E-05	1.15E-04	1.10E-04	0.001	7.48E-05		5,408
	Rad	2.07E-04	0.010	8.66E-04	3.53E-05	1.15E-04	1.10E-04	0.001	7.46E-05		203

Sources - Emission Factors used to determine weighted emissions taken from Table 1-9.

Assumptions
- 453.6 grams per pound
- Weighted average is based on distance and speed.
- Max Trucks per day assumes maximum potential milage based on number of trucks per waste type and length of trip, and 32 trips per day per RP
- Max trucks per year assumes 80 trucks per day (27 for DOE and Boeing, 26 for NASA) and is weighted to take into account the total amount of trucks per waste type (Table 1-11)

Santa Susana Field Laboratory
Overall Site Cleanup - Unmitigated

Offsite Emissions

Assumptions

- 40 miles per commute trip, either within VCAPCD or SCAQMD.
- Number of workers per day is taken from Table 1-11. For M&M each RP is assumed to have 3 workers.
- Assumes 2 trips per worker
- Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. Only the maximum for each air district is reported as a worst case scenario. 40 miles per trip was the average trip length assumed for workers.

- For maximum emissions by air basin, the maximum distance that could be traveled through each air basin based on the potential disposal sites is used. Disposal sites are determined based on RP and type of disposal (non-hazardous, hazardous, radiological).
- No haul trucks required for M&M activities.

Equations

-	Commuter Trips	=	Sum of: emission factor in grams per mile (Table 1-1) times 453.6 (grams per pound) times miles total miles per day for each Air District (SCAQMD, VCAPCD).
-	Haul Truck Trips	=	sum of: emission factor in grams per mile (Table 1-9) times 453.6 (grams per pound) times miles total miles per day for each type of disposal location (Non-hazardous, Hazardous, Radiological) plus the emission factors for fugitive
		=	road dust times total miels per day.
-	Total Miles	=	miles per trip times number of trips.
-	tons/year	=	lbs/day multiplied by 260 days divided by 2000 lbs per ton.
-	MT/year	=	lbs/day multiplied by 260 days per year divided by 2004.62 metric tons per pound.

Sources

- Worker Trips and Truck Trips taken from Table 1-11
- Miles for haul truck trips taken from Table 1-9
- Number of haul truck trips taken from Table 1-12

Santa Susana Field Laboratory
Landfill Distance by Air District and Air Basin

Table 1-13 Distance in Air District (Miles)

		From Site	Ventura	Los Angeles	SBDO	Riverside	Riverside	Riverside	Los Angeles	Kern	Kings
Landfill	RP	(Miles)	VCAPCD	SCAQMD					Antelpoe Valley AQMD	SJAPCD	
Antelope Valley	Boeing, DOE	57	0.42	45.78					10.8		
Azusa Land Reclamation	NASA	54	0.42	53.58							
Chiquita Canyon Landfill	Boeing, DOE, NASA	36	0.42	35.58							
Clean Harbors Aragonite	Boeing	680	0.42	65.78	26.74						
Clean Harbors Buttonwillow	Boeing, DOE	125	0.42	67.58						57	
Clean Harbors Colafax	Boeing	1758	0.42	65.78	42.8	16	48.4	61.8			
Clean Harbors Deer Park	Boeing	1608	0.42	65.78	42.8	16	48.4	61.8			
Clean Harbors Deer Trail	Boeing	1089	0.42	27.49					32.92		
Clean Harbors Grassy Mountain	Boeing	698	0.42	65.78	26.74						
Clean Harbors Westmoreland	Boeing, DOE	228	0.42	65.78	42.8	16	64.4				
DeMenno Kerdon	NASA	53	0.42	52.58							
Energy Solutions	Boeing, DOE	690	0.42	26.74							
Equova Water Tech	Boeing, NASA	45	0.42	44.58							
Kettleman Hills Facility	Boeing	181	0.42	67.58						94.45	18.55
Kramer Metals	DOE	46.1	0.42	45.68							
La Paz County Landfill	NASA	324	0.42	65.78	42.8	16	48.4	71.89			
Lancaster Landfill and Recycling Center	Boeing	74	0.42	45.78					27.8		
McKittrick Wast Treatment Site	Boeing, DOE	138	0.42	67.58						71	
Mesquite Regional Landfill	DOE	263	0.42	65.78	42.8	16	64.4				
Nevada National Security Site	DOE	337	0.42	45.78					27.96		
Simi Valley Landfill and Recycling Center	Boeing	21.88	10.29	11.59							
Soil Safe	NASA	97	0.42	45.78					33.06		
Southwest Treatment Systems	Boeing	45	0.42	44.58							
Standard Industries	DOE	36	17.84	18.16							
US Ecology, Beatty	Boeing, NASA	291	0.42	45.78					27.96		
US Ecology, Richland (Through NV)	Boeing	1069	0.42	45.78					27.96		
US Ecology, Richland (Through CA)	Boeing	1069	0.42	67.58						94.45	26.5
US Ecology, Grandview	Boeing, DOE	897	0.42	27.49					32.92		

Santa Susana Field Laboratory

Landfill Distance by Air District and Air Basin

Table 1-13 Distance in Air District (Miles)

	SBDO	Imperial	Kern	Inyo	Fresno	Merced	Stanislaus	Joaquin	Sacramento	Yolo	Colusa	Glenn	Tehama	Shasta	Siskiyou	
Landfill	MDAQMD	Imperial County APCD	EKCAPCD	Great Basin Unified APCD	SJVAPCD				Sacramento	Yolo/Solano	Colusa	Glenn	Tehama	Shasta	Siskiyou	Outside CA
Antelope Valley																
Azusa Land Reclamation																
Chiquita Canyon Landfill																
Clean Harbors Aragonite	161.64															425.42
Clean Harbors Buttonwillow																
Clean Harbors Colafax	27.8															1495
Clean Harbors Deer Park	27.8															1345
Clean Harbors Deer Trail	165.29															862.88
Clean Harbors Grassy Mountain	162.93															442.13
Clean Harbors Westmoreland		38.6														
DeMenno Kerdon																
Energy Solutions	162.93															499.91
Equova Water Tech																
Kettleman Hills Facility																
Kramer Metals																
La Paz County Landfill	52.1															26.61
Lancaster Landfill and Recycling Center																
McKittrick Wast Treatment Site																
Mesquite Regional Landfill		73.6														
Nevada National Security Site			72	142.64												48.2
Simi Valley Landfill and Recycling Center																
Soil Safe	17.74															
Southwest Treatment Systems																
Standard Industries																
US Ecology, Beatty			72	131.4												13.44
US Ecology, Richland (Through NV)			72	156.57												766.27
US Ecology, Richland (Through CA)					66.19	32.3	28.07	49.85	34.2	28.84	33.86	28.55	39.94	61.7	65.74	410.81
US Ecology, Grandview	165.29															670.88

Santa Susana Field Laboratory
Landfill Distance by Air District and Air Basin

Table 1-14 Distance in Air Basin

Landfill	RP	From Site (Miles)	SCCAB	SCAB	SSAB	MDAB	SJVAB	GBVAB	SACVAB	NEPAB	Outside CA
Antelope Valley	Boeing, DOE	57	0.42	45.78	0	10.8	0	0	0	0	0
Azusa Land Reclamation	NASA	54	0.42	53.58	0	0	0	0	0	0	0
Chiquita Canyon Landfill	Boeing, DOE, NASA	36	0.42	35.58	0	0	0	0	0	0	0
Clean Harbors Aragonite	Boeing	680	0.42	92.52	0	161.64	0	0	0	0	425.42
Clean Harbors Buttonwillow	Boeing, DOE	125	0.42	67.58	0	0	57	0	0	0	0
Clean Harbors Colafax	Boeing	1758	0.42	124.58	48.4	89.6	0	0	0	0	1495
Clean Harbors Deer Park	Boeing	1608	0.42	124.58	48.4	89.6	0	0	0	0	1345
Clean Harbors Deer Trail	Boeing	1089	0.42	27.49	0	198.21	0	0	0	0	862.88
Clean Harbors Grassy Mountain	Boeing	698	0.42	92.52	0	162.93	0	0	0	0	442.13
Clean Harbors Westmoreland	Boeing, DOE	228	0.42	124.58	103	0	0	0	0	0	0
DeMenno Kerdon	NASA	53	0.42	52.58	0	0	0	0	0	0	0
Energy Solutions	Boeing, DOE	690	0.42	26.74	0	162.93	0	0	0	0	499.91
Equova Water Tech	Boeing, NASA	45	0.42	44.58	0	0	0	0	0	0	0
Kettleman Hills Facility	Boeing	181	0.42	67.58	0	0	113	0	0	0	0
Kramer Metals	DOE	46.1	0.42	45.68	0	0	0	0	0	0	0
La Paz County Landfill	NASA	324	0.42	124.58	48.4	123.99	0	0	0	0	26.61
Lancaster Landfill and Recycling Center	Boeing	74	0.42	45.78	0	27.8	0	0	0	0	0
McKittrick Wast Treatment Site	Boeing, DOE	139	0.42	67.58	0	0	71	0	0	0	0
Mesquite Regional Landfill	DOE	263	0.42	124.58	138	0	0	0	0	0	0
Nevada National Security Site	DOE	337	0.42	45.78	0	99.96	0	142.64	0	0	48.2
Simi Valley Landfill and Recycling Center	Boeing	21.88	10.29	11.59	0	0	0	0	0	0	0
Soil Safe	NASA	97	0.42	45.78	0	50.8	0	0	0	0	0
Southwest Treatment Systems	Boeing	45	0.42	44.58	0	0	0	0	0	0	0
Standard Industries	DOE	36	17.84	18.16	0	0	0	0	0	0	0
US Ecology, Beatty	Boeing, NASA	291	0.42	45.78	0	99.96	0	131.4	0	0	13.44
US Ecology, Richland (Through NV)	Boeing	1069	0.42	45.78	0	99.96	0	156.57	0	0	766.27
US Ecology, Richland (Through CA)	Boeing	1069	0.42	67.58			297.36	0	227.09	65.74	410.81
US Ecology, Grandview	Boeing, DOE	897	0.42	27.49	0	198.21	0	0	0	0	670.88

Santa Susana Field Laboratory
Air Quality Appendix
Section 2
Existing Conditions

Santa Susana Field Laboratory
Existing Conditions

Table 2-1: Existing Conditions - Boeing Commuter Emissions

					lbs/day							
		Miles/trip	# trips	Miles	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4
Boeing	VCAPCD Offsite	31.32	60	1,879	0.090	0.347	3.696	0.013	1.501	0.373	1,251.138	0.050
	SCAQMD	8.68	60	521	0.025	0.096	1.024	0.003	0.416	0.103	346.739	0.014
	Onsite Travel	4.00	30	120	0.015	0.029	0.359	0.001	0.097	0.025	147.118	0.006
	total[1]	44.00	60	2,640	0.130	0.473	5.080	0.017	2.014	0.502	1,744.995	0.069
	VCAPCD	0.42	60	25	0.001	0.005	0.050	1.7E-04	0.020	0.005	16.778	0.001
	SCAQMD	39.58	60	2,375	0.114	0.439	4.671	0.016	1.897	0.472	1,581.099	0.063
	Onsite Travel	4.00	30	120	0.015	0.029	0.359	0.001	0.097	0.025	147.118	0.006
	total[1]	44	60	2,640	0.115	0.444	4.721	0.016	1.917	0.477	1,597.877	0.063
					tons/year						MT/year	
					ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4
	VCAPCD	31.32	15,600	488,592	0.012	0.045	0.481	0.002	0.195	0.049	147.552	0.006
	SCAQMD	8.68	15,600	135,408	0.003	0.013	0.133	4.5E-04	0.054	0.013	40.892	0.002
	Onsite Travel	4.00	15,600	62,400	0.002	0.004	0.047	1.0E-04	0.013	0.003	17.350	0.001
	total[1]	44	15,600	686,400	0.017	0.062	0.660	0.002	0.262	0.065	205.794	0.008
	VCAPCD	0.42	15,600	6,552	1.6E-04	0.001	0.006	2.2E-05	0.003	0.001	1.979	0.000
	SCAQMD	39.58	15,600	617,448	0.015	0.057	0.607	0.002	0.247	0.061	186.465	0.007
	Onsite Travel	4.00	15,600	62,400	0.002	0.004	0.047	1.0E-04	0.013	0.003	17.350	0.001
	total[1]	44	15,600	686,400	0.017	0.062	0.660	0.002	0.262	0.065	205.794	0.008

*Totals may not add exactly due to rounding.

Assumptions

- Boeing has 15 workers and 15 contractors, DOE has 2 workers, and NASA has 6 workers. Existing onsite emissions are based on the operations occurring onsite at the time of the NOP. The NOP was completed before the NASA demolition of existing structures. The personnel onsite consists of one NASA civil servant and four NASA contractors for environmental investigation (NASA, 2016). The analysis assumed 6 workers as a worst case scenario based on the information provided at the time the analysis was conducted.
- [1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

- Average 4 mile onsite round trip in addition to the offsite.
- Emissions occur 260 days per year = 52 weeks x 5 days per week.
- Miles provided for offsite trips are one way miles and the analysis assumes two one way trips per employee (one to and one from the site)

Santa Susana Field Laboratory
Existing Conditions

Equations: (For daily and annual pollutant concentrations)

emission factors (lbs/mile) = emission factor in grams per mile (Table 1-1) divided by 453.6 (grams per pound)

Miles = miles per trip times number of trips.

pollutant calculations

lbs/day = emission factor in lbs/mile time number of miles. PM10 and PM2.5 include fugitive emissions from road travel.

tons/year = lbs/day multiplied by 260 days divided by 2000 lbs per ton.

MT/year = lbs/day multiplied by 260 days per year divided by 2004.62 metric tons per pound.

Note: Assumptions and equations are the same for all RPs and therefore are not repeated for each set of cacluations

Table 2-2: Existing Conditions - DOE Commuter Emissions

					lbs/day							
		Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**	**CO_2**	**CH_4**
DOE	VCAPCD Offsite	31.32	4	125	0.006	0.023	0.246	0.001	0.100	0.025	83.409	0.003
	SCAQMD	8.68	4	35	0.002	0.006	0.068	2.3E-04	0.028	0.007	23.116	0.001
	Onsite Travel	4	2	8	3.8E-04	0.001	0.016	5.3E-05	0.006	0.002	5.326	2.1E-04
	total[1]	44.00	4	176	0.008	0.031	0.330	0.001	0.134	0.033	111.851	0.004
	VCAPCD	0.42	4	2	0.000	0.000	0.003	1.1E-05	0.001	3.3E-04	1.119	4.4E-05
	SCAQMD	39.58	4	158	0.008	0.029	0.311	0.001	0.126	0.031	105.407	0.004
	Onsite Travel	4	2	8	3.8E-04	0.001	0.016	5.3E-05	0.006	0.002	5.326	2.1E-04
	total[1]	44	4	176	0.008	0.030	0.315	0.001	0.128	0.032	106.525	0.004
					tons/year						**MT/year**	
					ROC/VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**	**CO_2**	**CH_4**
	VCAPCD	31.32	1,040	32,573	0.001	0.003	0.032	1.1E-04	0.013	0.003	9.837	3.9E-04
	SCAQMD	8.68	1,040	9,027	2.2E-04	0.001	0.009	3.0E-05	0.004	0.001	2.726	1.1E-04
	Onsite Travel	4	1,040	4,160	5.0E-05	1.9E-04	0.002	6.9E-06	0.001	0.000	0.628	2.5E-05
	total[1]	44	1,040	45,760	0.001	0.004	0.043	1.5E-04	0.017	0.004	13.191	0.001
	VCAPCD	0.42	1,040	437	1.0E-05	4.0E-05	4.3E-04	1.5E-06	1.7E-04	4.3E-05	0.132	5.2E-06
	SCAQMD	39.58	1,040	41,163	0.001	0.004	0.040	1.4E-04	0.016	0.004	12.431	4.9E-04
	Onsite Travel	4	1,040	4,160	5.0E-05	1.9E-04	0.002	6.9E-06	0.001	0.000	0.628	2.5E-05
	total[1]	44	1,040	45,760	0.001	0.004	0.043	1.5E-04	0.017	0.004	13.191	0.001

*Totals may not add exactly due to rounding.

- Emissions occur 260 days per year = 52 weeks x 5 days per week.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

Santa Susana Field Laboratory
Existing Conditions

Table 2-3: Existing Conditions - NASA Commuter Emissions

		Miles/trip	# trips	Miles	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4
NASA	VCAPCD Offsite	31.32	12	376	0.018	0.069	0.739	0.003	0.300	0.075	250.228	0.010
	SCAQMD	8.68	12	104	0.005	0.019	0.205	0.001	0.083	0.021	69.348	0.003
	Onsite Travel	4	6	24	0.001	0.004	0.047	1.6E-04	0.019	0.005	15.979	0.001
	total[1]	44	30	504	0.024	0.093	0.991	0.003	0.403	0.100	335.554	0.013
	VCAPCD	0.42	12	5	2.4E-04	0.001	0.010	3.4E-05	0.004	0.001	3.356	0.000
	SCAQMD	39.58	12	475	0.023	0.088	0.934	0.003	0.379	0.094	316.220	0.013
	Onsite Travel	4	6	24	0.001	0.004	0.047	1.6E-04	0.019	0.005	15.979	0.001
	total[1]	44	12	528	0.023	0.089	0.944	0.003	0.383	0.095	319.575	0.013
					tons/year						MT/year	
					ROC/VOC	NOx	CO	SO_x	PM_{10}	$PM_{2.5}$	CO_2	CH_4
	VCAPCD	31.32	3,120	97,718	0.002	0.009	0.096	3.3E-04	0.039	0.010	29.510	0.001
	SCAQMD	8.68	3,120	27,082	0.001	0.003	0.027	9.0E-05	0.011	0.003	8.178	3.2E-04
	Onsite Travel	4	3,120	12,480	1.5E-04	0.001	0.006	2.1E-05	0.003	0.001	1.884	7.5E-05
	total[1]	44	7,800	343,200	0.003	0.012	0.129	4.4E-04	0.052	0.013	39.573	0.002
	VCAPCD	0.42	3,120	1,310	3.1E-05	0.000	0.001	4.4E-06	0.001	0.000	0.396	1.6E-05
	SCAQMD	39.58	3,120	123,490	0.003	0.011	0.121	4.1E-04	0.049	0.012	37.293	0.001
	Onsite Travel	4	3,120	12,480	1.5E-04	0.001	0.006	2.1E-05	0.003	0.001	1.884	7.5E-05
	total[1]	44	3,120	137,280	0.003	0.012	0.129	4.4E-04	0.052	0.013	39.573	0.002

*Totals may not add exactly due to rounding.

- Emissions occur 260 days per year = 52 weeks x 5 days per week.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

Santa Susana Field Laboratory
Existing Conditions

Total Daily Emissions for Existing Conditions:

Table 2-4: Existing Conditions - Total Daily Mobile Emissions

	lbs/day							
	ROC/VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**	**CO_2**	**CH_4**
Boeing	0.130	0.473	5.080	0.017	2.014	0.502	1,744.995	0.069
DOE	0.008	0.031	0.330	0.001	0.134	0.033	111.851	0.004
NASA	0.024	0.093	0.991	0.003	0.403	0.100	335.554	0.013
total	0.162	0.597	6.401	0.021	2.551	0.635	2,192.401	0.087

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Air Quality Appendix
Section 3
Unmitigated Initial Clean-up Programs

Santa Susana Field Laboratory

Initial Clean-up - Emissions Summary (Unmitigated)

Table 3-1: Sumamry of Initial Clean-up Emissions

	Lbs/Day					
	ROC/VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Area IV						
Onsite						
Equipment	0.970	20.574	22.249	0.037	75.414	11.168
Haul	0.571	14.587	3.357	0.013	0.060	0.058
Crew	0.224	0.446	5.422	0.012	0.020	0.018
Onsite Total	1.765	35.607	31.029	0.063	75.494	11.244
Offsite						
Crew	0.038	0.148	1.574	0.005	0.639	0.159
Haul -VCAPCD	0.014	0.672	0.057	0.002	0.468	0.120
Haul - SCAQMD	3.232	160.225	13.593	0.537	111.609	28.642
Haul - Other	2.877	143.875	12.074	0.483	100.461	25.781
Offsite Total	6.161	304.919	27.297	1.028	213.177	54.702
Area IV Total						
VCAPCD	1.817	36.427	32.659	0.071	76.601	11.523
SCAQMD	5.035	195.980	46.195	0.605	187.742	40.044
All	7.925	340.527	58.325	1.091	288.671	65.946
Liquid Oxygen Plant						
Onsite						
Equipment	0.970	20.574	22.249	0.037	14.948	4.893
Haul	0.068	1.727	0.398	0.002	0.007	0.007
Crew	0.224	0.446	5.422	0.012	0.020	0.018
Onsite Total	1.262	22.747	28.069	0.051	14.975	4.918
Offsite						
Crew	0.038	0.148	1.574	0.005	0.639	0.159
Haul -VCAPCD	0.006	0.290	0.026	0.001	0.200	0.051
Haul - SCAQMD	0.443	22.075	1.861	0.074	15.400	3.952
Haul - Other	0.684	34.167	2.874	0.115	23.844	6.119
Offsite Total	1.172	56.680	6.334	0.195	40.083	10.281
Liquid Oxygen Plant Total						
VCAPCD	1.306	23.185	29.668	0.057	15.814	5.128
SCAQMD	1.743	44.970	31.503	0.131	31.014	9.029
All	2.433	79.427	34.403	0.246	55.058	15.199
Demolition - DOE						
Onsite						
Equipment	0.680	14.895	16.954	0.025	4.936	1.326
Haul	0.023	0.576	0.133	0.001	0.002	0.002
Crew	0.447	0.892	10.844	0.024	0.039	0.036
Onsite Total	1.150	16.363	27.931	0.050	4.977	1.364
Offsite						
Crew	0.088	0.340	3.619	0.012	1.470	0.366
Haul -VCAPCD	0.001	0.027	0.002	8.9E-05	0.018	0.018
Haul - SCAQMD	0.058	2.925	0.261	0.010	2.014	2.012
Haul - Other	0.366	18.582	1.659	0.062	12.792	12.783
Offsite Total	0.513	21.874	5.542	0.084	16.294	15.180
Demolition Total						
VCAPCD	1.239	16.730	31.553	0.063	6.466	1.748
SCAQMD	1.296	19.628	31.812	0.072	8.461	3.742
All	1.663	38.237	33.473	0.134	21.271	16.543

Santa Susana Field Laboratory

Initial Clean-up - Emissions Summary (Unmitigated)

Table 3-1: Sumamry of Initial Clean-up Emissions

	Lbs/Day					
	ROC/VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
TTF - Boeing						
Onsite						
Equipment	0.790	16.818	17.642	0.030	8.220	3.520
Haul	0.023	0.576	0.133	0.001	0.002	0.002
Crew	0.224	0.446	5.422	0.012	0.020	0.018
Onsite Total	1.036	17.840	23.197	0.043	8.242	3.540
Offsite						
Crew	0.031	0.118	1.259	0.004	0.511	0.127
Haul -VCAPCD	0.001	0.026	0.002	8.9E-05	0.018	0.005
Haul - SCAQMD	0.158	7.856	0.662	0.026	5.480	1.406
Haul - Other	0.210	10.468	0.882	0.035	7.302	1.874
Offsite Total	0.399	18.468	2.805	0.066	13.312	3.412
TTF- Boeing Total						
VCAPCD	1.067	17.985	24.458	0.047	8.771	3.672
SCAQMD	1.224	25.814	25.118	0.073	14.233	5.073
All	1.435	36.308	26.002	0.108	21.554	6.952
RMHF/HWMF - DOE						
Onsite						
Equipment	1.579	33.636	35.284	0.060	15.537	6.946
Haul	0.038	0.960	0.221	0.001	0.004	0.004
Crew	0.447	0.892	10.844	0.024	0.039	0.036
Onsite Total	2.064	35.488	46.350	0.085	15.580	6.985
Offsite						
Crew	0.077	0.296	3.147	0.011	1.278	0.318
Haul -VCAPCD	0.001	0.044	0.004	1.5E-04	0.031	0.008
Haul - SCAQMD	0.169	8.192	0.716	0.027	5.667	1.454
Haul - Other	0.398	19.675	1.676	0.066	13.692	3.514
Offsite Total	0.061	3.037	0.255	0.010	2.120	0.544
RMHF/HWMF - DOE Total						
VCAPCD	2.142	35.828	49.501	0.096	16.889	7.311
SCAQMD	2.311	43.975	50.213	0.123	22.525	8.758
All	2.125	38.525	46.605	0.095	17.700	7.530
Project Total						
Onsite	7.276	128.045	156.575	0.292	119.268	28.051
Crew	0.273	1.050	11.173	0.038	4.537	1.129
Offsite (VCAPCD)	0.022	1.059	0.091	0.004	0.736	0.203
Offsite (SCAQMD)	4.060	201.273	17.093	0.674	140.170	37.467
Offsite (Other)	4.536	226.766	19.165	0.761	158.092	50.071
Totals						
VCAPCD	7.521	**129.961**	165.784	0.326	123.557	29.138
Threshold	25.00	25.00	N/A	N/A	N/A	N/A
Significant	No	**Yes**	No	No	No	No
SCAQMD	11.617	330.401	185.190	1.005	263.928	66.635
Threshold	55	55	550	150	150	55
Significant	No	**Yes**	**No**	No	**Yes**	**Yes**
All Air Districts						
All	15.582	533.023	198.808	1.674	404.254	112.170

*Totals may not add exactly due to rounding.

Sources: Emissions are taken from Tables 3-3 through 3-16.

Santa Susana Field Laboratory

Initial Clean-up - LST Emissions Summary (Unmitigated)

Table 3-2: LST Initial Clean-up Emissions Summary

LST Emissions Summary
(lbs/day)

	NOx	CO	PM10	PM2.5
Emissions	128	157	75	28
Threshold	131	5045	114	53
Significant?	No	No	**No**	**No**

Threshold Determination (2 acre site)

	NOx	NOx[2]	CO	PM10	PM2.5	
500 meters	263	146	7,460	162	84	Source Receptor Area 6
400 meters	237	131	5,045	114	53	
300 meters	212	117	3,837	90	37	
200 meters	187	103	2,629	66	21	Source Receptor Area 6

LST's determined by max for each activity as the activities occur at different locations throughout the site.

Sources: LSTs are determined by summing the onsite emissions as reported in Table 3-1.

Assumptions NOx[2]: The screening criteria for NOx were developed based on the 1-hour NO_2 CAAQS of 0.18 ppm. However, since the publication of the SCAQMD's guidance, the USEPA has promulgated a 1-hour NO_2 NAAQS of 0.100 ppm based on a 98th percentile value, which is more stringent than the CAAQS. In order to determine if Project emissions would result in an exceedance of the 1 hour NO_2 NAAQS, an approximated LST was estimated to evaluate the federal 1-hour NO_2 standard, as the SCAQMD significance threshold has not been updated to reflect this standard. Calculated by scaling the NO_2 LST for by the ratio of 1-hour NO_2 standards (federal/state)(i.e., 236 lb/day * (0.10/0.18) = 131 lb/day).

Santa Susana Field Laboratory
Initial Clean-up - Unmitigated

Assumptions - Equipment usage is the number of equipment operating a full 8 hours. Therefore, 0.75 of an equipmment or 0.5 of a piece of equipment means operation of 6 or 4 hours per day respectively.

Initial Clean Up Emissions

Table 3-3 Initial Clean-up Daily Emissions

	Maximum Daily Emissions (Lbs/day)							
	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4
Area IV - DOE								
Exhaust	0.970	20.574	22.249	0.037	0.953	0.952	4106.964	32.063
Fugitive	-	-	-	-	74.461	10.216	-	-
Haul Trucks	0.571	14.587	3.357	0.013	0.060	0.058	2378.539	118.927
Crew	0.224	0.446	5.422	0.012	0.020	0.018	2224.430	111.221
Total	1.765	35.607	31.029	0.063	75.494	11.244	8709.934	262.211
Liquid Oxygen Plant - NASA								
Exhaust	0.970	20.574	22.249	0.037	0.953	0.952	4106.964	32.063
Fugitive	-	-	-	-	13.996	3.941	-	-
Haul Trucks	0.068	1.727	0.398	0.002	0.007	0.007	281.669	14.083
Crew	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Demolition - DOE								
Exhaust	0.680	14.895	16.954	0.025	0.834	0.833	2876.196	31.679
Fugitive	-	-	-	-	4.102	0.492	-	-
Haul Trucks	0.023	0.576	0.133	0.001	0.002	0.002	93.890	4.694
Crew	0.447	0.892	10.844	0.024	0.039	0.036	4448.860	222.443
Total	1.150	16.363	27.931	0.050	4.977	1.364	7418.946	258.816
TTF - Boeing								
Exhaust	0.790	16.818	17.642	0.030	0.754	0.754	3339.423	31.831
Fugitive	-	-	-	-	7.465	2.766	-	-
Haul Trucks	0.023	0.576	0.133	0.001	0.002	0.002	93.890	4.694
Crew	0.224	0.446	5.422	0.012	0.020	0.018	2224.430	111.221
Total	1.036	17.840	23.197	0.043	8.242	3.540	5657.743	147.747
RMHF/HWMF - DOE								
Exhaust	1.579	33.636	35.284	0.060	1.509	1.508	6678.846	63.662
Fugitive	-	-	-	-	0.00	0.00	-	-
Haul Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew	0.224	0.446	5.422	0.012	0.039	0.018	2224.430	111.221
Total	0.224	0.446	5.422	0.012	0.039	0.018	2224.430	111.221

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Initial Clean-up - Unmitigated

Initial Clean Up Emissions

Table 3-4 Initial Clean-up Annual Emissions

	Annual Emissions (Tons/year)						(MT/year)	
Year 1	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4
Area IV - DOE								
Exhaust	0.126	2.675	2.892	0.005	0.124	0.124	484.351	3.781
Fugitive	-	-	-	-	9.680	1.328	-	-
Haul Trucks	0.074	1.896	0.436	0.002	0.008	0.008	280.511	14.026
Crew	0.029	0.058	0.705	0.002	0.003	0.002	262.336	13.117
Total	0.229	4.629	4.034	0.008	9.814	1.462	1027.197	30.924
Liquid Oxygen Plant - NASA								
Exhaust	0.126	2.675	2.892	0.005	0.124	0.124	484.351	3.781
Fugitive	-	-	-	-	1.819	0.512	-	-
Haul Trucks	0.009	0.225	0.052	0.000	0.001	0.001	33.218	1.661
Crew	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00
Demolition - DOE								
Exhaust	0.088	1.936	2.204	0.003	0.108	0.108	339.201	3.736
Fugitive	-	-	-	-	0.533	0.064	-	-
Haul Trucks	0.003	0.075	0.017	0.000	0.000	0.000	11.073	0.554
Crew	0.058	0.116	1.410	0.003	0.005	0.005	524.672	26.234
Total	0.149	2.127	3.631	0.007	0.647	0.177	874.946	30.523
TTF - Boeing								
Exhaust	0.103	2.186	2.293	0.004	0.098	0.098	393.832	3.754
Fugitive	-	-	-	-	0.970	0.360	-	-
Haul Trucks	0.003	0.075	0.017	0.000	0.000	0.000	11.073	0.554
Crew	0.029	0.058	0.705	0.002	0.003	0.002	262.336	13.117
Total	0.135	2.319	3.016	0.006	1.071	0.460	667.240	17.424
RMHF/HWMF - DOE								
Exhaust	0.205	4.373	4.587	0.008	0.196	0.196	787.663	7.508
Fugitive	-	-	-	-	0.00	0.00	-	-
Haul Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00
Crew	0.029	0.058	0.705	0.002	0.005	0.002	262.336	13.117
Total	0.029	0.058	0.705	0.002	0.005	0.002	262.336	13.117

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Initial Clean-up - Unmitigated

Initial Clean Up Emissions

Equations

- Daily emssions (Exhaust) (lbs/day) = sum of daily emissions for each piece of equipment.
- Emissions from each equipment type = Number of pieces of equipment times the emissions per day for that piece of equipment.
  - Emissions per day per equipment type from Table 1-5.
  - Number of Pieces of Equipment per activty from Table 1-6.
- Daily emssions (Fugitive) (lbs/day) - Taken from Table 3-5 and 3-6 for initial clean-up projects.
- Daily emssions (haul trucks) (lbs/day) = [(Emission $Factor_{exhaust}$ X number of trips X Miles) x (Emission $Factor_{idle}$ X number of minutes X number of trucks)] / 453.6
  - Emission Factors from Table 1-4.
  - Number of Trips from Table 1-6
  - **4** miles/ round trip
  - **15** minutes idling per truck (- assumes idling entering the site, at the loading location, and leaving the site)
- Daily emssions (crew (onsite worker transport)) = ((Number of Employees/15) times Emission Factor times 4) / 453.6
  - Number of employees per phase taken from Table 1-6.
  - **15** workers/onsite van
  - Emission Factor taken from Table 1-5
  - **4** miles/ round trip
  - 453.6 grams per pound
- Total Daily Emissions for each criteria pollutant is the sume of the daily exhaust, fugitive, haul truck, and crew emissions.
- Annual emssions (Tons/year) = (Daily Emissions * Number of Days)/2000
  - Daily Emissions from Table 3-3.
  - 2,000.00 lbs/ton
  - 260 days per year
- Annual emssions (MT/year) = (Daily Emissions * Number of Days)/2204.623
  - Daily Emissions from Table 3-3.
  - 2,204.62 lbs per Metric Ton

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Initial Clean-up - Unmitigated

Onsite Fugitive Emissions

Table 3-5 Initial Clean-up Daily Fugitive Emissions

	Acres	#	Tons/truck	# Trucks	PM10	PM2.5
Maximum (lbs/day) - Area IV						
Scrapers/graders	0.75	N/A	N/A	N/A	0.295	0.032
Dozers/Excavators	N/A	2.50	N/A	N/A	5.578	3.066
Truck Loading	N/A	N/A	N/A	N/A	0.388	0.059
Total					***6.261***	***3.157***
Maximum (lbs/day) - Oxygen Plant						
Scrapers	0.75	N/A	N/A	N/A	0.295	0.032
Truck Loading	N/A	N/A	N/A	N/A	0.046	0.007
Total					***5.919***	***3.105***
Maximum (lbs/day) - Demolition - DOE						
Mechanic Demolition	N/A	N/A	23	3	0.008	0.001
Debris Loading	N/A	N/A	23	3	1.401	0.212
Total					***1.408***	***0.213***

*Totals may not add exactly due to rounding.

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Table 3-6 Initial Clean-up Fugitive Dust from Unpaved Roads

Maximum Daily Emissions (lbs/day)

	# Miles							
	Unpaved	**Paved**	**# Trucks**	**PM10**	**PM2.5**	**# Vans**	**PM10**	**PM2.5**
Area IV - DOE	1	3	76	68.200	7.059	1	0.001	0.000
Liquid Oxygen Plant - NASA	1	3	9	8.076	0.836	1	0.001	0.000
Demolition - DOE	1	3	3	2.692	0.279	2	0.002	0.000
TTF - Boeing	1	3	3	2.692	0.279	1	0.001	0.000
RMHF/HWMF - DOE	1	3	5	4.487	0.464	2	0.002	0.000

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Demolition Offsite Emissions - DOE

Table 3-7: Offsite Demolition - DOE Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	46	1,441	0.069	0.266	2.834	0.010	1.151	0.286
SCAQMD	8.68	46	399	0.019	0.074	0.785	0.003	0.319	0.079
total[1]	40	46	1,840	0.088	0.340	3.619	0.012	1.470	0.366
VCAPCD	0.42	46	19	0.001	0.004	0.038	1.3E-04	0.015	0.004
SCAQMD	39.58	46	1,821	0.087	0.337	3.581	0.012	1.454	0.362
total[1]	40	46	1,840	0.088	0.340	3.619	0.012	1.470	0.366
				tons/year					
Worker Commute				**VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	11,960	374,587	0.009	0.035	0.368	0.001	0.150	0.037
SCAQMD	8.68	11,960	103,813	0.002	0.010	0.102	3.5E-04	0.041	0.010
total[1]	40	11,960	478,400	0.011	0.044	0.471	0.002	0.191	0.048
VCAPCD	0.42	11,960	5,023	1.2E-04	0.000	0.005	1.7E-05	0.002	0.000
SCAQMD	39.58	11,960	473,377	0.011	0.044	0.466	0.002	0.189	0.047
total[1]	40	11,960	478,400	0.011	0.044	0.471	0.002	0.191	0.048

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

Santa Susana Field Laboratory
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Demolition Offsite Emissions - DOE

Table 3-8: Offsite Demolition - DOE Haul Emissions

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Radiological Disposal Site									
VCAPCD	0.42	6	3	0.001	0.027	0.002	8.9E-05	0.018	0.018
SCAQMD	45.78	6	275	0.058	2.925	0.261	0.010	2.014	2.012
Other CA	242.6	6	1,456	0.306	15.502	1.384	0.051	10.672	10.664
Non-CA	48.2	6	289	0.061	3.080	0.275	0.010	2.120	2.119
Total	337	6	2022	0.425	21.534	1.923	0.071	14.824	14.814
Maximum Emissions by Air Basin									
SCCAB	0.42	6	3	0.001	0.027	0.002	8.9E-05	0.018	0.018
SCAB	45.78	6	275	0.058	2.925	0.261	0.010	2.014	2.012
SSAB	0.00	6	0	0.000	0.000	0.000	0.0E+00	0.000	0.000
MDAB	198.21	6	1,189	0.250	12.665	1.131	0.042	8.719	8.713
SJVAB	0.00	6	0	0.000	0.000	0.000	0.000	0.000	0.000
GBVAB	142.64	6	856	0.180	9.114	0.814	0.030	6.274	6.270
SACVAB	0.00	6	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0.00	6	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	670.88	6	4,025	0.845	42.868	3.828	0.142	29.511	29.491
				tons/year					
	Miles/trip	**# Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Radiological Disposal Site									
VCAPCD	0.42	1,560	655	6.9E-05	0.003	3.1E-04	1.2E-05	0.002	0.002
SCAQMD	45.78	1,560	71,417	0.007	0.380	0.034	0.001	0.262	0.262
Other CA	242.6	1,560	378,456	0.040	2.015	0.180	0.007	1.387	1.386
Non-CA	48.2	1,560	75,192	0.008	0.400	0.036	0.001	0.276	0.275
Total	337	1,560	525,720	0.055	2.799	0.250	0.009	1.927	1.926
Maximum Emissions by Air Basin									
SCCAB	0.42	1,560	655	6.9E-05	0.003	3.1E-04	1.2E-05	0.002	0.002
SCAB	45.78	1,560	71,417	7.5E-03	0.380	0.034	0.001	0.262	0.262
SSAB	0	1,560	0	0.000	0.000	0.000	0.000	0.000	0.000
MDAB	198.21	1,560	309,208	0.032	1.646	0.147	0.005	1.133	1.133
SJVAB	0	1,560	0	0.000	0.000	0.000	0.000	0.000	0.000
GBVAB	142.64	1,560	222,518	0.023	1.185	0.106	0.004	0.816	0.815
SACVAB	0	1,560	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0	1,560	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	670.88	1,560	1,046,573	0.110	5.573	0.498	0.018	3.836	3.834

*Totals may not add exactly due to rounding.

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Area IV Offsite Emissions

Table 3-9: Aera IV Offsite - DOE Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	20	626	0.030	0.116	1.232	0.004	0.500	0.124
SCAQMD	8.68	20	174	0.008	0.032	0.341	0.001	0.139	0.034
total	40	20	800	0.038	0.148	1.574	0.005	0.639	0.159
VCAPCD	0.42	20	8	4.0E-04	0.002	0.017	5.6E-05	0.007	0.002
SCAQMD	39.58	20	792	0.038	0.146	1.557	0.005	0.632	0.157
Total	40	20	800	0.038	0.148	1.574	0.005	0.639	0.159
				tons/year					
	Miles/trip	**# trips**	**Miles**	**VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	5,200	162,864	0.004	0.015	0.160	0.001	0.065	0.016
SCAQMD	8.68	5,200	45,136	0.001	0.004	0.044	1.5E-04	0.018	0.004
total	40	5,200	208,000	0.005	0.019	0.205	0.001	0.083	0.021
VCAPCD	0.42	5,200	2,184	5.2E-05	2.0E-04	0.002	7.3E-06	0.001	0.000
SCAQMD	39.58	5,200	205,816	0.005	0.019	0.202	0.001	0.082	0.020
Total	40	5,200	208,000	0.005	0.019	0.205	0.001	0.083	0.021

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

Santa Susana Field Laboratory
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Area IV Offsite Emissions

Table 3-10: Aera IV Offsite - DOE Haul Emissions

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Radiological Disposal Site									
VCAPCD	0.42	47	20	0.004	0.208	0.017	0.001	0.145	0.037
SCAQMD	45.78	47	2,157	0.453	22.650	1.901	0.076	15.815	4.059
Other CA	242.6	47	11,431	2.400	120.028	10.072	0.403	83.810	21.508
Other Non-CA	48.2	47	2,271	0.477	23.847	2.001	0.080	16.651	4.273
Total	337	47	15879.44	3.334	166.733	13.992	0.560	116.421	29.877
Hazardous Disposal Site									
VCAPCD	0.42	105	44	0.009	0.464	0.039	0.002	0.323	0.083
SCAQMD	124.58	105	13,066	2.779	137.575	11.692	0.461	95.794	24.583
Other CA	0	105	0	0.000	0.000	0.000	0.000	0.000	0.000
Other Non-CA	0	105	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	125	105	13,110	2.788	138.039	11.731	0.462	96.116	24.666
Maximum Emissions by Air Basin									
SCCAB	0.42	162	68	0.014	0.716	0.061	0.002	0.499	0.128
SCAB	124.58	162	20,182	4.293	212.501	18.059	0.712	147.966	37.972
SSAB	103	162	16,686	3.549	175.691	14.931	0.589	122.335	31.395
MDAB	198.21	162	32,110	6.830	338.095	28.733	1.133	235.417	60.415
SJVAB	57	162	9,234	1.964	97.227	8.263	0.326	67.700	17.374
GBVAB	142.64	162	23,108	4.915	243.307	20.678	0.815	169.416	43.477
SACVAB	0	162	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0	162	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	670.88	162	108,683	23.117	1144.349	97.253	3.834	796.816	204.485
				Tons/year					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Radiological Disposal Site									
VCAPCD	0.42	12,251	5,146	0.001	0.027	0.002	9.1E-05	0.019	0.005
SCAQMD	45.78	12,251	560,860	0.059	2.944	0.247	0.010	2.056	0.528
Other CA	242.6	12,251	2,972,141	0.312	15.604	1.309	0.052	10.895	2.796
Other Non-CA	48.2	12,251	590,508	0.062	3.100	0.260	0.010	2.165	0.556
Total	337	12,251	4128654.4	0.433	21.675	1.819	0.073	15.135	3.884
Hazardous Disposal Site									
VCAPCD	0.42	27,269	11,453	0.001	0.060	0.005	2.0E-04	0.042	0.011
SCAQMD	124.58	27,269	3,397,147	0.361	17.885	1.520	0.060	12.453	3.196
Other CA	0	27,269	0	0.000	0.000	0.000	0.000	0.000	0.000
Other Non-CA	0	27,269	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	125	27,269	3,408,600	0.363	17.945	1.525	0.060	12.495	3.207
Maximum Emissions by Air Basin									
SCCAB	0.42	42,120	17,690	0.002	0.093	0.008	3.1E-04	0.065	0.017
SCAB	124.58	42,120	5,247,310	0.558	27.625	2.348	0.093	19.236	4.936
SSAB	103	42,120	4,338,360	0.461	22.840	1.941	0.077	15.904	4.081
MDAB	198.21	42,120	8,348,605	0.888	43.952	3.735	0.147	30.604	7.854
SJVAB	57	42,120	2,400,840	0.255	12.640	1.074	0.042	8.801	2.259
GBVAB	142.64	42,120	6,007,997	0.639	31.630	2.688	0.106	22.024	5.652
SACVAB	0	42,120	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0	42,120	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	670.88	42,120	28,257,466	3.005	148.765	12.643	0.498	103.586	26.583

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
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Liquid Oxygen Plant Offsite Emissions

Table 3-11: Liquid Oxygen Plant Offsite - NASA Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	20	626	0.030	0.116	1.232	0.004	0.500	0.124
SCAQMD	8.68	20	174	0.008	0.032	0.341	0.001	0.139	0.034
total[1]	40	20	800	0.038	0.148	1.574	0.005	0.639	0.159
VCAPCD	0.42	20	8	0.000	0.002	0.017	5.6E-05	0.007	0.002
SCAQMD	39.58	20	792	0.038	0.146	1.557	0.005	0.632	0.157
total[1]	40	20	800	0.038	0.148	1.574	0.005	0.639	0.159
				tons/year					
				ROC/VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	5,200	162,864	0.004	0.015	0.160	0.001	0.065	0.016
SCAQMD	8.68	5,200	45,136	0.001	0.004	0.044	1.5E-04	0.018	0.004
total[1]	40	5,200	208,000	0.005	0.019	0.205	0.001	0.083	0.021
VCAPCD	0.42	5,200	2,184	5.2E-05	2.0E-04	0.002	7.3E-06	0.001	0.000
SCAQMD	39.58	5,200	205,816	0.005	0.019	0.202	0.001	0.082	0.020
total[1]	40	5,200	208,000	0.005	0.019	0.205	0.001	0.083	0.021

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

Santa Susana Field Laboratory
Initial Clean-up - Unmitigated

Liquid Oxygen Plant Offsite Emissions

Table 3-12: Liquid Oxygen Plant Offsite - NASA Haul Emissions

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Non-Hazardous Disposal Site									
VCAPCD	10.29	2	21	0.005	0.219	0.020	0.001	0.151	0.039
SCAQMD	53.58	2	107	0.024	1.141	0.102	0.004	0.786	0.202
Other CA	34.13	2	68	0.015	0.727	0.065	0.002	0.500	0.128
Other Non-CA	0	2	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	98	2	196	0.044	2.087	0.186	0.007	1.437	0.369
Hazardous Disposal Site									
VCAPCD	0.42	16	7	0.001	0.071	0.006	2.4E-04	0.049	0.013
SCAQMD	124.58	16	1,993	0.419	20.934	1.759	0.070	14.614	3.750
Other CA	172.39	16	2,758	0.580	28.968	2.434	0.097	20.222	5.190
Other Non-CA	26.61	16	426	0.089	4.471	0.376	0.015	3.121	0.801
Total	324	16	5,184	1.090	54.444	4.574	0.183	38.007	9.754
Maximum Emissions by Air Basin									
SCCAB	0.42	18	8	0.002	0.081	0.007	2.7E-04	0.055	0.014
SCAB	124.58	18	2,242	0.502	23.881	2.133	0.079	16.441	4.219
SSAB	48.4	18	871	0.195	9.278	0.829	0.031	6.387	1.639
MDAB	123.99	18	2,232	0.500	23.768	2.123	0.079	16.363	4.199
SJVAB	0	18	0	0.000	0.000	0.000	0.000	0.000	0.000
GBVAB	131.4	18	2,365	0.530	25.189	2.249	0.083	17.341	4.450
SACVAB	0	18	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0	18	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	26.61	18	479	0.107	5.101	0.456	0.017	3.512	0.901
				tons/year					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Non-Hazardous Disposal Site									
VCAPCD	10.29	520	5,351	0.001	0.028	0.003	9.4E-05	0.020	0.005
SCAQMD	53.58	520	27,862	0.003	0.148	0.013	4.9E-04	0.102	0.026
Other CA	34.13	520	17,748	0.002	0.095	0.008	3.1E-04	0.065	0.017
Other Non-CA	0	520	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	98	520	50960	0.006	0.271	0.024	0.001	0.187	0.048
Hazardous Disposal Site									
VCAPCD	0.42	4,160	1,747	1.8E-04	0.009	0.001	3.1E-05	0.006	0.002
SCAQMD	124.58	4,160	518,253	0.054	2.721	0.229	0.009	1.900	0.488
Other CA	172.39	4,160	717,142	0.075	3.766	0.316	0.013	2.629	0.675
Other Non-CA	26.61	4,160	110,698	0.012	0.581	0.049	0.002	0.406	0.104
Total	324	4,160	1,347,840	0.142	7.078	0.595	0.024	4.941	1.268
Maximum Emissions by Air Basin									
SCCAB	0.42	4,680	1,966	2.2E-04	0.010	0.001	3.5E-05	0.007	0.002
SCAB	124.58	4,680	583,034	0.065	3.105	0.277	0.010	2.137	0.548
SSAB	48.4	4,680	226,512	0.025	1.206	0.108	0.004	0.830	0.213
MDAB	123.99	4,680	580,273	0.065	3.090	0.276	0.010	2.127	0.546
SJVAB	0	4,680	0	0.000	0.000	0.000	0.000	0.000	0.000
GBVAB	131.4	4,680	614,952	0.069	3.275	0.292	0.011	2.254	0.579
SACVAB	0	4,680	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0	4,680	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	26.61	4,680	124,535	0.014	0.663	0.059	0.002	0.457	0.117

*Totals may not add exactly due to rounding.

TTF- Boeing

Table 3-13: TTF Offsite - Boeing Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	16	501	0.024	0.093	0.986	0.003	0.400	0.100
SCAQMD	8.68	16	139	0.007	0.026	0.273	0.001	0.111	0.028
total[1]	40	32	1,280	0.031	0.118	1.259	0.004	0.511	0.127
VCAPCD	0.42	16	7	0.000	0.001	0.013	4.5E-05	0.005	0.001
SCAQMD	39.58	16	633	0.030	0.117	1.246	0.004	0.506	0.126
total[1]	40	32	1,280	0.031	0.118	1.259	0.004	0.511	0.127
				tons/year					
				VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	4,160	130,291	0.003	0.012	0.128	4.4E-04	0.052	0.013
SCAQMD	8.68	4,160	36,109	0.001	0.003	0.036	1.2E-04	0.014	0.004
total[1]	40	8,320	332,800	0.004	0.015	0.164	0.001	0.066	0.017
VCAPCD	0.42	4,160	1,747	4.2E-05	1.6E-04	0.002	5.8E-06	0.001	0.000
SCAQMD	39.58	4,160	164,653	0.004	0.015	0.162	0.001	0.066	0.016
total[1]	40	8,320	332,800	0.004	0.015	0.164	0.001	0.066	0.017

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

Santa Susana Field Laboratory
Initial Clean-up - Unmitigated

TTF- Boeing

Table 3-14: TTF Offsite - Boeing Haul Emissions

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Hazardous Disposal Site									
VCAPCD	0.42	6	3	0.001	0.026	0.002	8.9E-05	0.018	0.005
SCAQMD	124.58	6	747	0.158	7.856	0.662	0.026	5.480	1.406
Other CA	166	6	996	0.210	10.468	0.882	0.035	7.302	1.874
Other Non-CA	0	6	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	291	6	1,746	0.368	18.350	1.546	0.062	12.801	3.285
Maximum Emissions by Air Basin									
SCCAB	10.29	6	62	0.013	0.649	0.055	0.002	0.453	0.116
SCAB	124.58	6	747	0.158	7.856	0.662	0.026	5.480	1.406
SSAB	48.40	6	290	0.061	3.052	0.257	0.010	2.129	0.546
MDAB	198.21	6	1,189	0.251	12.499	1.053	0.042	8.719	2.238
SJVAB	297.36	6	1,784	0.376	18.751	1.580	0.063	13.081	3.357
GBVAB	156.57	6	939	0.198	9.873	0.832	0.033	6.887	1.767
SACVAB	227.09	6	1,363	0.287	14.320	1.207	0.048	9.990	2.564
NEPAB	65.74	6	394	0.083	4.145	0.349	0.014	2.892	0.742
Outside CA	1495.00	6	8,970	1.891	94.271	7.944	0.316	65.764	16.877
				tons/year					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Hazardous Disposal Site									
VCAPCD	0.42	6	3	6.9E-05	0.003	2.9E-04	1.2E-05	0.002	6.2E-04
SCAQMD	124.58	6	747	0.020	1.021	0.086	0.003	0.712	0.183
Other CA	166	6	996	0.027	1.361	0.115	0.005	0.949	0.244
Other Non-CA	0	6	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	291	6	1,746	0.048	2.385	0.201	0.008	1.664	0.427
Maximum Emissions by Air Basin									
SCCAB	10.29	6	62	6.9E-06	3.3E-04	2.9E-05	1.1E-06	0.059	0.015
SCAB	124.58	6	747	8.4E-05	0.004	3.6E-04	1.3E-05	0.712	0.183
SSAB	48.4	6	290	3.3E-05	0.002	1.4E-04	5.1E-06	0.277	0.071
MDAB	198.21	6	1,189	1.3E-04	0.006	0.001	2.1E-05	1.133	0.291
SJVAB	297.36	6	1,784	2.0E-04	0.010	0.001	3.1E-05	1.700	0.436
GBVAB	156.57	6	939	1.1E-04	0.005	4.5E-04	1.7E-05	0.895	0.230
SACVAB	227.09	6	1,363	1.5E-04	0.007	0.001	2.4E-05	1.299	0.333
NEPAB	65.74	6	394	4.4E-05	0.002	1.9E-04	7.0E-06	0.376	0.096
Outside CA	1495	6	8,970	0.001	0.048	0.004	1.6E-04	8.549	2.194

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Initial Clean-up - Unmitigated

RMHF/ HWMF -DOE

Table 3-15: RMHF/HWMF Offsite - DOE Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	40	1,253	0.060	0.232	2.464	0.008	1.001	0.249
SCAQMD	8.68	40	347	0.017	0.064	0.683	0.002	0.277	0.069
total[1]	40	40	1,600	0.077	0.296	3.147	0.011	1.278	0.318
VCAPCD	0.42	40	17	0.001	0.003	0.033	1.1E-04	0.013	0.003
SCAQMD	39.58	40	1,583	0.076	0.293	3.114	0.011	1.265	0.315
total[1]	40	40	1,600	0.077	0.296	3.147	0.011	1.278	0.318
				tons/year					
				ROC/VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	2,600	81,432	0.008	0.030	0.320	0.001	0.130	0.032
SCAQMD	8.68	2,600	22,568	0.002	0.008	0.089	3.0E-04	0.036	0.009
total[1]	40	2,600	104,000	0.010	0.038	0.409	0.001	0.166	0.041
VCAPCD	0.42	2,600	1,092	1.0E-04	4.0E-04	0.004	1.5E-05	0.002	0.000
SCAQMD	39.58	2,600	102,908	0.010	0.038	0.405	0.001	0.164	0.041
total[1]	40	2,600	104,000	0.010	0.038	0.409	0.001	0.166	0.041

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

Santa Susana Field Laboratory
Initial Clean-up - Unmitigated

RMHF/ HWMF -DOE

Table 3-16: RMHF/HWMF Offsite - DOE Haul Emissions

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Hazardous Disposal Site									
VCAPCD	0.42	4	2	3.8E-04	0.018	0.002	5.9E-05	0.012	0.003
SCAQMD	124.58	4	498	0.112	5.307	0.474	0.018	3.653	0.937
Other CA	103	4	412	0.092	4.388	0.392	0.015	3.021	0.775
Other Non-CA	0	4	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	228	4	912	0.204	9.713	0.867	0.032	6.686	1.716
Radiological Disposal Site									
VCAPCD	0.42	6	3	0.001	0.026	0.002	8.9E-05	0.018	0.005
SCAQMD	45.78	6	275	0.058	2.885	0.242	0.010	2.014	0.517
Other CA	242.6	6	1,456	0.306	15.287	1.284	0.051	10.672	2.739
Other Non-CA	48.2	6	289	0.061	3.037	0.255	0.010	2.120	0.544
Total	337	6	2,022	0.425	21.236	1.784	0.071	14.824	3.804
Maximum Emissions by Air Basin									
SCCAB	0.42	10	4	0.001	0.044	0.004	1.5E-04	0.031	0.008
SCAB	124.58	10	1,246	0.265	13.117	1.115	0.044	9.134	2.344
SSAB	103	10	1,030	0.219	10.845	0.922	0.036	7.552	1.938
MDAB	198.21	10	1,982	0.422	20.870	1.774	0.070	14.532	3.729
SJVAB	57	10	570	0.121	6.002	0.510	0.020	4.179	1.072
GBVAB	142.64	10	1,426	0.303	15.019	1.276	0.050	10.458	2.684
SACVAB	0	10	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0	10	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	670.88	10	6,709	1.427	70.639	6.003	0.237	49.186	12.623
				tons/year					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Hazardous Disposal Site									
VCAPCD	0.42	26	11	4.9E-05	0.002	2.1E-04	7.7E-06	0.002	4.1E-04
SCAQMD	124.58	26	3,239	0.015	0.690	0.062	0.002	0.475	0.122
Other CA	103	26	2,678	0.012	0.570	0.051	0.002	0.393	0.101
Other Non-CA	0	26	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	228	26	5928	0.027	1.263	0.113	0.004	0.869	0.223
Radiological Disposal Site									
VCAPCD	0.42	496	208	6.9E-05	0.003	2.9E-04	1.2E-05	0.002	0.001
SCAQMD	45.78	496	22,707	0.008	0.375	0.032	0.001	0.262	0.067
Other CA	242.6	496	120,330	0.040	1.987	0.167	0.007	1.387	0.356
Other Non-CA	48.2	496	23,907	0.008	0.395	0.033	0.001	0.276	0.071
Total	337	496	167,152	0.055	2.761	0.232	0.009	1.927	0.495
Maximum Emissions by Air Basin									
SCCAB	0.42	522	219	0.047	2.308	0.196	0.008	0.025	0.024
SCAB	124.58	522	65,031	13.832	684.727	58.192	2.294	7.490	7.166
SSAB	103	522	53,766	11.436	566.117	48.112	1.897	6.192	5.924
MDAB	198.21	522	103,466	22.007	1089.418	92.584	3.650	11.916	11.401
SJVAB	57	522	29,754	6.329	313.288	26.625	1.050	3.427	3.279
GBVAB	142.64	522	74,458	15.837	783.990	66.628	2.626	8.576	8.205
SACVAB	0	522	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0	522	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	670.88	522	350,199	74.487	3687.346	313.370	12.353	40.333	38.589

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Air Quality Appendix
Section 4
Unmitigated Overall Cleanup Emissions

Santa Susana Field Laboratory
Overall Cleanup - Emissions Summary - Unmitigated

Table 4-1: Sumamry of Program Emissions

	Lbs/Day					
	ROC/VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Boeing						
Onsite						
Equipment	1.848	39.865	39.135	0.068	40.243	9.633
Haul	0.240	6.142	1.413	0.006	0.025	0.024
Crew	0.010	0.020	0.239	0.001	0.001	0.001
Onsite Total	2.098	46.027	40.788	0.074	40.269	9.658
Offsite						
Crew	0.576	2.218	23.605	0.080	9.585	2.385
Haul -VCAPCD	0.146	6.993	0.617	0.023	4.828	1.239
Haul - SCAQMD	1.681	83.794	7.061	0.281	58.456	15.001
Haul - Other	8.014	405.367	33.546	1.366	283.909	72.860
Offsite Total	10.418	498.372	64.829	1.751	356.778	91.485
Boeing Total						
VCAPCD	2.820	55.238	65.009	0.177	54.682	13.282
SCAQMD	4.355	132.039	71.454	0.435	108.309	27.044
All	12.515	544.399	105.617	1.825	397.047	101.143
DOE						
Onsite						
Equipment	1.011	21.358	23.128	0.039	35.835	7.088
Haul	0.240	6.142	1.413	0.006	0.025	0.024
Crew	0.003	0.007	0.080	1.8E-04	2.9E-04	2.6E-04
Onsite Total	1.254	27.507	24.622	0.045	35.861	7.113
Offsite						
Crew	0.192	0.739	7.868	0.027	3.195	0.795
Haul -VCAPCD	0.006	0.285	0.025	0.001	0.197	0.051
Haul - SCAQMD	1.696	83.951	7.135	0.281	58.455	15.001
Haul - Other	3.907	195.416	16.399	0.656	136.450	35.017
Offsite Total	5.801	280.392	31.427	0.965	198.297	50.863
DOE Total						
VCAPCD	1.452	28.531	32.515	0.073	39.253	7.958
SCAQMD	3.142	112.197	39.624	0.353	97.511	22.909
All	7.056	307.898	56.048	1.010	234.158	57.976
NASA						
Onsite						
Equipment	1.011	21.358	23.128	0.039	35.835	7.088
Haul	0.240	6.142	1.413	0.006	0.025	0.024
Crew	0.003	0.007	0.080	1.8E-04	2.9E-04	2.6E-04
Onsite Total	1.254	27.507	24.622	0.045	35.861	7.113
Offsite						
Crew	0.192	0.739	7.868	0.027	3.195	0.795
Haul -VCAPCD	0.148	7.013	0.626	0.023	4.828	1.239
Haul - SCAQMD	1.676	83.737	7.034	0.281	58.456	15.001
Haul - Other	8.014	405.367	33.546	1.366	283.909	72.860
Offsite Total	10.030	496.856	49.075	1.697	350.388	89.896
NASA Total						
VCAPCD	1.594	35.259	33.116	0.095	43.884	9.147
SCAQMD	3.122	111.983	39.524	0.353	97.512	22.909
All	11.284	524.363	73.697	1.742	386.249	97.008
Project Total						
Onsite	4.607	101.040	90.031	0.164	111.991	23.883
Offsite Commute	0.961	3.697	39.341	0.134	15.975	3.975
Offsite Haul (VCAPCD)	0.299	14.291	1.268	0.047	9.853	2.528
Offsite Haul (SCAQMD)	5.053	251.482	21.231	0.844	175.366	45.004
Haul (VC & SC total)	5.352	265.774	22.499	0.891	185.220	47.532
Offsite (Other Air Districts)	19.936	1006.150	83.492	3.388	704.268	180.738

*Totals may not add exactly due to rounding.

Sources: Emissions taken from Tables 4-6 through 4-18

Santa Susana Field Laboratory
Overall Cleanup - Emissions Summary - Unmitigated

Table 4-2: Sumamry of Maintenance & Monitoring Emissions

	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5
M&M (onsite)	0.005	0.009	0.115	2.6E-04	0.004	0.001
M&M Offsite (VCAPCD)[1]	0.217	0.834	8.872	0.030	3.602	0.896
M&M Offsite (SCAQMD)[1]	0.274	1.053	11.211	0.038	4.552	1.133
M&M Total[1]	0.281	1.074	11.445	0.039	4.605	1.146

[1] Offsite emissions for each air district represent the maximum emissions that could occur depending on where the workers are located. The M&M total is the onsite emissions plus the total commute emissions (based on total workers and a total of a 40 mile round trip regardless of the air district the miles occur within).

*Totals may not add exactly due to rounding.

Sources: Emissions taken from Table 4-19

Table 4-3: Project Emissions Summary

Lbs/Day

	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5
Project Totals						
VCAPCD						
Onsite	4.607	101.040	90.031	0.164	111.991	23.883
Offsite - Crew	0.752	2.894	30.804	0.105	12.508	3.112
Offsite - Haul	0.299	14.291	1.268	0.047	9.853	2.528
M&M	0.217	0.834	8.872	0.030	3.602	0.896
Total Emissions	5.874	119.060	130.974	0.346	137.955	30.420
Threshold	25	25	N/A	N/A	N/A	N/A
Significant	No	**Yes**	No	No	No	No
SCAQMD						
Onsite	4.607	101.040	90.031	0.164	111.991	23.883
Offsite - Crew	0.950	3.658	38.928	0.132	15.807	3.933
Offsite - Haul	5.053	251.482	21.231	0.844	175.366	45.004
M&M	0.274	1.053	11.211	0.038	4.552	1.133
Total Emissions	10.884	357.234	161.400	1.178	307.717	73.953
Threshold	55	55	550	150	150	55
Significant	No	**Yes**	No	No	**Yes**	**Yes**
All Air Districts						
Average	11	372	163	1	318	77

*Totals may not add exactly due to rounding.

Sources Tables 4-1 and 4-2

Santa Susana Field Laboratory
Overall Cleanup - LST Emissions Summary - Unmitigated

Table 4-4: LST Program Level Emissions Summary

(lbs/day)

	NOx	CO	PM10	PM2.5
Emissions	101.040	90.031	40.269	23.883
Threshold	131	5,045	114	53
Significant?	No	No	No	No

Threshold Determination (2 acre site)

	NOx	NOx[2]	CO	PM10	PM2.5	
500 meters	263	146	7,460	162	84	Source Receptor Area 6
400 meters	237	131	5,045	114	53	
300 meters	212	117	3,837	90	37	
200 meters	187	103	2,629	66	21	Source Receptor Area 6
100 meters	156	86	1,497	33	9	Source Receptor Area 6
50 meters	143	79	903	17	5	Source Receptor Area 6
25 meters	147	81	644	7	4	Source Receptor Area 6
	25.3333333	1207.75	24	15.75		

LST's determined by max for each RP as the activities occur at different locations throughout the site.

Sources: LSTs are determined by summing the onsite emissions as reported in Table 4-1.

Assumptions NOx[2]: The screening criteria for NOx were developed based on the 1-hour NO_2 CAAQS of 0.18 ppm. However, since the publication of the SCAQMD's guidance, the USEPA has promulgated a 1-hour NO_2 NAAQS of 0.100 ppm based on a 98th percentile value, which is more stringent than the CAAQS. In order to determine if Project emissions would result in an exceedance of the 1 hour NO_2 NAAQS, an approximated LST was estimated to evaluate the federal 1-hour NO_2 standard, as the SCAQMD significance threshold has not been updated to reflect this standard. Calculated by scaling the NO_2 LST for by the ratio of 1-hour NO_2 standards (federal/state)(i.e., 236 lb/day * (0.10/0.18) = 131 lb/day).

Santa Susana Field Laboratory
Overall Cleanup - LST Emissions Summary - Unmitigated

Table 4-5: Maximum Haul Emissions By Air Basin

		ROC/VOC	NOx	CO	SO_x	PM10	PM2.5
		lbs/day					
SSAB		4.411	211.458	18.695	0.702	145.917	37.445
	ICAPCD	55	55	550	150	150	N/A
MDAB		8.433	**404.314**	35.738	1.342	**279.011**	71.600
	SCAQMD	55	55	550	150	150	55
	MDAQMD	137	137	548	137	82	65
	AVAQMD	137	137	548	137	82	82
	EKCAPCD	137	137	N/A	N/A	N/A	N/A
GBAVB		6	310	27	1	214	55
	GBUAPCD	N/A	N/A	N/A	N/A	N/A	N/A
SACVAB		6.468	309.107	27.433	1.025	**213.108**	54.688
	SMAQMD	65	65	N/A	N/A	80	80
	YSAQMD	N/A	N/A	CAAQS	N/A	80	N/A
	CCAPCD	N/A	N/A	N/A	N/A	N/A	N/A
	GCAPCD	N/A	N/A	N/A	N/A	N/A	N/A
	TCAPCD	25	25	N/A	N/A	80	N/A
	SHCAQMD	25	25	N/A	N/A	80	N/A
NEPAB		1.872	89.483	7.941	0.297	61.692	15.831
	SCAPCD	250	250	2500	250	250	250
Outside CA		43	2,059	182	7	1421	365
Exceed Threshold?		***No***	***Yes***	***No***	***No***	***Yes***	***No***
		Tons/year					
MDAB		0.838	41.025	3.535	0.137	**28.476**	7.308
	MDAQMD	*25*	*25*	*100*	*25*	*15*	*12*
	AVAQMD	*25*	*25*	*100*	*25*	*15*	*15*
SJVAB		0.645	31.605	2.721	0.106	**21.943**	5.631
	SJVPCP	*10*	*10*	*100*	*27*	*15*	*15*
SACVAB		*0.416*	*20.423*	*1.753*	*0.068*	*14.189*	*3.641*
	SMAQMD	N/A	N/A	N/A	N/A	15	15
	YSAQMD	10	10	N/A	N/A	N/A	N/A
NEPAB		*0.120*	*5.912*	*0.507*	*0.020*	*4.108*	*1.054*
	SCAPCD	40	40	100	40	15	N/A
Outside CA		4	178	15	1	123	32
Exceed Threshold?		***No***	***Yes***	***No***	***No***	***Yes***	***No***

*Totals may not add exactly due to rounding.

Sources: Emissions taken from Tables 4-6 through 4-18

Santa Susana Field Laboratory
Overall Site Clean-up - Unmitigated
Overall Site Cleanup Emissions

Table 4-6: Overall Cleanup Daily Onsite Emissions

	Maximum Daily Emissions (Lbs/day)					
	ROC/VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Boeing						
Exhaust	1.848	39.865	39.135	0.068	1.645	1.643
Fugitive	-	-	-	-	38.597	7.990
Haul Trucks	0.240	6.142	1.413	0.006	0.025	0.024
Crew	0.010	0.020	0.239	0.001	0.001	0.001
Total	2.098	46.027	40.788	0.074	40.269	9.658
DOE						
Exhaust	1.011	21.358	23.128	0.039	0.982	0.982
Fugitive	-	-	-	-	34.853	6.106
Haul Trucks	0.240	6.142	1.413	0.006	0.025	0.024
Crew	0.003	0.007	0.080	1.8E-04	2.9E-04	2.6E-04
Total	1.254	27.507	24.622	0.045	35.861	7.113
NASA						
Exhaust	1.011	21.358	23.128	0.039	0.982	0.982
Fugitive	-	-	-	-	34.853	6.106
Haul Trucks	0.240	6.142	1.413	0.006	0.025	0.024
Crew	0.003	0.007	0.080	1.8E-04	2.9E-04	2.6E-04
Total	1.254	27.507	24.622	0.045	35.861	7.113
Long-term Mitigation and Monitoring						
Exhaust	0.000	0.000	0.000	0.000	0.000	0.000
Fugitive	-	-	-	-	0.004	0.001
Haul Trucks	0.000	0.000	0.000	0.000	0.000	0.000
Crew	0.005	0.009	0.115	2.6E-04	4.1E-04	3.8E-04
Total	0.005	0.009	0.115	2.6E-04	0.004	0.001

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Clean-up - Unmitigated
Overall Site Cleanup Emissions

Table 4-7: Overall Cleanup Annual Onsite Emissions

Annual Emissions (Tons/year)

	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5
Boeing						
Exhaust	0.240	5.182	5.088	0.009	0.214	0.214
Fugitive	-	-	-	-	5.018	1.039
Haul Trucks	0.031	0.798	0.184	0.001	0.003	0.003
Crew	0.001	0.003	0.031	6.9E-05	1.1E-04	1.0E-04
Total	0.273	5.983	5.302	0.010	5.235	1.256
DOE						
Exhaust	0.131	2.777	3.007	0.005	0.128	0.128
Fugitive	-	-	-	-	4.531	0.794
Haul Trucks	0.031	0.798	0.184	0.001	0.003	0.003
Crew	4.3E-04	0.001	0.010	2.3E-05	3.7E-05	3.4E-05
Total	0.163	3.576	3.201	0.006	4.662	0.925
NASA						
Exhaust	0.131	2.777	3.007	0.005	0.128	0.128
Fugitive	-	-	-	-	4.531	0.794
Haul Trucks	0.031	0.798	0.184	0.001	0.003	0.003
Crew	4.3E-04	0.001	0.010	2.3E-05	3.7E-05	3.4E-05
Total	0.163	3.576	3.201	0.006	4.662	0.925
Long-term Mitigation and Monitoring						
Exhaust	0.000	0.000	0.000	0.000	0.000	0.000
Fugitive	-	-	-	-	0.001	0.000
Haul Trucks	0.000	0.000	0.000	0.000	0.000	0.000
Crew	0.001	0.001	0.015	3.3E-05	5.4E-05	4.9E-05
Total	0.001	0.001	0.015	3.3E-05	0.001	0.000

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Clean-up - Unmitigated
Overall Site Cleanup Emissions

Equations

- Daily emssions (Exhaust) (lbs/day) = sum of daily emissions for each piece of equipment.
- Emissions from each equipment type = Number of pieces of equipment times the emissions per day for that piece of equipment.
  - Emissions per day per equipment type from Table 1-5.
  - Number of Pieces of Equipment per activty from Table 1-11.
- Daily emssions (Fugitive) (lbs/day) - Taken from Tables 4-8 and 4-9.
- Daily emssions (haul trucks) (lbs/day) =
  [(Emission Factorexhaust X number of trips X Miles) x (Emission Factoridle X number of minutes X number of trucks)] / 453.6
  - Emission Factors from Table 1-4.
  - Number of Trips from Table 1-11
  - **4** miles/ round trip
  - **15** minutes idling per truck (- assumes idling entering the site, at the loading location, and leaving the site)
- Daily emssions (crew (onsite worker transport)) (lbs/day) = ((Number of Employees/15) times Emission Factor times 4) / 453.6
  - Number of employees per phase taken from Table 1-11.
  - **15** workers/onsite van
  - Emission Factor taken from Table 1-5
  - **4** miles/ round trip
  - 453.6 grams per pound
- Total Daily Emissions (lbs/day) for each criteria pollutant is the sume of the daily exhaust, fugitive, haul truck, and crew emissions.
- Annual emssions (Tons/year) = (Daily Emissions * Number of Days)/2000
  - Daily Emissions from Table 4-6.
  - 2,000.00 lbs/ton
  - 260 days per year
- Annual emssions (MT/year) = (Daily Emissions * Number of Days)/2204.623
  - Daily Emissions from Table 4-6.
  - 2,204.62 lbs per Metric Ton
  - 260 days per year

Santa Susana Field Laboratory
Overall Site Clean-up - Unmitigated

Onsite Fugitive Emissions

Table 4-8: Overall Cleanup Daily Fugitive Emissions

	Acres	#	Tons/truck	# Trucks	PM10	PM2.5
	Maximum (lbs/day) - Boeing					
Scrapers/graders	2	N/A	N/A	N/A	0.786	0.085
Dozers/Excavators	N/A	4.00	N/A	N/A	8.925	4.906
Truck Loading	N/A	N/A	N/A	N/A	0.163	0.025
Total					***9.874***	***5.015***
	Maximum (lbs/day) - DOE					
Scrapers	1	N/A	N/A	N/A	0.393	0.042
Dozers/Excavators	N/A	2.50	N/A	N/A	5.578	3.066
Truck Loading	N/A	N/A	N/A	N/A	0.163	0.025
Total					***6.134***	***3.133***
	Maximum (lbs/day) - NASA					
Scrapers	1	N/A	N/A	N/A	0.393	0.042
Dozers/Excavators	N/A	2.50	N/A	N/A	5.578	3.066
Truck Loading	N/A	N/A	N/A	N/A	0.163	0.025
Total					***6.134***	***3.133***

*Totals may not add exactly due to rounding.

Table 4-9 Overall Cleanup Fugitive Dust from Unpaved Roads
Maximum Daily Emissions (lbs/day)

	# Miles							
	Unpaved	Paved	# Trucks	PM10	PM2.5	# Vans	PM10	PM2.5
Boeing	1	3	32	28.716	2.972	10	0.008	0.002
DOE	1	3	32	28.716	2.972	4	0.003	0.001
NASA	1	3	32	28.716	2.972	4	0.003	0.001
Long-term Mitigation and Monitoring	1	3	0	0	0	5	0.004	0.001

Santa Susana Field Laboratory
Overall Site Clean-up - Unmitigated

Onsite Fugitive Emissions

Equations

- Emissons for graders and scrapers = Emission factor x(((Acres / blade width of 12 ft) x 43,560 sqft per acre) / 5,280 ft per mile)
  - Acres are based on table provided on page 8 of CalEEMod Appendix A. (BREEZE software, a Division of Trinity Consultants, 2016).
    scrapers 1 acers/8hr day (conservately uses 1 acre for both because of the type of activities)
  - Emissions include a 63% reduction for required fugitive dust control measures based on VCAPCD regulations and a 69% reduction based on mitigation.
  - Emission factor taken from Table 1-8.
- Emissions for dozers/excavators = # equipment x hours of operation x emission factor
  - Number of dozers and excavators taken from Table 1-11.
  - 8 hours per day
  - Emission factor taken from Table 1-8.
- Emissions for truck loading (soils) = emission factor * tons of material
  - Emission factor taken from Table 1-8.
- Emissions include a 63% reduction for required fugitive dust control measures.
- Emissions for Excavation truck loading = EF x Tons
  - Tons of soil = tons per truck (Assumed 23) times 2 times the number of trucks (From Table 1-11). Twice the number of trucks is used to account for potential import and unloading of backfill.
- Emissions for Mechanical demolition and debris loading = Emission Factor (lbs/ton) X tons of debris
  - Assumes 23 tons per truck
  - Emission factor taken from Table 1-8.
  - Tons of soil = tons per truck (Assumed 23) times the number of trucks (From Table 1-11).
- Emissions for Pave and Unpaved Roads = Emission Factor (Table 1-8) times number of miles per vehicle times number of vehicles
  - Emissions for unpaved roads include a 63% reduction for required fugitive dust control measures based on VCAPCD regulations and a 69% reduction based on mitigation.
  - Assumes 3/4 of haul routes are paved.

Santa Susana Field Laboratory
Overall Site Cleanup - Unmitigated

Boeing

Table 4-10: Offsite Overall - Boeing Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	300	9,396	0.451	1.737	18.482	0.063	7.505	1.867
SCAQMD	8.68	300	2,604	0.125	0.481	5.122	0.017	2.080	0.517
total[1]	40	300	12,000	0.576	2.218	23.605	0.080	9.585	2.385
VCAPCD	0.42	300	126	0.006	0.023	0.248	0.001	0.101	0.025
SCAQMD	39.58	300	11,874	0.570	2.195	23.357	0.079	9.484	2.360
total[1]	40	300	12,000	0.576	2.218	23.605	0.080	9.585	2.385
				tons/year					
Worker Commute				**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
VCAPCD	31.32	78,000	2,442,960	0.059	0.226	2.403	0.008	0.976	0.243
SCAQMD	8.68	78,000	677,040	0.016	0.063	0.666	0.002	0.270	0.067
total[1]	40	78,000	3,120,000	0.075	0.288	3.069	0.010	1.246	0.310
VCAPCD	0.42	78,000	32,760	0.001	0.003	0.032	1.1E-04	0.013	0.003
SCAQMD	39.58	78,000	3,087,240	0.074	0.285	3.036	0.010	1.233	0.307
total[1]	40	78,000	3,120,000	0.075	0.288	3.069	0.010	1.246	0.310

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

Santa Susana Field Laboratory
Overall Site Cleanup - Unmitigated

Boeing

Table 4-11: Offsite Overall - Boeing Haul Emissions (lbs/day)

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Non-Hazardous									
VCAPCD	10.29	64	659	0.146	6.993	0.617	0.023	4.828	1.239
SCAQMD	67.58	64	4,325	0.956	45.926	4.050	0.153	31.709	8.137
Other CA	37.13	64	2,376	0.525	25.233	2.225	0.084	17.422	4.471
Non-CA	0	64	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	115	64	7360	1.627	78.152	6.892	0.260	53.959	13.846
Hazardous									
VCAPCD	0.42	64	27	0.006	0.282	0.024	0.001	0.197	0.051
SCAQMD	124.58	64	7,973	1.681	83.794	7.061	0.281	58.456	15.001
Other CA	166	64	10,624	2.240	111.654	9.409	0.375	77.891	19.989
Non-CA	0	64	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	291	64	18624	3.927	195.731	16.495	0.657	136.543	35.041
Radiological Soil									
VCAPCD	0.42	64	27	0.006	0.281	0.023	0.001	0.197	0.051
SCAQMD	92.52	64	5,921	1.226	61.985	5.130	0.209	43.413	11.141
Other CA	162.93	64	10,428	2.158	109.157	9.033	0.368	76.451	19.620
Non-CA	442.13	64	28,296	5.856	296.210	24.513	0.998	207.458	53.241
Total	698	64	44672	9.246	467.633	38.699	1.576	327.519	84.052
Maximum Emissions									
VCAPCD				0.146	6.993	0.617	0.023	4.828	1.239
SCAQMD				1.681	83.794	7.061	0.281	58.456	15.001
Other CA				2.240	111.654	9.409	0.375	77.891	19.989
Non-CA				5.856	296.210	24.513	0.998	207.458	53.241
Total				9.923	498.652	41.600	1.677	348.633	89.470
Maximum Emissions by Air Basin									
SCCAB	10.29	64	659	0.146	6.993	0.617	0.023	4.828	1.239
SCAB	124.58	64	7,973	1.763	84.662	7.467	0.281	58.456	15.002
SSAB	48.40	64	3,098	0.685	32.892	2.901	0.109	22.710	5.828
MDAB	198.21	64	12,685	2.804	134.700	11.880	0.447	93.005	23.868
SJVAB	297.36	64	19,031	4.207	202.081	17.822	0.671	139.529	35.808
GBVAB	156.57	64	10,020	2.215	106.402	9.384	0.353	73.467	18.854
SACVAB	227.09	64	14,534	3.213	154.326	13.610	0.513	106.556	27.346
NEPAB	65.74	64	4,207	0.930	44.676	3.940	0.148	30.847	7.916
Outside CA	1495.00	64	95,680	21.151	1015.976	89.602	3.375	701.491	180.026

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Cleanup - Unmitigated

Boeing

Table 4-12: Offsite Overall - Boeing Haul Emissions (tons/year)

				Tons/year					
	Miles/trip	Trips	Miles	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5
Non-Hazardous									
VCAPCD	10.29	7,616	78,369	0.009	0.416	0.037	0.001	0.287	0.074
SCAQMD	67.58	7,616	514,689	0.057	2.733	0.241	0.009	1.887	0.484
Other CA	37.13	7,616	282,782	0.031	1.501	0.132	0.005	1.037	0.266
Non-CA	0	7,616	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	115	7,616	875,840	0.097	4.650	0.410	0.015	3.211	0.824
Hazardous									
VCAPCD	0.42	7,040	2,957	3.1E-04	0.016	0.001	5.2E-05	0.011	0.003
SCAQMD	124.58	7,040	877,043	0.092	4.609	0.388	0.015	3.215	0.825
Other CA	166	7,040	1,168,640	0.123	6.141	0.518	0.021	4.284	1.099
Non-CA	0	7,040	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	291	7,040	2,048,640	0.216	10.765	0.907	0.036	7.510	1.927
Radiological Soil									
VCAPCD	0.42	1,984	833	8.6E-05	0.004	3.6E-04	1.5E-05	0.003	0.001
SCAQMD	92.52	1,984	183,560	0.019	0.961	0.080	0.003	0.673	0.173
Other CA	162.93	1,984	323,253	0.033	1.692	0.140	0.006	1.185	0.304
Non-CA	442.13	1,984	877,186	0.091	4.591	0.380	0.015	3.216	0.825
Total	698	1,984	1,384,832	0.143	7.248	0.600	0.024	5.077	1.303
Total Tons/year									
VCAPCD				0.009	0.436	0.038	0.001	0.301	0.077
SCAQMD				0.168	8.302	0.709	0.028	5.775	1.482
Other CA				0.188	9.334	0.790	0.031	6.506	1.669
Non-CA				0.091	4.591	0.380	0.015	3.216	0.825
Total				0.456	22.664	1.917	0.076	15.797	4.054
Maximum Emissions by Air Basin									
SCCAB				0.009	0.436	0.038	0.001	0.301	0.077
SCAB				0.168	8.302	0.709	0.028	5.775	1.482
SSAB				0.077	3.748	0.323	0.013	2.600	0.667
Non-Hazardous	48.40	7,616	368,614	0.041	1.957	0.173	0.007	1.351	0.347
Hazardous	48.40	7,040	340,736	0.036	1.791	0.151	0.006	1.249	0.321
Radiological	0.00	1,984	0	0.000	0.000	0.000	0.000	0.000	0.000
MDAB				0.355	17.406	1.495	0.058	12.090	3.103
Non-Hazardous	198.21	7,616	1,509,567	0.167	8.015	0.707	0.027	5.534	1.420
Hazardous	198.21	7,040	1,395,398	0.147	7.333	0.618	0.025	5.115	1.313
Radiological	198.21	1,984	393,249	0.041	2.058	0.170	0.007	1.442	0.370
SJVAB				0.532	26.112	2.243	0.087	18.138	4.655
Non-Hazardous	297.36	7,616	2,264,694	0.250	12.024	1.060	0.040	8.302	2.130
Hazardous	297.36	7,040	2,093,414	0.221	11.000	0.927	0.037	7.674	1.969
Radiological	297.36	1,984	589,962	0.061	3.088	0.256	0.010	2.163	0.555
GBVAB				0.280	13.749	1.181	0.046	9.550	2.451
Non-Hazardous	156.57	7,616	1,192,437	0.132	6.331	0.558	0.021	4.371	1.122
Hazardous	156.57	7,040	1,102,253	0.116	5.792	0.488	0.019	4.041	1.037
Radiological	156.57	1,984	310,635	0.032	1.626	0.135	0.005	1.139	0.292
SACVAB				0.406	19.942	1.713	0.067	13.852	3.555
Non-Hazardous	227.09	7,616	1,729,517	0.191	9.182	0.810	0.031	6.340	1.627
Hazardous	227.09	7,040	1,598,714	0.169	8.401	0.708	0.028	5.861	1.504
Radiological	227.09	1,984	450,547	0.047	2.358	0.195	0.008	1.652	0.424
NEPAB				0.118	5.773	0.496	0.019	4.010	1.029
Non-Hazardous	65.74	7,616	500,676	0.055	2.658	0.234	0.009	1.835	0.471
Hazardous	65.74	7,040	462,810	0.049	2.432	0.205	0.008	1.697	0.435
Radiological	65.74	1,984	130,428	0.013	0.683	0.056	0.002	0.478	0.123
Outside CA				2.545	124.717	10.734	0.417	86.595	22.222
Non-Hazardous	1495.00	7,616	11,385,920	1.258	60.451	5.331	0.201	41.737	10.710
Hazardous	1495.00	7,040	10,524,800	1.110	55.306	4.661	0.186	38.582	9.901
Radiological	862.88	1,984	1,711,954	0.177	8.960	0.742	0.030	6.276	1.611

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Cleanup - Unmitigated

DOE

Table 4-13: Offsite Overall - DOE Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	100	3,132	0.150	0.579	6.161	0.021	2.502	0.622
SCAQMD	8.68	100	868	0.042	0.160	1.707	0.006	0.693	0.172
total[1]	40	100	4,000	0.192	0.739	7.868	0.027	3.195	0.795
VCAPCD	0.42	100	42	0.002	0.008	0.083	2.8E-04	0.034	0.008
SCAQMD	39.58	100	3,958	0.190	0.732	7.786	0.026	3.161	0.787
total[1]	40	100	4,000	0.192	0.739	7.868	0.027	3.195	0.795
				tons/year					
Worker Commute				**VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	26,000	814,320	0.020	0.075	0.801	0.003	0.325	0.081
SCAQMD	8.68	26,000	225,680	0.005	0.021	0.222	0.001	0.090	0.022
total[1]	40	26,000	1,040,000	0.025	0.096	1.023	0.003	0.415	0.103
VCAPCD	0.42	26,000	10,920	2.6E-04	0.001	0.011	3.6E-05	0.004	0.001
SCAQMD	39.58	26,000	1,029,080	0.025	0.095	1.012	0.003	0.411	0.102
total[1]	40	26,000	1,040,000	0.025	0.096	1.023	0.003	0.415	0.103

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

Santa Susana Field Laboratory
Overall Site Cleanup - Unmitigated

DOE

Table 4-14: Offsite Overall - DOE Haul Emissions (lbs/day)

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Non-Hazardous									
VCAPCD	0.42	64	27	0.006	0.285	0.025	0.001	0.197	0.051
SCAQMD	67.58	64	4,325	0.950	45.864	4.021	0.153	31.709	8.137
Other CA	57	64	3,648	0.802	38.684	3.392	0.129	26.745	6.863
Non-CA	0	64	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	125	64	8,000	1.758	84.833	7.438	0.282	58.651	15.051
Hazardous									
VCAPCD	0.42	64	27	0.006	0.283	0.024	0.001	0.197	0.051
SCAQMD	124.58	64	7,973	1.696	83.951	7.135	0.281	58.455	15.001
Other CA	103	64	6,592	1.402	69.409	5.899	0.233	48.330	12.402
Non-CA	0	64	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	228	64	14,592	3.104	153.643	13.057	0.515	106.982	27.454
Radiological Soil									
VCAPCD	0.42	64	27	0.006	0.282	0.024	0.001	0.197	0.051
SCAQMD	45.78	64	2,930	0.615	30.764	2.582	0.103	21.481	5.513
Other CA	242.6	64	15,526	3.260	163.026	13.681	0.548	113.833	29.213
Non-CA	48.2	64	3,085	0.648	32.390	2.718	0.109	22.616	5.804
Total	337	64	21,568	4.528	226.462	19.004	0.761	158.128	40.580
Maximum Emissions									
VCAPCD				0.006	0.285	0.025	0.001	0.197	0.051
SCAQMD				1.696	83.951	7.135	0.281	58.455	15.001
Other CA				3.260	163.026	13.681	0.548	113.833	29.213
Non-CA				0.648	32.390	2.718	0.109	22.616	5.804
Total				4.528	226.462	19.004	0.761	158.128	40.580
Maximum Emissions by Air Basin									
SCCAB	17.84	64	1,142	0.251	12.107	1.062	0.040	8.371	2.148
SCAB	124.58	64	7,973	1.752	84.548	7.413	0.281	58.456	15.001
SSAB	138.00	64	8,832	1.940	93.655	8.212	0.312	64.753	16.617
MDAB	198.21	64	12,685	2.787	134.517	11.794	0.447	93.004	23.868
SJVAB	71.00	64	4,544	0.998	48.185	4.225	0.160	33.315	8.549
GBVAB	142.64	64	9,129	2.006	96.804	8.488	0.322	66.930	17.176
SACVAB	0.00	64	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0.00	64	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	670.88	64	42,936	9.434	455.300	39.920	1.515	314.791	80.784

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Cleanup - Unmitigated

DOE

Table 4-15: Offsite Overall - DOE Haul Emissions (tons/year)

				Tons/year					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Non-Hazardous									
VCAPCD	0.42	12,483	5,243	0.001	0.028	0.002	9.2E-05	0.019	0.005
SCAQMD	67.58	12,483	843,578	0.093	4.473	0.392	0.015	3.092	0.794
Other CA	57	12,483	711,511	0.078	3.772	0.331	0.013	2.608	0.669
Non-CA	0	12,483	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	125	12,483	1,560,331	0.171	8.273	0.725	0.028	5.720	1.468
Hazardous									
VCAPCD	0.42	545	229	0.000	0.001	1.0E-04	4.0E-06	0.001	0.000
SCAQMD	124.58	545	67,926	0.007	0.358	0.030	0.001	0.249	0.064
Other CA	103	545	56,160	0.006	0.296	0.025	0.001	0.206	0.053
Non-CA	0	545	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	228	545	124,315	0.013	0.654	0.056	0.002	0.456	0.117
Radiological Soil									
VCAPCD	0.42	1,012	425	0.000	0.002	1.9E-04	7.5E-06	0.002	0.000
SCAQMD	45.78	1,012	46,334	0.005	0.243	0.020	0.001	0.170	0.044
Other CA	242.6	1,012	245,537	0.026	1.289	0.108	0.004	0.900	0.231
Non-CA	48.2	1,012	48,784	0.005	0.256	0.021	0.001	0.179	0.046
Total	337	1,012	341,080	0.036	1.791	0.150	0.006	1.250	0.321
Total Tons/year									
VCAPCD				0.001	0.031	0.003	1.0E-04	2.2E-02	5.5E-03
SCAQMD				0.105	5.074	0.443	0.017	3.511	0.901
Other CA				0.110	5.357	0.464	0.018	3.714	0.953
Non-CA				0.005	0.256	0.021	0.001	0.179	0.046
Total				0.220	10.718	0.931	0.036	7.426	1.906
Maximum Emissions by Air Basin									
SCCAB				0.001	0.031	0.003	1.0E-04	2.2E-02	5.5E-03
SCAB				0.105	5.074	0.443	0.017	3.511	0.901
SSAB				0.195	9.429	0.826	0.031	6.520	1.673
Non-Hazardous	138.00	12,483	1,722,606	0.189	9.133	0.801	0.030	6.315	1.620
Hazardous	103.00	545	56,160	0.006	0.296	0.025	0.001	0.206	0.053
Radiological	0.00	1,012	0	0.000	0.000	0.000	0.000	0.000	0.000
MDAB				0.302	14.639	1.278	0.049	10.131	2.600
Non-Hazardous	198.21	12,483	2,474,186	0.272	13.118	1.150	0.044	9.070	2.327
Hazardous	162.93	545	88,836	0.009	0.468	0.040	0.002	0.326	0.084
Radiological	198.21	1,012	200,610	0.021	1.053	0.088	0.004	0.735	0.189
SJVAB				0.101	4.863	0.426	0.016	3.363	0.863
Non-Hazardous	71.00	12,483	886,268	0.097	4.699	0.412	0.016	3.249	0.834
Hazardous	57.00	545	31,079	0.003	0.164	0.014	0.001	0.114	0.029
Radiological	0.00	1,012	0	0.000	0.000	0.000	0.000	0.000	0.000
GBVAB				0.015	0.758	0.064	0.003	0.529	0.136
Non-Hazardous	0.00	12,483	0	0.000	0.000	0.000	0.000	0.000	0.000
Hazardous	0.00	545	0	0.000	0.000	0.000	0.000	0.000	0.000
Radiological	142.64	1,012	144,367	0.015	0.758	0.064	0.003	0.529	0.136
SACVAB				0.000	0.000	0.000	0.000	0.000	0.000
Non-Hazardous	0.00	12,483	0	0.000	0.000	0.000	0.000	0.000	0.000
Hazardous	0.00	545	0	0.000	0.000	0.000	0.000	0.000	0.000
Radiological	0.00	1,012	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB				0.000	0.000	0.000	0.000	0.000	0.000
Non-Hazardous	0.00	12,483	0	0.000	0.000	0.000	0.000	0.000	0.000
Hazardous	0.00	545	0	0.000	0.000	0.000	0.000	0.000	0.000
Radiological	0.00	1,012	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA				1.020	49.401	4.314	0.164	34.186	8.773
Non-Hazardous	670.88	12,483	8,374,361	0.920	44.401	3.893	0.148	30.698	7.877
Hazardous	499.91	545	272,572	0.029	1.435	0.122	0.005	0.999	0.256
Radiological	670.88	1,012	679,002	0.071	3.565	0.299	0.012	2.489	0.639

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Cleanup - Unmitigated

NASA

Table 4-16: Offsite Overall - NASA Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	100	3,132	0.150	0.579	6.161	0.021	2.502	0.622
SCAQMD	8.68	100	868	0.042	0.160	1.707	0.006	0.693	0.172
total[1]	40	100	4,000	0.192	0.739	7.868	0.027	3.195	0.795
VCAPCD	0.42	100	42	0.002	0.008	0.083	0.000	0.034	0.008
SCAQMD	39.58	100	3,958	0.190	0.732	7.786	0.026	3.161	0.787
total[1]	40	100	4,000	0.192	0.739	7.868	0.027	3.195	0.795
				tons/year					
Worker Commute				**VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	26,000	814,320	0.020	0.075	0.801	0.003	0.325	0.081
SCAQMD	8.68	26,000	225,680	0.005	0.021	0.222	0.001	0.090	0.022
total[1]	40	26,000	1,040,000	0.025	0.096	1.023	0.003	0.415	0.103
VCAPCD	0.42	26,000	10,920	2.6E-04	0.001	0.011	3.6E-05	0.004	0.001
SCAQMD	39.58	26,000	1,029,080	0.025	0.095	1.012	0.003	0.411	0.102
total[1]	40	26,000	1,040,000	0.025	0.096	1.023	0.003	0.415	0.103

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

Santa Susana Field Laboratory
Overall Site Cleanup - Unmitigated

NASA

Table 4-17: Offsite Overall - NASA Haul Emissions (lbs/day)

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Non-Hazardous									
VCAPCD	10.29	64	659	0.148	7.013	0.626	0.023	4.828	1.239
SCAQMD	53.58	64	3,429	0.768	36.519	3.261	0.121	25.140	6.451
Other CA	34.13	64	2,184	0.489	23.262	2.077	0.077	16.014	4.109
Non-CA	0	64	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	98	64	6,272	1.405	66.795	5.965	0.221	45.982	11.799
Hazardous									
VCAPCD	0.42	64	27	0.006	0.282	0.024	0.001	0.197	0.051
SCAQMD	124.58	64	7,973	1.676	83.737	7.034	0.281	58.456	15.001
Other CA	172.39	64	11,033	2.319	115.872	9.734	0.389	80.889	20.758
Non-CA	26.61	64	1,703	0.358	17.886	1.503	0.060	12.486	3.204
Total	324	64	20,736	4.358	217.777	18.295	0.731	152.028	39.015
Radiological Soil									
VCAPCD	0.42	64	27	0.006	0.281	0.023	0.001	0.197	0.051
SCAQMD	92.52	64	5,921	1.226	61.985	5.130	0.209	43.413	11.141
Other CA	305.57	64	19,556	4.048	204.720	16.942	0.690	143.381	36.796
Non-CA	299.49	64	19,167	3.967	200.647	16.605	0.676	140.528	36.064
Total	698	64	44,672	9.246	467.633	38.699	1.576	327.519	84.052
Maximum Emissions									
VCAPCD				0.148	7.013	0.626	0.023	4.828	1.239
SCAQMD				1.676	83.737	7.034	0.281	58.456	15.001
Other CA				4.048	204.720	16.942	0.690	143.381	36.796
Non-CA				3.967	200.647	16.605	0.676	140.528	36.064
Total				9.838	496.117	41.207	1.670	347.193	89.101
Maximum Emissions by Air Basin									
SCCAB	0.42	64	27	0.006	0.286	0.026	0.001	0.197	0.051
SCAB	124.58	64	7,973	1.786	84.911	7.583	0.281	58.454	15.000
SSAB	48.40	64	3,098	0.694	32.989	2.946	0.109	22.710	5.827
MDAB	198.21	64	12,685	2.841	135.096	12.064	0.447	93.001	23.865
SJVAB	297.36	64	19,031	4.263	202.675	18.099	0.671	139.523	35.802
GBVAB	156.57	64	10,020	2.244	106.715	9.530	0.353	73.464	18.851
SACVAB	227.09	64	14,534	3.255	154.780	13.822	0.513	106.552	27.342
NEPAB	65.74	64	4,207	0.942	44.807	4.001	0.148	30.846	7.915
Outside CA	862.88	64	55,224	12.370	588.123	52.521	1.948	404.869	103.892

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Cleanup - Unmitigated

NASA

Table 4-18: Offsite Overall - NASA Haul Emissions (tons/year)

				Tons/year					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Non-Hazardous									
VCAPCD	10.29	2,299	23,657	0.003	0.126	0.011	4.2E-04	0.087	0.022
SCAQMD	53.58	2,299	123,180	0.014	0.656	0.059	0.002	0.452	0.116
Other CA	34.13	2,299	78,465	0.009	0.418	0.037	0.001	0.288	0.074
Non-CA	0	2,299	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	98	2,299	225,302	0.025	1.200	0.107	0.004	0.826	0.212
Hazardous									
VCAPCD	0.42	10,816	4,543	4.8E-04	0.024	0.002	8.0E-05	0.017	0.004
SCAQMD	124.58	10,816	1,347,457	0.142	7.076	0.594	0.024	4.939	1.268
Other CA	172.39	10,816	1,864,570	0.196	9.791	0.823	0.033	6.835	1.754
Non-CA	26.61	10,816	287,814	0.030	1.511	0.127	0.005	1.055	0.271
Total	324	10,816	3,504,384	0.368	18.402	1.546	0.062	12.846	3.297
Radiological Soil									
VCAPCD	0.42	405	170	1.8E-05	0.001	7.4E-05	3.0E-06	0.001	0.000
SCAQMD	92.52	405	37,471	0.004	0.196	0.016	0.001	0.137	0.035
Other CA	305.57	405	123,757	0.013	0.648	0.054	0.002	0.454	0.116
Non-CA	299.49	405	121,295	0.013	0.635	0.053	0.002	0.445	0.114
Total	698	405	282,693	0.029	1.480	0.122	0.005	1.036	0.266
Total Tons/year									
VCAPCD				0.003	0.151	0.013	0.001	0.104	0.027
SCAQMD				0.159	7.928	0.669	0.027	5.528	1.419
Other CA				0.218	10.857	0.913	0.036	7.576	1.944
Non-CA				0.043	2.146	0.180	0.007	1.500	0.385
Total				0.423	21.082	1.776	0.071	14.709	3.775
Maximum Emissions by Air Basin									
SCCAB				0.003	0.151	0.013	0.001	0.104	0.027
SCAB				0.159	7.928	0.669	0.027	5.528	1.419
SSAB				0.067	3.341	0.284	0.011	2.327	0.597
Non-Hazardous	48.40	2,299	111,271	0.012	0.593	0.053	0.002	0.408	0.105
Hazardous	48.40	10,816	523,494	0.055	2.749	0.231	0.009	1.919	0.492
Radiological	0.00	405	0	0.000	0.000	0.000	0.000	0.000	0.000
MDAB				0.181	8.980	0.762	0.030	6.255	1.605
Non-Hazardous	123.99	2,299	285,052	0.032	1.518	0.136	0.005	1.045	0.268
Hazardous	123.99	10,816	1,341,076	0.141	7.042	0.592	0.024	4.916	1.262
Radiological	198.21	405	80,276	0.008	0.420	0.035	0.001	0.294	0.076
SJVAB				0.012	0.630	0.052	0.002	0.441	0.113
Non-Hazardous	0.00	2,299	0	0.000	0.000	0.000	0.000	0.000	0.000
Hazardous	0.00	10,816	0	0.000	0.000	0.000	0.000	0.000	0.000
Radiological	297.36	405	120,432	0.012	0.630	0.052	0.002	0.441	0.113
GBVAB				0.190	9.404	0.798	0.032	6.550	1.681
Non-Hazardous	131.40	2,299	302,088	0.034	1.609	0.144	0.005	1.107	0.284
Hazardous	131.40	10,816	1,421,222	0.149	7.463	0.627	0.025	5.210	1.337
Radiological	156.57	405	63,412	0.007	0.332	0.027	0.001	0.232	0.060
SACVAB				0.010	0.481	0.040	0.002	0.337	0.087
Non-Hazardous	0.00	2,299	0	0.000	0.000	0.000	0.000	0.000	0.000
Hazardous	0.00	10,816	0	0.000	0.000	0.000	0.000	0.000	0.000
Radiological	227.09	405	91,972	0.010	0.481	0.040	0.002	0.337	0.087
NEPAB				0.003	0.139	0.012	0.000	0.098	0.025
Non-Hazardous	0.00	2,299	0	0.000	0.000	0.000	0.000	0.000	0.000
Hazardous	0.00	10,816	0	0.000	0.000	0.000	0.000	0.000	0.000
Radiological	65.74	405	26,625	0.003	0.139	0.012	0.000	0.098	0.025
Outside CA				0.073	3.666	0.307	0.012	2.560	0.657
Non-Hazardous	26.61	2,299	61,176	0.007	0.326	0.029	0.001	0.224	0.058
Hazardous	26.61	10,816	287,814	0.030	1.511	0.127	0.005	1.055	0.271
Radiological	862.88	405	349,470	0.036	1.829	0.151	0.006	1.281	0.329

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Cleanup - Unmitigated

Monitoring and Maintenance

Table 4-19: Offsite Overall - Monitoring & Maintenance Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	144	4,510	0.217	0.834	8.872	0.030	3.602	0.896
SCAQMD	8.68	144	1,250	0.060	0.231	2.459	0.008	0.998	0.248
total[1]	40	144	5,760	0.277	1.065	11.330	0.038	4.601	1.145
VCAPCD	0.42	144	60	0.003	0.011	0.119	4.0E-04	0.048	0.012
SCAQMD	39.58	144	5,700	0.274	1.053	11.211	0.038	4.552	1.133
total[1]	40	144	5,760	0.277	1.065	11.330	0.038	4.601	1.145
				tons/year					
Worker Commute				**VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	37,440	1,172,621	0.028	0.108	1.153	0.004	0.468	0.117
SCAQMD	8.68	37,440	324,979	0.008	0.030	0.320	0.001	0.130	0.032
total[1]	40	37,440	1,497,600	0.036	0.138	1.473	0.005	0.598	0.149
VCAPCD	0.42	37,440	15,725	3.8E-04	0.001	0.015	5.3E-05	0.006	0.002
SCAQMD	39.58	37,440	1,481,875	0.036	0.137	1.457	0.005	0.592	0.147
total[1]	40	37,440	1,497,600	0.036	0.138	1.473	0.005	0.598	0.149

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

Santa Susana Field Laboratory
Air Quality Appendix
Section 5
Mitigated Emission Factors

Santa Susana Field Laboratory
Initial Clean-up - Mitigated

Onsite Exhaust Emission Factors

Table 5-1: Emission Factors for Offroad Equipment (Adjusted to Tier 4 Final Compliance)

	Adjusted Emission Factors (g/bhp-hr)								HP	LF
	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4		
Rubber Tired Dozers	0.060	0.260	2.200	0.005	0.008	0.008	509.462	0.154	247	0.40
Concrete/Industrial Saws	0.060	0.260	3.700	0.006	0.008	0.008	568.300	0.055	81	0.73
Tractors/Loaders/Backhoes	0.060	0.260	3.700	0.005	0.008	0.008	511.346	0.154	97	0.37
Graders	0.060	0.260	2.200	0.005	0.008	0.008	511.696	0.154	187	0.41
Excavators	0.060	0.260	3.700	0.005	0.008	0.008	506.495	0.153	158	0.38
Scrapers	0.060	0.260	2.200	0.005	0.008	0.008	502.255	0.151	367	0.48
street sweepers	0.120	2.740	3.700	0.005	0.008	0.008	508.357	0.153	64	0.46
cranes	0.060	0.260	2.200	0.005	0.008	0.008	507.155	0.153	236	0.29
impact chisels	Electric/battery powered N/A for emissions									
grapplers	0.060	0.260	3.700	0.005	0.008	0.008	506.324	0.153	168	0.40
Forklifts	0.060	0.260	3.700	0.005	0.008	0.008	505.583	0.153	89	0.20

* modeled as "Other Material Handling Equipment"

Table 5-2: Emission Factors for Onroad Vehicles (Onsite)

	Emission Factors (g/mile)							
	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4/N_2O
Water Truck	0.229	5.494	8.522	0.016	0.006	0.006	2582.031	129.102
Haul Truck	0.229	5.494	8.522	0.016	0.006	0.006	2582.031	129.102
Onsite Worker Transport	0.056	0.111	1.356	0.003	0.005	0.004	556.107	27.805
	Emission Factors (g/min)							
Haul Truck	0.008	0.258	0.030	0.001	0.000	0.000	95.46	4.773

Onsite Exhaust Emission Factors

Sources:

- Quantity of each equipment type was provided by DTSC based on current onsite operations.
- Emission factors for unmitigated onsite construction equipment taken from Table 3.4 of Appendix D of the CalEEMod user guide (BREEZE software, a Division of Trinity Consultants, 2016). 2016 emission factors were used as a conservative estimate for all years as equipment is not anticipated to be changed out unless it breaks. Therefore even though construction could last for 18 years, there is the potential that the same equipment in use at the beginning of the project would be in use at the end of the project.
- Emissions for water truck and Haul trucks taken from EMFAC 2014 for Ventura County for Heavy Heavy Duty Trucks at 15 mph.
  (See "EMFAC2014 Emission Rates for Haul Trucks", Section 8 of Appendix D of this EIR, for full EMFAC modeling details)
- Emission factors for onsite worker transport trips are from EMFAC2014 for Ventura County for LDA vehicles traveling 15 mph. (See
  (See "EMFAC2014 Emission Rates for Commuter Vehicles", Section 8 of Appendix D of this EIR, for full EMFAC modeling details)
- Horsepower and load factors taken as the average for each equipment type from Table 3.3 of Appendix D of the CalEEMod User's Guide (BREEZE software, a Division of Trinity Consultants, 2016).
- Tier 4 final Emissions are taken from Table 3.5 of Appendix D of the CalEEMod User Guide (BREEZE software, a Division of Trinity Consultants, 2016). Tier 4 is an EPA standard for emissions of offroad vehicle engines.

Santa Susana Field Laboratory
Initial Clean-up - Mitigated

Onsite Exhaust Emissions

Table 5-3: Mitigated Emissions Per Offroad Vehicle Type per 8 Hour Work Day

	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4
	(lbs/day) per Excavation Site							
Rubber Tired Dozers	0.105	0.453	3.834	0.009	0.014	0.014	887.739	0.268
Concrete/Industrial Saws	0.063	0.271	3.859	0.006	0.008	0.008	592.656	0.057
Tractors/Loaders/Backhoes	0.038	0.165	2.342	0.003	0.005	0.005	323.672	0.097
Graders	0.081	0.352	2.975	0.007	0.011	0.011	691.918	0.208
Excavators	0.064	0.275	3.918	0.005	0.008	0.008	536.331	0.162
Scrapers	0.186	0.808	6.835	0.016	0.025	0.025	1560.445	0.469
street sweepers	0.062	1.423	1.921	0.003	0.004	0.004	263.951	0.080
cranes	0.072	0.314	2.656	0.006	0.010	0.010	612.164	0.185
impact chisels	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
grapplers	0.071	0.308	4.385	0.006	0.009	0.009	600.088	0.181
Forklifts	0.019	0.082	1.162	0.002	0.003	0.003	158.719	0.048
Water Truck	0.045	1.090	1.691	0.003	0.001	0.001	512.308	25.615

Equations

- Daily emssions = (Emission Factor X Horse power X Load Factor X Quantity X Hours per day) / 453.6
  - 453.6 grams per pound
  - Emission Factor, Horse Power, and Load Factor from Table 1-3.
  - 8 Hour work day (8 hour of equipment usage)
  - Quantity is assumed to be 1 for the purposes of daily emissions in Table 1-5.
- Daily emissions (Water truck) = (Emission Factor X Miles) / 453.6
  - Assumes water trucks at 90 miles per day for onsite operations (15 mph for 6 hrs per day)
- Impact Chisels are electric and therefore do not have quantifiable onsite emissions.

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Initial Clean-up - Mitigated

Offsite Exhaust Emission Factors

Table 5-4: Mitigated Mileage and Emission Factors for Haul Trucks (offsite)

Emission Factors (lbs/mile criteria pollutants; MT/mile GHGs)

		Exhaust								Fugitive	
Haul Truck Emission Factors		ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4	PM10	PM2.5
	< 55 mph	1.8E-04	0.003	0.002	3.5E-05	1.1E-05	1.0E-05	0.002	8.0E-05	0.007	0.002
	55 mph	5.6E-05	0.001	0.000	3.5E-05	9.0E-06	8.6E-06	0.001	6.7E-05		

Distance (by speed)		Total	<55	55
Boeing	Non-Haz	115	7.3	107.7
	Haz	291	7.3	283.7
	Rad	698	7.3	690.7
DOE	Non-Haz	125	7.3	117.7
	Haz	228	7.3	220.7
	Rad	337	7.3	329.7
NASA	Non-Haz	98	7.3	90.7
	Haz	324	7.3	316.7
	Rad	698	7.3	690.7

Reintrained Road Dust Emission Factors:

$E = k(sL)^{0.91} \times W^{1.02}$

E_{PM10} = k*(0.1)^0.91*497^1.02

= 0.0022 * 0.123 * 26.662

= 0.007 PM10

$E_{PM2.5}$ = 0.00054 * 0.123 * 26.662

= 0.002 PM2.5

E	?	particulate emissions (lbs/VMT)
k	0.0022	PM10 - particle size multiplier (lbs/VMT)
k	0.00054	PM2.5 - particle size multiplier (lbs/VMT)
sL	0.1	road surace silt loading grams per square meter (g/m^2)
w	25	average weight in tons of the vehicles traveling the road (tons)

Table 5-5: Mitigated Weighted Emission Factors and Trucks per day for Initial Clean-up

Weighted Average Haul Truck Emissions (lbs/mile - criteria pollutants; MT - GHGs)

		ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4	#/day	#/year	Activity
Boeing	Non-Haz	6.37E-05	0.001	4.31E-04	3.53E-05	9.10E-06	8.71E-06	0.001	6.78E-05			
	Haz	5.88E-05	0.001	3.69E-04	3.53E-05	9.04E-06	8.65E-06	0.001	6.73E-05	3	780	TTF
	Rad	5.69E-05	0.001	3.45E-04	3.53E-05	9.01E-06	8.62E-06	0.001	6.71E-05	0	0	Demolition
DOE	Non-Haz	6.30E-05	0.001	4.23E-04	3.53E-05	9.09E-06	8.70E-06	0.001	6.78E-05			
	Haz	5.97E-05	0.001	3.80E-04	3.53E-05	9.05E-06	8.66E-06	0.001	6.74E-05	55	14,934	Area IV & HWMF
	Rad	5.83E-05	0.001	3.63E-04	3.53E-05	9.03E-06	8.64E-06	0.001	6.73E-05	26	5,606	Area IV & RMHF
	Rad	5.83E-05	0.001	4.49E-04	3.53E-05	9.12E-06	8.72E-06	0.001	6.80E-05	3	780	Demolition
NASA	Non-Haz	6.51E-05	0.001	4.49E-04	3.53E-05	9.12E-06	8.72E-06	0.001	6.80E-05	1	260	Liquid O2
	Haz	5.84E-05	0.001	3.65E-04	3.53E-05	9.03E-06	8.64E-06	0.001	6.73E-05	8	2,080	Liquid O2
	Max	6.51E-05	0.001	4.49E-04	3.53E-05	9.12E-06	8.72E-06	0.001	6.80E-05			

Sources
- Trucks per day taken from Table 1-6
- Emission Factors taken from EMFAC2014, maximum emissions from each air district potentially crossed for 55 mph, and weighted average by distance for SCCAB and SCAB for <55MPH.
- Distance assumptions for each waste type provided by DTSC.
- Fugitive road dust taken from USEPA AP42 13.2.2 - Paved Roads

Assumptions
- 453.6 grams per pound
- Weighted average determined by distance and speed for each RP.
- Daily trucks are based on 96 trucks per day.
- Annual truck trips are based on 96 trips per day for 260 days.
- HWMF has 412 trips per year and RMHF has 824 trips per year

Santa Susana Field Laboratory
Initial Clean-up - Mitigated

Offsite Emissions

Assumptions

- 40 miles per commute trip, either within VCAPCD or SCAQMD.
- Assumes 23 workers per day
- Assumes 2 trips per worker
- Boeing activities have been removed from initial projects.
- [1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

- For maximum emissions by air basin, the maximum distance that could be traveled through each air basin based on the potential disposal sites is used. Disposal sites are determined based on RP and type of disposal (non-hazardous, hazardous, radiological).

Equations

-	Commuter Trips	=	Sum of: emission factor in grams per mile (Table 1-1) divided by 453.6 (grams per pound) times miles total miles per day plus fugitive lbs per mile (Table 1-1) times number of miles for each Air District (SCAQMD, VCAPCD).
-	Haul Truck Trips	=	sum of: emission factor in grams per mile (Table 1-9) times 453.6 (grams per pound) times miles total miles per day for each type of disposal location (Non-hazardous, Hazardous, Radiological) plus the emission factors for fugitive road dust (Table 1-9) times total miels per day.
-	Total Miles	=	miles per trip times number of trips.
-	tons/year	=	lbs/day multiplied by 260 days divided by 2000 lbs per ton.
-	MT/year	=	lbs/day multiplied by 260 days per year divided by 2004.62 metric tons per pound.

Sources

- Worker Trips and Truck Trips taken from Table 1-6
- Number of Haul Trips per daty taken from Table 1-10
- Miles per waste disposal type taken from Table 1-9

Santa Susana Field Laboratory
Overall Site Cleanup - Mitigated

Offsite Exhaust Emission Factors

Table 5-6: Weighted Emission Factors and Trucks per day for Overall Clean-up

Weighted Average Haul Truck Emissions (lbs/mile - criteria pollutants; MT - GHGs)

		ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4	Max Truks /day	Max Truks /year
Boeing	Non-Haz	6.37E-05	0.001	4.31E-04	3.53E-05	9.10E-06	8.71E-06	0.001	6.78E-05	32	5,579
	Haz	5.88E-05	0.001	3.69E-04	3.53E-05	9.04E-06	8.65E-06	0.001	6.73E-05		1,127
	Rad	5.69E-05	0.001	3.45E-04	3.53E-05	9.01E-06	8.62E-06	0.001	6.71E-05		314
DOE	Non-Haz	6.30E-05	0.001	4.23E-04	3.53E-05	9.09E-06	8.70E-06	0.001	6.78E-05	32	6,241
	Haz	5.97E-05	0.001	3.80E-04	3.53E-05	9.05E-06	8.66E-06	0.001	6.74E-05		273
	Rad	5.83E-05	0.001	3.63E-04	3.53E-05	9.03E-06	8.64E-06	0.001	6.73E-05		506
NASA	Non-Haz	6.51E-05	0.001	4.49E-04	3.53E-05	9.12E-06	8.72E-06	0.001	6.80E-05	32	1,149
	Haz	5.84E-05	0.001	3.65E-04	3.53E-05	9.03E-06	8.64E-06	0.001	6.73E-05		5,408
	Rad	5.69E-05	0.001	3.45E-04	3.53E-05	9.01E-06	8.62E-06	0.001	6.71E-05		203

Sources
- Emission Factors used to determine weighted emissions taken from Table 1-9.

Assumptions
- 453.6 grams per pound
- Weighted average is based on distance and speed.
- Max Trucks per day assumes maximum potential milage based on number of trucks per waste type and length of trip, and 32 trips per day per RP
- Max trucks per year assumes 80 trucks per day (27 for DOE and Boeing, 26 for NASA) and is weighted to take into account the total amount of trucks per waste type (Table 1-11)

Santa Susana Field Laboratory
Overall Site Cleanup - Mitigated

Offsite Emissions

Assumptions

- 40 miles per commute trip, either within VCAPCD or SCAQMD.
- Number of workers per day is taken from Table 1-11. For M&M each RP is assumed to have 3 workers.
- Assumes 2 trips per worker
- Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. Only the maximum for each air district is reported as a worst case scenario. 40 miles per trip was the average trip length assumed for workers.

- For maximum emissions by air basin, the maximum distance that could be traveled through each air basin based on the potential disposal sites is used. Disposal sites are determined based on RP and type of disposal (non-hazardous, hazardous, radiological).
- No haul trucks required for M&M activities.

Equations

-	Commuter Trips	=	Sum of: emission factor in grams per mile (Table 1-1) times 453.6 (grams per pound) times miles total miles per day for each Air District (SCAQMD, VCAPCD).
-	Haul Truck Trips	=	sum of: emission factor in grams per mile (Table 1-9) times 453.6 (grams per pound) times miles total miles per day for each type of disposal location (Non-hazardous, Hazardous, Radiological) plus the emission factors for fugitive
		=	road dust times total miels per day.
-	Total Miles	=	miles per trip times number of trips.
-	tons/year	=	lbs/day multiplied by 260 days divided by 2000 lbs per ton.
-	MT/year	=	lbs/day multiplied by 260 days per year divided by 2004.62 metric tons per pound.

Sources

- Worker Trips and Truck Trips taken from Table 1-11
- Miles for haul truck trips taken from Table 1-9
- Number of haul truck trips taken from Table 1-12

Santa Susana Field Laboratory
Initial Clean-up - Mitigated

Onsite Fugitive Dust Emission Factors

Table 5-7: Mitigated Emission Factors For Fugitive Dust

	PM10	PM2.5	Units
Scraper/Grader	1.436	0.155	lbs/VMT
Dozer/Excavator	0.701	0.385	lbs/hr
Truck Loading	1.11E-04	1.68E-05	lbs/ton
Mechanical Demolition	1.03E-04	1.56E-05	lbs/ton
Debris Loading	0.020	0.003	lbs/ton
Unpaved Road Haul	0.734	0.073	lbs/VMT
Paved Road Haul	0.007	0.002	lbs/VMT
Paved Road Commute	7.9E-04	2.0E-04	lbs/VMT

Fugitive emissions from scrapers/graders:

PM_{10} = $(0.051 \times (S)^{2.0}) \times F_{PM10}$

= $(0.051 \times (7.1)^{2.0}) \times 0.6$

= 1.543 lbs/VMT

$PM_{2.5}$ = $(0.04 \times (S)^{2.5}) \times F_{PM2.5}$

= $(0.04 \times (7.1)^{2.5}) \times 0.031$

= 0.167 lbs/VMT

S = mean vehicle speed (mph) Default = 7.1

F_{PM10} = PM_{10} scaling factor default of 0.6

$F_{PM2.5}$ = $PM_{2.5}$ scaling factor default of 0.031

Fugitive emissions from Dozers and Excavators:

PM_{10} = $((C_{PM15} \times s^{1.5})/M^{1.4}) \times F_{PM10}$

= $((1 \times 6.9^{1.5})/7.9^{1.4}) \times 0.75$

= 0.753 lbs/hr

$PM_{2.5}$ = $((C_{TSP} \times s^{1.2})/M^{1.3}) \times F_{PM2.5}$

= $((5.7 \times 6.9^{1.2})/7.9^{1.3}) \times 0.105$

C_{PM15} = arbitary coefficient used by AP-42 = 1

s = material silt content = 6.9 %

M = material moisture content = 7.9%

F_{PM10} = PM_{10} scaling factor default of 0.75

C_{TSP} = arbitary coefficient used by AP-42 = 5.7

$F_{PM2.5}$ = $PM_{2.5}$ scaling factor default of 0.105

Fugitive emissions from truck loading

PM_{10} = $k \times (0.0032) \times ((U/5)^{1.3}/(M/2)^{1.4})$

= $0.35 \times (0.0032) \times ((5.82/5)^{1.3}/(12/2)^{1.4})$

= 1.11E-04 lbs/ton

$PM_{2.5}$ = $k \times (0.0032) \times ((U/5)^{1.3}/(M/2)^{1.4})$

= $0.053 \times (0.0032) \times ((5.82/5)^{1.3}/(12/2)^{1.4})$

= 1.68E-05 lbs/ton

k = particle size (PM10 = 0.35, PM2.5 = 0.053)

U= wind speed (miles - hour) = 5.82

M = Material moisture content = 12%

Fugitive Emissions from Mechanical Demolition

PM_{10} = $k \times (0.0032) \times ((U/5)^{1.3}/(M/2)^{1.4})$

= $0.35 \times (0.0032) \times ((5.82/5)^{1.3}/(12/2)^{1.4})$

= 1.11E-04 lbs/ton

k = particle size (PM10 = 0.35, PM2.5 = 0.053)

U= wind speed (miles - hour) = 5.82

M = Material moisture content = 12%

Santa Susana Field Laboratory
Initial Clean-up - Mitigated

Onsite Fugitive Emissions

$PM_{2.5}$ = k x (0.0032) x $((U/5)^{1.3}/(M/2)^{1.4})$

= 0.053 x (0.0032) x $((5.82/5)^{1.3}/(12/2)^{1.4})$

= 1.68E-05 lbs/ton

Fugitive Emissions from Debris Loading

PM_{10} = k x $EF_{L\text{-}TSP}$

= 0.35 x 0.058

= 0.020 lbs/ton

k = particle size (PM10 = 0.35, PM2.5 = 0.053)

$EF_{L\text{-}TSP}$ = default value = 0.058 lbs/ton

$PM_{2.5}$ = k x $EF_{L\text{-}TSP}$

= 0.053 x 0.058

= 0.003 lbs/ton

Equations

- Emissons for graders and scrapers = Emission factor x(((Acres / blade width of 12 ft) x 43,560 sqft per acre) / 5,280 ft per mile)
  - Acres are based on table provided on page 8 of CalEEMod Appendix A. (BREEZE software, a Division of Trinity Consultants, 2016).
    scrapers 1 acers/8hr day (conservately uses 1 acre for both because of the type of activities)
  - Emissions include a 69% reduction for required fugitive dust control measures.
  - Emission factor taken from Table 1-8.
- Emissions for dozers/excavators = # equipment x hours of operation x emission factor
  - Number of dozers and excavators taken from Table 1-6.
  - 8 hours per day
  - Emission factor taken from Table 1-8.
- Emissions for truck loading (soils) = emission factor * tons of material
  - Emission factor taken from Table 1-8.
- Emissions include a 63% reduction for required fugitive dust control measures.
- Emissions for Excavation truck loading = EF x Tons
  - Tons of soil = tons per truck (Assumed 23) times 2 times the number of trucks (From Table 1-6). Twice the number of trucks is used to account for
  - Emission factor taken from Table 1-8.
  - Tons of soil = tons per truck (Assumed 23) times the number of trucks (From Table 1-6).
- Emissions for fugitive dust from unpaved roads = Number of Miles x Number of Trucks x Emission Factor for PM10/PM2.5
  - Equations and constants taken from EPA's AP-42 13.2.2 Unpaved Roads
  - Emissions include a 69% reduction for required fugitive dust control measures.
  - Emission factor taken from Table 1-8.

Santa Susana Field Laboratory
Air Quality Appendix
Section 6
Mitigated Initial Clean-up Programs

Santa Susana Field Laboratory

Initial Clean-up - Emissions Summary (Mitigated)

Table 6-1: Sumamry of Initial Clean-up Emissions

	Lbs/Day					
	ROC/VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Area IV						
Onsite						
Equipment	0.472	3.513	21.567	0.037	62.766	9.193
Haul	0.175	4.331	5.786	0.013	0.004	0.004
Crew	0.224	0.446	5.422	0.012	0.020	0.018
Onsite Total	0.870	8.290	32.776	0.063	62.789	9.215
Offsite						
Crew	0.038	0.148	1.574	0.005	0.639	0.159
Haul -VCAPCD	0.004	0.063	0.024	0.002	0.461	0.114
Haul - SCAQMD	0.905	15.176	5.751	0.537	109.994	27.096
Haul - Other	0.799	13.466	4.979	0.483	99.007	24.390
Offsite Total	1.747	28.853	12.328	1.028	210.101	51.759
Area IV Total						
VCAPCD	0.912	8.502	34.373	0.070	63.890	9.487
SCAQMD	1.814	23.614	40.101	0.605	173.422	36.470
All	2.617	37.144	45.103	1.090	272.890	60.973
Liquid Oxygen Plant						
Onsite						
Equipment	0.472	3.513	21.567	0.037	13.116	3.921
Haul	0.021	0.513	0.685	0.002	0.000	0.000
Crew	0.224	0.446	5.422	0.012	0.020	0.018
Onsite Total	0.716	4.472	27.675	0.051	13.136	3.939
Offsite						
Crew	0.038	0.148	1.574	0.005	0.639	0.159
Haul -VCAPCD	0.002	0.029	0.012	0.001	0.197	0.049
Haul - SCAQMD	0.123	2.076	0.775	0.074	15.177	3.739
Haul - Other	0.191	3.206	1.192	0.115	23.499	5.789
Offsite Total	0.354	5.459	3.553	0.195	39.512	9.735
Liquid Oxygen Plant Total						
VCAPCD	0.756	4.648	29.260	0.057	13.972	4.147
SCAQMD	0.878	6.696	30.024	0.130	28.951	7.837
All	1.070	9.931	31.227	0.246	52.648	13.674
Demolition - DOE						
Onsite						
Equipment	0.311	2.240	17.603	0.025	3.713	0.486
Haul	0.007	0.171	0.228	0.001	0.000	0.000
Crew	0.447	0.892	10.844	0.024	0.039	0.036
Onsite Total	0.765	3.303	28.675	0.050	3.752	0.522
Offsite						
Crew	0.088	0.340	3.619	0.012	1.470	0.366
Haul -VCAPCD	0.000	0.003	0.001	8.9E-05	0.018	0.018
Haul - SCAQMD	0.016	0.293	0.123	0.010	1.985	1.985
Haul - Other	0.102	1.861	0.784	0.062	12.607	12.606
Offsite Total	0.206	2.497	4.528	0.084	16.080	14.975
Demolition Total						
VCAPCD	0.854	3.646	32.296	0.062	5.240	0.906
SCAQMD	0.869	3.936	32.418	0.072	7.206	2.873
All	0.971	5.800	33.203	0.134	19.832	15.497

Santa Susana Field Laboratory

Initial Clean-up - Emissions Summary (Mitigated)

Table 6-1: Sumamry of Initial Clean-up Emissions

	Lbs/Day					
	ROC/VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
TTF - Boeing						
Onsite						
Equipment	0.381	3.122	17.309	0.030	7.083	2.767
Haul	0.007	0.171	0.228	0.001	0.000	0.000
Crew	0.224	0.446	5.422	0.012	0.020	0.018
Onsite Total	0.612	3.739	22.959	0.042	7.103	2.785
Offsite						
Crew	0.031	0.118	1.259	0.004	0.511	0.127
Haul -VCAPCD	0.000	0.002	0.001	8.9E-05	0.018	0.004
Haul - SCAQMD	0.044	0.739	0.276	0.026	5.401	1.330
Haul - Other	0.059	0.984	0.367	0.035	7.197	1.773
Offsite Total	0.133	1.844	1.903	0.066	13.127	3.235
TTF - Boeing Total						
VCAPCD	0.643	3.860	24.219	0.047	7.632	2.917
SCAQMD	0.687	4.596	24.494	0.073	13.015	4.243
All	0.745	5.583	24.862	0.108	20.230	6.020
RMHF/HWMF - DOE						
Onsite						
Equipment	0.763	6.244	34.617	0.060	13.406	5.455
Haul	0.011	0.285	0.381	0.001	0.000	0.000
Crew	0.447	0.892	10.844	0.024	0.039	0.036
Onsite Total	1.222	7.421	45.842	0.085	13.445	5.491
Offsite						
Crew	0.077	0.296	3.147	0.011	1.278	0.318
Haul -VCAPCD	0.000	0.004	0.002	1.5E-04	0.030	0.007
Haul - SCAQMD	0.048	0.802	0.324	0.027	5.585	1.376
Haul - Other	0.112	1.872	0.716	0.066	13.494	3.324
Offsite Total	0.017	0.285	0.105	0.010	2.090	0.515
RMHF/HWMF - DOE Total						
VCAPCD	1.299	7.721	48.991	0.096	14.753	5.816
SCAQMD	1.347	8.518	49.313	0.123	20.308	7.185
All	1.238	7.705	45.948	0.095	15.535	6.006
Project Total						
Onsite	4.185	27.225	157.927	0.291	100.225	21.953
Crew	0.273	1.050	11.173	0.038	4.537	1.129
Offsite (VCAPCD)	0.006	0.101	0.039	0.004	0.725	0.192
Offsite (SCAQMD)	1.137	19.085	7.250	0.674	138.141	35.526
Offsite (Other)	1.262	21.390	8.038	0.761	155.804	47.882
Totals						
VCAPCD	4.413	**28.183**	167.084	0.325	104.503	23.030
Threshold	25.00	25.00	N/A	N/A	N/A	N/A
Significant	No	**Yes**	No	No	No	No
SCAQMD	5.603	47.392	176.699	1.005	242.857	58.597
Threshold	55	55	550	150	150	55
Significant	No	**No**	**No**	No	Yes	Yes
All Air Districts						
All	6.642	66.162	180.343	1.674	381.134	102.171

*Totals may not add exactly due to rounding.

Sources: Emissions are taken from Tables 6-3 through 6-16.

Santa Susana Field Laboratory

Initial Clean-up - LST Emissions Summary (Mitigated)

Table 6-2: LST Initial Clean-up Emissions Summary

LST Emissions Summary
(lbs/day)

	NOx	CO	PM10	PM2.5
Emissions	27	158	63	22
Threshold	131	5045	114	53
Significant?	No	No	**No**	**No**

Threshold Determination (2 acre site)

	NOx	NOx[2]	CO	PM10	PM2.5	
500 meters	263	146	7,460	162	84	Source Receptor Area 6
400 meters	237	131	5,045	114	53	
300 meters	212	117	3,837	90	37	
200 meters	187	103	2,629	66	21	Source Receptor Area 6

LST's determined by max for each activity as the activities occur at different locations throughout the site.

Sources: LSTs are determined by summing the onsite emissions as reported in Table 3-1.

Assumptions NOx[2]: The screening criteria for NOx were developed based on the 1-hour NO_2 CAAQS of 0.18 ppm. However, since the publication of the SCAQMD's guidance, the USEPA has promulgated a 1-hour NO_2 NAAQS of 0.100 ppm based on a 98th percentile value, which is more stringent than the CAAQS. In order to determine if Project emissions would result in an exceedance of the 1 hour NO_2 NAAQS, an approximated LST was estimated to evaluate the federal 1-hour NO_2 standard, as the SCAQMD significance threshold has not been updated to reflect this standard. Calculated by scaling the NO_2 LST for by the ratio of 1-hour NO_2 standards (federal/state)(i.e., 236 lb/day * (0.10/0.18) = 131 lb/day).

Santa Susana Field Laboratory
Initial Clean-up - Mitigated

Initial Clean Up Emissions

Table 6-3 Initial Clean-up Daily Emissions

	Maximum Daily Emissions (Lbs/day)							
	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4
Area IV - DOE								
Exhaust	0.472	3.513	21.567	0.037	0.056	0.056	3999.060	26.668
Fugitive	-	-	-	-	62.710	9.137	-	-
Haul Trucks	0.175	4.331	5.786	0.013	0.004	0.004	1970.371	98.519
Crew	0.224	0.446	5.422	0.012	0.020	0.018	2224.430	111.221
Total	0.870	8.290	32.776	0.063	62.789	9.215	8193.861	236.408
Liquid Oxygen Plant - NASA								
Exhaust	0.472	3.513	21.567	0.037	0.056	0.056	3999.060	26.668
Fugitive	-	-	-	-	13.060	3.865	-	-
Haul Trucks	0.021	0.513	0.685	0.002	0.000	0.000	233.333	11.667
Crew	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Demolition - DOE								
Exhaust	0.311	2.240	17.603	0.025	0.037	0.037	2768.292	26.284
Fugitive	-	-	-	-	3.676	0.450	-	-
Haul Trucks	0.007	0.171	0.228	0.001	0.000	0.000	77.778	3.889
Crew	0.447	0.892	10.844	0.024	0.039	0.036	4448.860	222.443
Total	0.765	3.303	28.675	0.050	3.752	0.522	7294.929	252.616
TTF - Boeing								
Exhaust	0.381	3.122	17.309	0.030	0.044	0.044	3231.518	26.436
Fugitive	-	-	-	-	7.039	2.723	-	-
Haul Trucks	0.007	0.171	0.228	0.001	0.000	0.000	77.778	3.889
Crew	0.224	0.446	5.422	0.012	0.020	0.018	2224.430	111.221
Total	0.612	3.739	22.959	0.042	7.103	2.785	5533.726	141.546
RMHF/HWMF - DOE								
Exhaust	0.763	6.244	34.617	0.060	0.088	0.088	6463.037	52.872
Fugitive	-	-	-	-	0.00	0.00	-	-
Haul Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crew	0.224	0.446	5.422	0.012	0.039	0.018	2224.430	111.221
Total	0.224	0.446	5.422	0.012	0.039	0.018	2224.430	111.221

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Initial Clean-up - Mitigated

Initial Clean Up Emissions

Table 6-4 Initial Clean-up Annual Emissions

	Annual Emissions (Tons/year)						(MT/year)	
Year 1	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5	CO_2	CH_4
Area IV - DOE								
Exhaust	0.061	0.457	2.804	0.005	0.007	0.007	471.625	3.145
Fugitive	-	-	-	-	8.152	1.188	-	-
Haul Trucks	0.023	0.563	0.752	0.002	0.001	0.001	232.374	11.619
Crew	0.029	0.058	0.705	0.002	0.003	0.002	262.336	13.117
Total	0.113	1.078	4.261	0.008	8.163	1.198	966.335	27.881
Liquid Oxygen Plant - NASA								
Exhaust	0.061	0.457	2.804	0.005	0.007	0.007	471.625	3.145
Fugitive	-	-	-	-	1.698	0.502	-	-
Haul Trucks	0.003	0.067	0.089	0.000	0.000	0.000	27.518	1.376
Crew	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00
Demolition - DOE								
Exhaust	0.040	0.291	2.288	0.003	0.005	0.005	326.476	3.100
Fugitive	-	-	-	-	0.478	0.058	-	-
Haul Trucks	0.001	0.022	0.030	0.000	0.000	0.000	9.173	0.459
Crew	0.058	0.116	1.410	0.003	0.005	0.005	524.672	26.234
Total	0.099	0.429	3.728	0.007	0.488	0.068	860.320	29.792
TTF - Boeing								
Exhaust	0.050	0.406	2.250	0.004	0.006	0.006	381.106	3.118
Fugitive	-	-	-	-	0.915	0.354	-	-
Haul Trucks	0.001	0.022	0.030	0.000	0.000	0.000	9.173	0.459
Crew	0.029	0.058	0.705	0.002	0.003	0.002	262.336	13.117
Total	0.080	0.486	2.985	0.006	0.923	0.362	652.614	16.693
RMHF/HWMF - DOE								
Exhaust	0.099	0.812	4.500	0.008	0.011	0.011	762.212	6.235
Fugitive	-	-	-	-	0.00	0.00	-	-
Haul Trucks	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00
Crew	0.029	0.058	0.705	0.002	0.005	0.002	262.336	13.117
Total	0.029	0.058	0.705	0.002	0.005	0.002	262.336	13.117

*Totals may not add exactly due to rounding.

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Initial Clean-up - Mitigated

Initial Clean Up Emissions

Equations

- Daily emssions (Exhaust) (lbs/day) = sum of daily emissions for each piece of equipment.
- Emissions from each equipment type = Number of pieces of equipment times the emissions per day for that piece of equipment.
  - Emissions per day per equipment type from Table 1-5.
  - Number of Pieces of Equipment per activty from Table 1-6.
- Daily emssions (Fugitive) (lbs/day) - Taken from Table 3-5 and 3-6 for initial clean-up projects.
- Daily emssions (haul trucks) (lbs/day) = [(Emission $Factor_{exhaust}$ X number of trips X Miles) x (Emission $Factor_{idle}$ X number of minutes X number of trucks)] / 453.6
  - Emission Factors from Table 1-4.
  - Number of Trips from Table 1-6
  - **4** miles/ round trip
  - **15** minutes idling per truck (- assumes idling entering the site, at the loading location, and leaving the site)
- Daily emssions (crew (onsite worker transport)) = ((Number of Employees/15) times Emission Factor times 4) / 453.6
  - Number of employees per phase taken from Table 1-6.
  - **15** workers/onsite van
  - Emission Factor taken from Table 1-5
  - **4** miles/ round trip
  - 453.6 grams per pound
- Total Daily Emissions for each criteria pollutant is the sume of the daily exhaust, fugitive, haul truck, and crew emissions.
- Annual emssions (Tons/year) = (Daily Emissions * Number of Days)/2000
  - Daily Emissions from Table 3-3.
  - 2,000.00 lbs/ton
  - 260 days per year
- Annual emssions (MT/year) = (Daily Emissions * Number of Days)/2204.623
  - Daily Emissions from Table 3-3.
  - 2,204.62 lbs per Metric Ton

Santa Susana Field Laboratory
Initial Clean-up - Mitigated

Onsite Fugitive Emissions

Table 6-5 Initial Clean-up Daily Fugitive Emissions

	Acres	#	Tons/truck	# Trucks	PM10	PM2.5
Maximum (lbs/day) - Area IV						
Scrapers/graders	0.75	N/A	N/A	N/A	0.247	0.032
Dozers/Excavators	N/A	2.50	N/A	N/A	4.667	3.066
Truck Loading	N/A	N/A	N/A	N/A	0.388	0.059
Total					***5.302***	***3.157***
Maximum (lbs/day) - Oxygen Plant						
Scrapers	0.75	N/A	N/A	N/A	0.295	0.032
Dozers/Excavators	N/A	2.50	N/A	N/A	5.578	3.066
Truck Loading	N/A	N/A	N/A	N/A	0.388	0.059
Total					***6.261***	***3.157***

Table 6-6 Initial Clean-up Fugitive Dust from Unpaved Roads
Maximum Daily Emissions (lbs/day)

	# Miles							
	Unpaved	Paved	# Trucks	PM10	PM2.5	# Vans	PM10	PM2.5
Area IV - DOE	1	3	76	57.407	5.980	1	0.001	0.000
Liquid Oxygen Plant - NASA	1	3	9	6.798	0.708	1	0.001	0.000
Demolition - DOE	1	3	3	2.266	0.236	2	0.002	0.000

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Demolition Offsite Emissions - DOE

Table 6-7: Offsite Demolition - DOE Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	46	1,441	0.069	0.266	2.834	0.010	1.151	0.286
SCAQMD	8.68	46	399	0.019	0.074	0.785	0.003	0.319	0.079
total[1]	40	46	1,840	0.088	0.340	3.619	0.012	1.470	0.366
VCAPCD	0.42	46	19	0.001	0.004	0.038	1.3E-04	0.015	0.004
SCAQMD	39.58	46	1,821	0.087	0.337	3.581	0.012	1.454	0.362
total[1]	40	46	1,840	0.088	0.340	3.619	0.012	1.470	0.366
				tons/year					
Worker Commute				**VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	11,960	374,587	0.009	0.035	0.368	0.001	0.150	0.037
SCAQMD	8.68	11,960	103,813	0.002	0.010	0.102	3.5E-04	0.041	0.010
total[1]	40	11,960	478,400	0.011	0.044	0.471	0.002	0.191	0.048
VCAPCD	0.42	11,960	5,023	1.2E-04	0.000	0.005	1.7E-05	0.002	0.000
SCAQMD	39.58	11,960	473,377	0.011	0.044	0.466	0.002	0.189	0.047
total[1]	40	11,960	478,400	0.011	0.044	0.471	0.002	0.191	0.048

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

Santa Susana Field Laboratory
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Demolition Offsite Emissions - DOE

Table 6-8: Offsite Demolition - DOE Haul Emissions

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Radiological Disposal Site									
VCAPCD	0.42	6	3	0.000	0.003	0.001	8.9E-05	0.018	0.018
SCAQMD	45.78	6	275	0.016	0.293	0.123	0.010	1.985	1.985
Other CA	242.6	6	1,456	0.085	1.553	0.654	0.051	10.517	10.517
Non-CA	48.2	6	289	0.017	0.308	0.130	0.010	2.090	2.090
Total	337	6	2022	0.118	2.157	0.908	0.071	14.610	14.609
Maximum Emissions by Air Basin									
SCCAB	0.42	6	3	0.000	0.003	0.001	8.9E-05	0.018	0.018
SCAB	45.78	6	275	0.016	0.293	0.123	0.010	1.985	1.985
SSAB	0.00	6	0	0.000	0.000	0.000	0.0E+00	0.000	0.000
MDAB	198.21	6	1,189	0.069	1.268	0.534	0.042	8.593	8.593
SJVAB	0.00	6	0	0.000	0.000	0.000	0.000	0.000	0.000
GBVAB	142.64	6	856	0.050	0.913	0.384	0.030	6.184	6.184
SACVAB	0.00	6	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0.00	6	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	670.88	6	4,025	0.235	4.293	1.808	0.142	29.085	29.083
				tons/year					
	Miles/trip	**# Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Radiological Disposal Site									
VCAPCD	0.42	1,560	655	1.9E-05	0.000	1.5E-04	1.2E-05	0.002	0.002
SCAQMD	45.78	1,560	71,417	0.002	0.038	0.016	0.001	0.258	0.258
Other CA	242.6	1,560	378,456	0.011	0.202	0.085	0.007	1.367	1.367
Non-CA	48.2	1,560	75,192	0.002	0.040	0.017	0.001	0.272	0.272
Total	337	1,560	525,720	0.015	0.280	0.118	0.009	1.899	1.899
Maximum Emissions by Air Basin									
SCCAB	0.42	1,560	655	1.9E-05	0.000	1.5E-04	1.2E-05	0.002	0.002
SCAB	45.78	1,560	71,417	2.1E-03	0.038	0.016	0.001	0.258	0.258
SSAB	0	1,560	0	0.000	0.000	0.000	0.000	0.000	0.000
MDAB	198.21	1,560	309,208	0.009	0.165	0.069	0.005	1.117	1.117
SJVAB	0	1,560	0	0.000	0.000	0.000	0.000	0.000	0.000
GBVAB	142.64	1,560	222,518	0.006	0.119	0.050	0.004	0.804	0.804
SACVAB	0	1,560	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0	1,560	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	670.88	1,560	1,046,573	0.031	0.558	0.235	0.018	3.781	3.781

*Totals may not add exactly due to rounding.

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Initial Clean-up - Mitigated

Area IV Offsite Emissions

Table 6-9: Aera IV Offsite - DOE Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	20	626	0.030	0.116	1.232	0.004	0.500	0.124
SCAQMD	8.68	20	174	0.008	0.032	0.341	0.001	0.139	0.034
total	40	20	800	0.038	0.148	1.574	0.005	0.639	0.159
VCAPCD	0.42	20	8	4.0E-04	0.002	0.017	5.6E-05	0.007	0.002
SCAQMD	39.58	20	792	0.038	0.146	1.557	0.005	0.632	0.157
Total	40	20	800	0.038	0.148	1.574	0.005	0.639	0.159
				tons/year					
	Miles/trip	**# trips**	**Miles**	**VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	5,200	162,864	0.004	0.015	0.160	0.001	0.065	0.016
SCAQMD	8.68	5,200	45,136	0.001	0.004	0.044	1.5E-04	0.018	0.004
total	40	5,200	208,000	0.005	0.019	0.205	0.001	0.083	0.021
VCAPCD	0.42	5,200	2,184	5.2E-05	2.0E-04	0.002	7.3E-06	0.001	0.000
SCAQMD	39.58	5,200	205,816	0.005	0.019	0.202	0.001	0.082	0.020
Total	40	5,200	208,000	0.005	0.019	0.205	0.001	0.083	0.021

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

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Area IV Offsite Emissions

Table 6-10: Aera IV Offsite - DOE Haul Emissions

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Radiological Disposal Site									
VCAPCD	0.42	47	20	0.001	0.019	0.007	0.001	0.143	0.035
SCAQMD	45.78	47	2,157	0.126	2.120	0.784	0.076	15.586	3.840
Other CA	242.6	47	11,431	0.667	11.234	4.154	0.403	82.596	20.347
Other Non-CA	48.2	47	2,271	0.132	2.232	0.825	0.080	16.410	4.043
Total	337	47	15879.44	0.926	15.606	5.770	0.560	114.736	28.264
Hazardous Disposal Site									
VCAPCD	0.42	105	44	0.003	0.044	0.017	0.002	0.318	0.078
SCAQMD	124.58	105	13,066	0.779	13.056	4.967	0.461	94.408	23.257
Other CA	0	105	0	0.000	0.000	0.000	0.000	0.000	0.000
Other Non-CA	0	105	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	125	105	13,110	0.782	13.100	4.984	0.462	94.726	23.335
Maximum Emissions by Air Basin									
SCCAB	0.42	162	68	0.004	0.068	0.026	0.002	0.492	0.121
SCAB	124.58	162	20,182	1.204	20.166	7.673	0.712	145.824	35.923
SSAB	103	162	16,686	0.995	16.673	6.344	0.589	120.564	29.700
MDAB	198.21	162	32,110	1.915	32.084	12.208	1.133	232.010	57.155
SJVAB	57	162	9,234	0.551	9.227	3.511	0.326	66.720	16.436
GBVAB	142.64	162	23,108	1.378	23.089	8.785	0.815	166.964	41.131
SACVAB	0	162	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0	162	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	670.88	162	108,683	6.483	108.596	41.320	3.834	785.282	193.451
				Tons/year					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Radiological Disposal Site									
VCAPCD	0.42	12,251	5,146	0.000	0.003	0.001	9.1E-05	0.019	0.005
SCAQMD	45.78	12,251	560,860	0.016	0.276	0.102	0.010	2.026	0.499
Other CA	242.6	12,251	2,972,141	0.087	1.460	0.540	0.052	10.738	2.645
Other Non-CA	48.2	12,251	590,508	0.017	0.290	0.107	0.010	2.133	0.526
Total	337	12,251	4128654.4	0.120	2.029	0.750	0.073	14.916	3.674
Hazardous Disposal Site									
VCAPCD	0.42	27,269	11,453	0.000	0.006	0.002	2.0E-04	0.041	0.010
SCAQMD	124.58	27,269	3,397,147	0.101	1.697	0.646	0.060	12.273	3.023
Other CA	0	27,269	0	0.000	0.000	0.000	0.000	0.000	0.000
Other Non-CA	0	27,269	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	125	27,269	3,408,600	0.102	1.703	0.648	0.060	12.314	3.034
Maximum Emissions by Air Basin									
SCCAB	0.42	42,120	17,690	0.001	0.009	0.003	3.1E-04	0.064	0.016
SCAB	124.58	42,120	5,247,310	0.157	2.622	0.997	0.093	18.957	4.670
SSAB	103	42,120	4,338,360	0.129	2.167	0.825	0.077	15.673	3.861
MDAB	198.21	42,120	8,348,605	0.249	4.171	1.587	0.147	30.161	7.430
SJVAB	57	42,120	2,400,840	0.072	1.199	0.456	0.042	8.674	2.137
GBVAB	142.64	42,120	6,007,997	0.179	3.002	1.142	0.106	21.705	5.347
SACVAB	0	42,120	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0	42,120	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	670.88	42,120	28,257,466	0.843	14.118	5.372	0.498	102.087	25.149

*Totals may not add exactly due to rounding.

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Liquid Oxygen Plant Offsite Emissions

Table 6-11: Liquid Oxygen Plant Offsite - NASA Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	20	626	0.030	0.116	1.232	0.004	0.500	0.124
SCAQMD	8.68	20	174	0.008	0.032	0.341	0.001	0.139	0.034
total[1]	40	20	800	0.038	0.148	1.574	0.005	0.639	0.159
VCAPCD	0.42	20	8	0.000	0.002	0.017	5.6E-05	0.007	0.002
SCAQMD	39.58	20	792	0.038	0.146	1.557	0.005	0.632	0.157
total[1]	40	20	800	0.038	0.148	1.574	0.005	0.639	0.159
				tons/year					
				ROC/VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	5,200	162,864	0.004	0.015	0.160	0.001	0.065	0.016
SCAQMD	8.68	5,200	45,136	0.001	0.004	0.044	1.5E-04	0.018	0.004
total[1]	40	5,200	208,000	0.005	0.019	0.205	0.001	0.083	0.021
VCAPCD	0.42	5,200	2,184	5.2E-05	2.0E-04	0.002	7.3E-06	0.001	0.000
SCAQMD	39.58	5,200	205,816	0.005	0.019	0.202	0.001	0.082	0.020
total[1]	40	5,200	208,000	0.005	0.019	0.205	0.001	0.083	0.021

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

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Liquid Oxygen Plant Offsite Emissions

Table 6-12: Liquid Oxygen Plant Offsite - NASA Haul Emissions

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Non-Hazardous Disposal Site									
VCAPCD	10.29	2	21	0.001	0.022	0.009	0.001	0.149	0.037
SCAQMD	53.58	2	107	0.007	0.114	0.048	0.004	0.774	0.191
Other CA	34.13	2	68	0.004	0.073	0.031	0.002	0.493	0.122
Other Non-CA	0	2	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	98	2	196	0.013	0.209	0.088	0.007	1.416	0.349
Hazardous Disposal Site									
VCAPCD	0.42	16	7	0.000	0.007	0.002	2.4E-04	0.049	0.012
SCAQMD	124.58	16	1,993	0.116	1.962	0.727	0.070	14.402	3.548
Other CA	172.39	16	2,758	0.161	2.715	1.006	0.097	19.930	4.910
Other Non-CA	26.61	16	426	0.025	0.419	0.155	0.015	3.076	0.758
Total	324	16	5,184	0.303	5.102	1.891	0.183	37.457	9.227
Maximum Emissions by Air Basin									
SCCAB	0.42	18	8	0.000	0.008	0.003	2.7E-04	0.055	0.013
SCAB	124.58	18	2,242	0.146	2.392	1.007	0.079	16.203	3.992
SSAB	48.4	18	871	0.057	0.929	0.391	0.031	6.295	1.551
MDAB	123.99	18	2,232	0.145	2.381	1.002	0.079	16.126	3.973
SJVAB	0	18	0	0.000	0.000	0.000	0.000	0.000	0.000
GBVAB	131.4	18	2,365	0.154	2.523	1.062	0.083	17.090	4.210
SACVAB	0	18	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0	18	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	26.61	18	479	0.031	0.511	0.215	0.017	3.461	0.853
				tons/year					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Non-Hazardous Disposal Site									
VCAPCD	10.29	520	5,351	0.000	0.003	0.001	9.4E-05	0.019	0.005
SCAQMD	53.58	520	27,862	0.001	0.015	0.006	4.9E-04	0.101	0.025
Other CA	34.13	520	17,748	0.001	0.009	0.004	3.1E-04	0.064	0.016
Other Non-CA	0	520	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	98	520	50960	0.002	0.027	0.011	0.001	0.184	0.045
Hazardous Disposal Site									
VCAPCD	0.42	4,160	1,747	5.1E-05	0.001	0.000	3.1E-05	0.006	0.002
SCAQMD	124.58	4,160	518,253	0.015	0.255	0.095	0.009	1.872	0.461
Other CA	172.39	4,160	717,142	0.021	0.353	0.131	0.013	2.591	0.638
Other Non-CA	26.61	4,160	110,698	0.003	0.054	0.020	0.002	0.400	0.099
Total	324	4,160	1,347,840	0.039	0.663	0.246	0.024	4.869	1.200
Maximum Emissions by Air Basin									
SCCAB	0.42	4,680	1,966	6.4E-05	0.001	0.000	3.5E-05	0.007	0.002
SCAB	124.58	4,680	583,034	0.019	0.311	0.131	0.010	2.106	0.519
SSAB	48.4	4,680	226,512	0.007	0.121	0.051	0.004	0.818	0.202
MDAB	123.99	4,680	580,273	0.019	0.309	0.130	0.010	2.096	0.516
SJVAB	0	4,680	0	0.000	0.000	0.000	0.000	0.000	0.000
GBVAB	131.4	4,680	614,952	0.020	0.328	0.138	0.011	2.222	0.547
SACVAB	0	4,680	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0	4,680	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	26.61	4,680	124,535	0.004	0.066	0.028	0.002	0.450	0.111

*Totals may not add exactly due to rounding.

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TTF- Boeing

Table 6-13: TTF Offsite - Boeing Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	16	501	0.024	0.093	0.986	0.003	0.400	0.100
SCAQMD	8.68	16	139	0.007	0.026	0.273	0.001	0.111	0.028
total[1]	40	32	1,280	0.031	0.118	1.259	0.004	0.511	0.127
VCAPCD	0.42	16	7	0.000	0.001	0.013	4.5E-05	0.005	0.001
SCAQMD	39.58	16	633	0.030	0.117	1.246	0.004	0.506	0.126
total[1]	40	32	1,280	0.031	0.118	1.259	0.004	0.511	0.127
				tons/year					
				VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	4,160	130,291	0.003	0.012	0.128	4.4E-04	0.052	0.013
SCAQMD	8.68	4,160	36,109	0.001	0.003	0.036	1.2E-04	0.014	0.004
total[1]	40	8,320	332,800	0.004	0.015	0.164	0.001	0.066	0.017
VCAPCD	0.42	4,160	1,747	4.2E-05	1.6E-04	0.002	5.8E-06	0.001	0.000
SCAQMD	39.58	4,160	164,653	0.004	0.015	0.162	0.001	0.066	0.016
total[1]	40	8,320	332,800	0.004	0.015	0.164	0.001	0.066	0.017

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

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TTF- Boeing

Table 6-14: TTF Offsite - Boeing Haul Emissions

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Hazardous Disposal Site									
VCAPCD	0.42	6	3	0.000	0.002	0.001	8.9E-05	0.018	0.004
SCAQMD	124.58	6	747	0.044	0.739	0.276	0.026	5.401	1.330
Other CA	166	6	996	0.059	0.984	0.367	0.035	7.197	1.773
Other Non-CA	0	6	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	291	6	1,746	0.103	1.725	0.644	0.062	12.616	3.108
Maximum Emissions by Air Basin									
SCCAB	10.29	6	62	0.004	0.061	0.023	0.002	0.446	0.110
SCAB	124.58	6	747	0.044	0.739	0.276	0.026	5.401	1.330
SSAB	48.40	6	290	0.017	0.287	0.107	0.010	2.098	0.517
MDAB	198.21	6	1,189	0.070	1.175	0.439	0.042	8.593	2.117
SJVAB	297.36	6	1,784	0.105	1.763	0.658	0.063	12.891	3.176
GBVAB	156.57	6	939	0.055	0.928	0.347	0.033	6.788	1.672
SACVAB	227.09	6	1,363	0.080	1.346	0.503	0.048	9.845	2.425
NEPAB	65.74	6	394	0.023	0.390	0.146	0.014	2.850	0.702
Outside CA	1495.00	6	8,970	0.527	8.864	3.309	0.316	64.812	15.966
				tons/year					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Hazardous Disposal Site									
VCAPCD	0.42	6	3	1.9E-05	0.000	1.2E-04	1.2E-05	0.002	0.001
SCAQMD	124.58	6	747	0.006	0.096	0.036	0.003	0.702	0.173
Other CA	166	6	996	0.008	0.128	0.048	0.005	0.936	0.230
Other Non-CA	0	6	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	291	6	1,746	0.013	0.224	0.084	0.008	1.640	0.404
Maximum Emissions by Air Basin									
SCCAB	10.29	6	62	2.0E-06	3.3E-05	1.4E-05	1.1E-06	0.058	0.014
SCAB	124.58	6	747	2.4E-05	0.000	1.7E-04	1.3E-05	0.702	0.173
SSAB	48.4	6	290	9.4E-06	0.000	6.5E-05	5.1E-06	0.273	0.067
MDAB	198.21	6	1,189	3.9E-05	0.001	0.000	2.1E-05	1.117	0.275
SJVAB	297.36	6	1,784	5.8E-05	0.001	0.000	3.1E-05	1.676	0.413
GBVAB	156.57	6	939	3.1E-05	0.001	2.1E-04	1.7E-05	0.882	0.217
SACVAB	227.09	6	1,363	4.4E-05	0.001	0.000	2.4E-05	1.280	0.315
NEPAB	65.74	6	394	1.3E-05	0.000	8.9E-05	7.0E-06	0.371	0.091
Outside CA	1495	6	8,970	0.000	0.005	0.002	1.6E-04	8.426	2.076

*Totals may not add exactly due to rounding.

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RMHF/ HWMF -DOE

Table 36-15: RMHF/HWMF Offsite - DOE Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	40	1,253	0.060	0.232	2.464	0.008	1.001	0.249
SCAQMD	8.68	40	347	0.017	0.064	0.683	0.002	0.277	0.069
total[1]	40	40	1,600	0.077	0.296	3.147	0.011	1.278	0.318
VCAPCD	0.42	40	17	0.001	0.003	0.033	1.1E-04	0.013	0.003
SCAQMD	39.58	40	1,583	0.076	0.293	3.114	0.011	1.265	0.315
total[1]	40	40	1,600	0.077	0.296	3.147	0.011	1.278	0.318
				tons/year					
				ROC/VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	2,600	81,432	0.008	0.030	0.320	0.001	0.130	0.032
SCAQMD	8.68	2,600	22,568	0.002	0.008	0.089	3.0E-04	0.036	0.009
total[1]	40	2,600	104,000	0.010	0.038	0.409	0.001	0.166	0.041
VCAPCD	0.42	2,600	1,092	1.0E-04	4.0E-04	0.004	1.5E-05	0.002	0.000
SCAQMD	39.58	2,600	102,908	0.010	0.038	0.405	0.001	0.164	0.041
total[1]	40	2,600	104,000	0.010	0.038	0.409	0.001	0.166	0.041

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

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RMHF/ HWMF -DOE

Table 6-16: RMHF/HWMF Offsite - DOE Haul Emissions

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Hazardous Disposal Site									
VCAPCD	0.42	4	2	1.1E-04	0.002	0.001	5.9E-05	0.012	0.003
SCAQMD	124.58	4	498	0.032	0.532	0.224	0.018	3.601	0.887
Other CA	103	4	412	0.027	0.439	0.185	0.015	2.977	0.733
Other Non-CA	0	4	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	228	4	912	0.059	0.973	0.410	0.032	6.590	1.623
Radiological Disposal Site									
VCAPCD	0.42	6	3	0.000	0.002	0.001	8.9E-05	0.018	0.004
SCAQMD	45.78	6	275	0.016	0.270	0.100	0.010	1.985	0.489
Other CA	242.6	6	1,456	0.085	1.433	0.531	0.051	10.517	2.591
Other Non-CA	48.2	6	289	0.017	0.285	0.105	0.010	2.090	0.515
Total	337	6	2,022	0.118	1.990	0.738	0.071	14.610	3.599
Maximum Emissions by Air Basin									
SCCAB	0.42	10	4	0.000	0.004	0.002	1.5E-04	0.030	0.007
SCAB	124.58	10	1,246	0.074	1.245	0.474	0.044	9.001	2.217
SSAB	103	10	1,030	0.061	1.029	0.392	0.036	7.442	1.833
MDAB	198.21	10	1,982	0.118	1.981	0.754	0.070	14.322	3.528
SJVAB	57	10	570	0.034	0.570	0.217	0.020	4.119	1.015
GBVAB	142.64	10	1,426	0.085	1.425	0.542	0.050	10.306	2.539
SACVAB	0	10	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0	10	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	670.88	10	6,709	0.400	6.703	2.551	0.237	48.474	11.941
				tons/year					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Hazardous Disposal Site									
VCAPCD	0.42	26	11	1.4E-05	0.000	9.8E-05	7.7E-06	0.002	3.9E-04
SCAQMD	124.58	26	3,239	0.004	0.069	0.029	0.002	0.468	0.115
Other CA	103	26	2,678	0.003	0.057	0.024	0.002	0.387	0.095
Other Non-CA	0	26	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	228	26	5928	0.008	0.126	0.053	0.004	0.857	0.211
Radiological Disposal Site									
VCAPCD	0.42	496	208	1.9E-05	0.000	1.2E-04	1.2E-05	0.002	0.001
SCAQMD	45.78	496	22,707	0.002	0.035	0.013	0.001	0.258	0.064
Other CA	242.6	496	120,330	0.011	0.186	0.069	0.007	1.367	0.337
Other Non-CA	48.2	496	23,907	0.002	0.037	0.014	0.001	0.272	0.067
Total	337	496	167,152	0.015	0.259	0.096	0.009	1.899	0.468
Maximum Emissions by Air Basin									
SCCAB	0.42	522	219	0.013	0.219	0.083	0.008	0.004	0.001
SCAB	124.58	522	65,031	3.879	64.979	24.724	2.294	1.170	0.288
SSAB	103	522	53,766	3.207	53.723	20.441	1.897	0.967	0.238
MDAB	198.21	522	103,466	6.172	103.383	39.336	3.650	1.862	0.459
SJVAB	57	522	29,754	1.775	29.730	11.312	1.050	0.535	0.132
GBVAB	142.64	522	74,458	4.441	74.399	28.308	2.626	1.340	0.330
SACVAB	0	522	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0	522	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	670.88	522	350,199	20.889	349.921	133.141	12.353	6.302	1.552

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Air Quality Appendix
Section 7
Mitigated Overall Cleanup Emissions

Santa Susana Field Laboratory
Overall Cleanup - Emissions Summary - Mitigated

Table 7-1: Sumamry of Program Emissions

	Lbs/Day					
	ROC/VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Boeing						
Onsite						
Equipment	0.868	7.592	38.966	0.068	32.565	4.036
Haul	0.074	1.824	2.436	0.005	0.002	0.002
Crew	0.010	0.020	0.239	0.001	0.001	0.001
Onsite Total	0.951	9.435	41.642	0.074	32.567	4.039
Offsite						
Crew	0.576	2.218	23.605	0.080	9.585	2.385
Haul -VCAPCD	0.042	0.691	0.284	0.023	4.758	1.172
Haul - SCAQMD	0.469	7.879	2.941	0.281	57.609	14.192
Haul - Other	2.204	37.368	13.366	1.366	279.796	68.926
Offsite Total	3.291	48.156	40.196	1.751	351.749	86.674
Boeing Total						
VCAPCD	1.569	12.344	65.530	0.177	46.910	7.596
SCAQMD	1.996	19.532	68.188	0.435	99.761	20.615
All	4.242	57.591	81.838	1.824	384.316	90.713
DOE						
Onsite						
Equipment	0.492	3.601	22.311	0.039	30.367	5.711
Haul	0.074	1.824	2.436	0.005	0.002	0.002
Crew	0.003	0.007	0.080	1.8E-04	2.9E-04	2.6E-04
Onsite Total	0.569	5.431	24.827	0.045	30.369	5.712
Offsite						
Crew	0.192	0.739	7.868	0.027	3.195	0.795
Haul -VCAPCD	0.002	0.028	0.011	0.001	0.194	0.048
Haul - SCAQMD	0.476	7.967	3.031	0.281	57.609	14.192
Haul - Other	1.086	18.290	6.763	0.656	134.474	33.127
Offsite Total	1.755	27.025	17.673	0.965	195.473	48.161
DOE Total						
VCAPCD	0.763	6.199	32.707	0.072	33.759	6.555
SCAQMD	1.236	14.137	35.726	0.353	91.174	20.699
All	2.324	32.456	42.500	1.010	225.842	53.874
NASA						
Onsite						
Equipment	0.492	3.601	22.311	0.039	29.392	5.203
Haul	0.074	1.824	2.436	0.005	0.002	0.002
Crew	0.003	0.007	0.080	1.8E-04	2.9E-04	2.6E-04
Onsite Total	0.569	5.431	24.827	0.045	29.394	5.205
Offsite						
Crew	0.192	0.739	7.868	0.027	3.195	0.795
Haul -VCAPCD	0.043	0.702	0.296	0.023	4.758	1.172
Haul - SCAQMD	0.466	7.847	2.908	0.281	57.609	14.192
Haul - Other	2.204	37.368	13.366	1.366	279.796	68.926
Offsite Total	2.905	46.656	24.439	1.697	345.359	85.084
NASA Total						
VCAPCD	0.804	6.873	32.991	0.095	37.348	7.172
SCAQMD	1.227	14.017	35.604	0.353	90.199	20.192
All	3.473	52.088	49.266	1.742	374.754	90.289
Project Total						
Onsite	2.088	20.298	91.296	0.163	92.331	14.956
Offsite Commute	0.961	3.697	39.341	0.134	15.975	3.975
Offsite Haul (VCAPCD)	0.086	1.421	0.591	0.047	9.711	2.392
Offsite Haul (SCAQMD)	1.410	23.693	8.881	0.844	172.828	42.575
Haul (VC & SC total)	1.497	25.114	9.472	0.891	182.539	44.968
Offsite (Other Air Districts)	5.493	93.026	33.495	3.388	694.067	170.978

*Totals may not add exactly due to rounding.

Sources: Emissions taken from Tables 7-6 through 7-18

Santa Susana Field Laboratory
Overall Cleanup - Emissions Summary - Mitigated

Table 7-2: Sumamry of Maintenance & Monitoring Emissions

	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5
M&M (onsite)	0.005	0.009	0.115	2.6E-04	0.004	0.001
M&M Offsite (VCAPCD)[1]	0.217	0.834	8.872	0.030	3.602	0.896
M&M Offsite (SCAQMD)[1]	0.274	1.053	11.211	0.038	4.552	1.133
M&M Total[1]	0.281	1.074	11.445	0.039	4.605	1.146

[1] Offsite emissions for each air district represent the maximum emissions that could occur depending on where the workers are located. The M&M total is the onsite emissions plus the total commute emissions (based on total workers and a total of a 40 mile round trip regardless of the air district the miles occur within).

*Totals may not add exactly due to rounding.

Sources: Emissions taken from Table 7-19

Table 7-3: Project Emissions Summary

Lbs/Day

	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5
Project Totals						
VCAPCD						
Onsite	2.088	20.298	91.296	0.163	92.331	14.956
Offsite - Crew	0.752	2.894	30.804	0.105	12.508	3.112
Offsite - Haul	0.086	1.421	0.591	0.047	9.711	2.392
M&M	0.217	0.834	8.872	0.030	3.602	0.896
Total Emissions	3.144	25.447	131.562	0.345	118.153	21.357
Threshold	25	25	N/A	N/A	N/A	N/A
Significant	No	**Yes**	No	No	No	No
SCAQMD						
Onsite	2.088	20.298	91.296	0.163	92.331	14.956
Offsite - Crew	0.950	3.658	38.928	0.132	15.807	3.933
Offsite - Haul	1.410	23.693	8.881	0.844	172.828	42.575
M&M	0.274	1.053	11.211	0.038	4.552	1.133
Total Emissions	4.723	48.702	150.316	1.177	285.518	62.597
Threshold	55	55	550	150	150	55
Significant	No	**No**	No	No	**Yes**	**Yes**
All Air Districts						
Average	5	50	152	1	295	65

*Totals may not add exactly due to rounding.

Sources Tables 7-1 and 7-2

Santa Susana Field Laboratory
Overall Cleanup - LST Emissions Summary - Mitigated

Table 7-4: LST Program Level Emissions Summary

(lbs/day)

	NOx	CO	PM10	PM2.5
Emissions	20.298	91.296	32.567	14.956
Threshold	131	5,045	114	53
Significant?	No	No	No	No

Threshold Determination (2 acre site)

	NOx	NOx[2]	CO	PM10	PM2.5	
500 meters	263	146	7,460	162	84	Source Receptor Area 6
400 meters	237	131	5,045	114	53	
300 meters	212	117	3,837	90	37	
200 meters	187	103	2,629	66	21	Source Receptor Area 6
100 meters	156	86	1,497	33	9	Source Receptor Area 6
50 meters	143	79	903	17	5	Source Receptor Area 6
25 meters	147	81	644	7	4	Source Receptor Area 6
	25.3333333	1207.75	24	15.75		

LST's determined by max for each RP as the activities occur at different locations throughout the site.

Sources: LSTs are determined by summing the onsite emissions as reported in Table 7-1.

Assumptions NOx[2]: The screening criteria for NOx were developed based on the 1-hour NO_2 CAAQS of 0.18 ppm. However, since the publication of the SCAQMD's guidance, the USEPA has promulgated a 1-hour NO_2 NAAQS of 0.100 ppm based on a 98th percentile value, which is more stringent than the CAAQS. In order to determine if Project emissions would result in an exceedance of the 1 hour NO_2 NAAQS, an approximated LST was estimated to evaluate the federal 1-hour NO_2 standard, as the SCAQMD significance threshold has not been updated to reflect this standard. Calculated by scaling the NO_2 LST for by the ratio of 1-hour NO_2 standards (federal/state)(i.e., 236 lb/day * (0.10/0.18) = 131 lb/day).

Santa Susana Field Laboratory
Overall Cleanup - LST Emissions Summary - Mitigated

Table 7-5: Maximum Haul Emissions By Air Basin

		ROC/VOC	NOx	CO	SO_x	PM10	PM2.5
		lbs/day					
SSAB		1.272	20.949	8.654	0.702	143.807	35.427
	ICAPCD	55	55	550	150	150	N/A
MDAB		2.432	**40.046**	16.535	1.342	**274.977**	67.741
	SCAQMD	55	55	550	150	150	55
	MDAQMD	137	137	548	137	82	65
	AVAQMD	137	137	548	137	82	82
	EKCAPCD	137	137	N/A	N/A	N/A	N/A
GBAVB		2	31	13	1	211	52
	GBUAPCD	N/A	N/A	N/A	N/A	N/A	N/A
SACVAB		1.871	30.750	12.796	1.025	**210.028**	51.741
	SMAQMD	65	65	N/A	N/A	80	80
	YSAQMD	N/A	N/A	CAAQS	N/A	80	N/A
	CCAPCD	N/A	N/A	N/A	N/A	N/A	N/A
	GCAPCD	N/A	N/A	N/A	N/A	N/A	N/A
	TCAPCD	25	25	N/A	N/A	80	N/A
	SHCAQMD	25	25	N/A	N/A	80	N/A
NEPAB		0.541	8.902	3.704	0.297	60.801	14.978
	SCAPCD	250	250	250	250	250	250
Outside CA		12	204	84	7	1401	345
Exceed Threshold?		***No***	***Yes***	***No***	***No***	***Yes***	***No***
		Tons/year					
MDAB		0.237	3.953	1.550	0.137	**28.029**	6.880
	MDAQMD	*25*	*25*	*100*	*25*	*15*	*12*
	AVAQMD	*25*	*25*	*100*	*25*	*15*	*15*
SJVAB		0.183	3.042	1.190	0.106	**21.598**	5.301
	SJVPCP	*10*	*10*	*100*	*27*	*15*	*15*
SACVAB		*0.117*	*1.959*	*0.761*	*0.068*	*13.966*	*3.428*
	SMAQMD	N/A	N/A	N/A	N/A	15	15
	YSAQMD	10	10	N/A	N/A	N/A	N/A
NEPAB		*0.034*	*0.567*	*0.220*	*0.020*	*4.043*	*0.992*
	SCAPCD	40	40	100	40	15	N/A
Outside CA		1	17	7	1	121	30
Exceed Threshold?		***No***	***Yes***	***No***	***No***	***Yes***	***No***

*Totals may not add exactly due to rounding.

Sources: Emissions taken from Tables 7-6 through 7-18

Santa Susana Field Laboratory
Overall Site Clean-up - Mitigated

Overall Site Cleanup Emissions

Table 7-6: Overall Cleanup Daily Onsite Emissions

	Maximum Daily Emissions (Lbs/day)					
	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5
Boeing						
Exhaust	0.868	7.592	38.966	0.068	0.097	0.097
Fugitive	-	-	-	-	32.468	3.940
Haul Trucks	0.074	1.824	2.436	0.005	0.002	0.002
Crew	0.010	0.020	0.239	0.001	0.001	0.001
Total	0.951	9.435	41.642	0.074	32.567	4.039
DOE						
Exhaust	0.492	3.601	22.311	0.039	0.059	0.059
Fugitive	-	-	-	-	30.309	5.652
Haul Trucks	0.074	1.824	2.436	0.005	0.002	0.002
Crew	0.003	0.007	0.080	1.8E-04	2.9E-04	2.6E-04
Total	0.569	5.431	24.827	0.045	30.369	5.712
NASA						
Exhaust	0.492	3.601	22.311	0.039	0.059	0.059
Fugitive	-	-	-	-	29.334	5.144
Haul Trucks	0.074	1.824	2.436	0.005	0.002	0.002
Crew	0.003	0.007	0.080	1.8E-04	2.9E-04	2.6E-04
Total	0.569	5.431	24.827	0.045	29.394	5.205
Long-term Mitigation and Monitoring						
Exhaust	0.000	0.000	0.000	0.000	0.000	0.000
Fugitive	-	-	-	-	0.004	0.001
Haul Trucks	0.000	0.000	0.000	0.000	0.000	0.000
Crew	0.005	0.009	0.115	2.6E-04	4.1E-04	3.8E-04
Total	0.005	0.009	0.115	2.6E-04	0.004	0.001

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Clean-up - Mitigated

Overall Site Cleanup Emissions

Table 7-7: Overall Cleanup Annual Onsite Emissions

	Annual Emissions (Tons/year)					
	ROC/VOC	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Boeing						
Exhaust	0.113	0.987	5.066	0.009	0.013	0.013
Fugitive	-	-	-	-	4.221	0.512
Haul Trucks	0.010	0.237	0.317	0.001	0.000	0.000
Crew	0.001	0.003	0.031	6.9E-05	1.1E-04	1.0E-04
Total	0.124	1.227	5.413	0.010	4.234	0.525
DOE						
Exhaust	0.064	0.468	2.900	0.005	0.008	0.008
Fugitive	-	-	-	-	3.940	0.735
Haul Trucks	0.010	0.237	0.317	0.001	0.000	0.000
Crew	4.3E-04	0.001	0.010	2.3E-05	3.7E-05	3.4E-05
Total	0.074	0.706	3.228	0.006	3.948	0.743
NASA						
Exhaust	0.064	0.468	2.900	0.005	0.008	0.008
Fugitive	-	-	-	-	3.813	0.669
Haul Trucks	0.010	0.237	0.317	0.001	0.000	0.000
Crew	4.3E-04	0.001	0.010	2.3E-05	3.7E-05	3.4E-05
Total	0.074	0.706	3.228	0.006	3.821	0.677
Long-term Mitigation and Monitoring						
Exhaust	0.000	0.000	0.000	0.000	0.000	0.000
Fugitive	-	-	-	-	0.001	0.000
Haul Trucks	0.000	0.000	0.000	0.000	0.000	0.000
Crew	0.001	0.001	0.015	3.3E-05	5.4E-05	4.9E-05
Total	0.001	0.001	0.015	3.3E-05	0.001	0.000

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Clean-up - Mitigated

Overall Site Cleanup Emissions

Equations

- Daily emssions (Exhaust) (lbs/day) = sum of daily emissions for each piece of equipment.
- Emissions from each equipment type = Number of pieces of equipment times the emissions per day for that piece of equipment.
  - Emissions per day per equipment type from Table 1-5.
  - Number of Pieces of Equipment per activty from Table 1-11.
- Daily emssions (Fugitive) (lbs/day) - Taken from Tables 7-8 and 7-9.
- Daily emssions (haul trucks) (lbs/day) =
  [(Emission Factorexhaust X number of trips X Miles) x (Emission Factoridle X number of minutes X number of trucks)] / 453.6
  - Emission Factors from Table 1-4.
  - Number of Trips from Table 1-11
  - **4** miles/ round trip
  - **15** minutes idling per truck (- assumes idling entering the site, at the loading location, and leaving the site)
- Daily emssions (crew (onsite worker transport)) (lbs/day) = ((Number of Employees/15) times Emission Factor times 4) / 453.6
  - Number of employees per phase taken from Table 1-11.
  - **15** workers/onsite van
  - Emission Factor taken from Table 1-5
  - **4** miles/ round trip
  - 453.6 grams per pound
- Total Daily Emissions (lbs/day) for each criteria pollutant is the sume of the daily exhaust, fugitive, haul truck, and crew emissions.
- Annual emssions (Tons/year) = (Daily Emissions * Number of Days)/2000
  - Daily Emissions from Table 7-6.
  - 2,000.00 lbs/ton
  - 260 days per year
- Annual emssions (MT/year) = (Daily Emissions * Number of Days)/2204.623
  - Daily Emissions from Table 7-6.
  - 2,204.62 lbs per Metric Ton
  - 260 days per year

Santa Susana Field Laboratory
Overall Site Clean-up - Mitigated

Onsite Fugitive Emissions

Table 7-8: Overall Cleanup Daily Fugitive Emissions

	Acres	#	Tons/truck	# Trucks	PM10	PM2.5
Maximum (lbs/day) - Boeing						
Scrapers/graders	2	N/A	N/A	N/A	0.658	0.071
Dozers/Excavators	N/A	4.00	N/A	N/A	7.467	1.324
Truck Loading	N/A	N/A	N/A	N/A	0.163	0.025
Total					***8.288***	***1.420***
Maximum (lbs/day) - DOE						
Scrapers	1	N/A	N/A	N/A	0.393	0.042
Dozers/Excavators	N/A	2.50	N/A	N/A	5.578	3.066
Truck Loading	N/A	N/A	N/A	N/A	0.163	0.025
Total					***6.134***	***3.133***
Maximum (lbs/day) - NASA						
Scrapers	1	N/A	N/A	N/A	0.329	0.035
Dozers/Excavators	N/A	2.50	N/A	N/A	4.667	2.565
Truck Loading	N/A	N/A	N/A	N/A	0.163	0.025
Total					***5.159***	***2.626***

*Totals may not add exactly due to rounding.

Table 7-9 Overall Cleanup Fugitive Dust from Unpaved Roads
Maximum Daily Emissions (lbs/day)

	# Miles							
	Unpaved	Paved	# Trucks	PM10	PM2.5	# Vans	PM10	PM2.5
Boeing	1	3	32	24.171	2.518	10	0.008	0.002
DOE	1	3	32	24.171	2.518	4	0.003	0.001
NASA	1	3	32	24.171	2.518	4	0.003	0.001
Long-term Mitigation and Monitoring	1	3	0	0.000	0.000	5	0.004	0.001

Santa Susana Field Laboratory
Overall Site Cleanup - Mitigated

Boeing

Table 7-10: Offsite Overall - Boeing Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	300	9,396	0.451	1.737	18.482	0.063	7.505	1.867
SCAQMD	8.68	300	2,604	0.125	0.481	5.122	0.017	2.080	0.517
total[1]	40	300	12,000	0.576	2.218	23.605	0.080	9.585	2.385
VCAPCD	0.42	300	126	0.006	0.023	0.248	0.001	0.101	0.025
SCAQMD	39.58	300	11,874	0.570	2.195	23.357	0.079	9.484	2.360
total[1]	40	300	12,000	0.576	2.218	23.605	0.080	9.585	2.385
				tons/year					
Worker Commute				**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
VCAPCD	31.32	78,000	2,442,960	0.059	0.226	2.403	0.008	0.976	0.243
SCAQMD	8.68	78,000	677,040	0.016	0.063	0.666	0.002	0.270	0.067
total[1]	40	78,000	3,120,000	0.075	0.288	3.069	0.010	1.246	0.310
VCAPCD	0.42	78,000	32,760	0.001	0.003	0.032	1.1E-04	0.013	0.003
SCAQMD	39.58	78,000	3,087,240	0.074	0.285	3.036	0.010	1.233	0.307
total[1]	40	78,000	3,120,000	0.075	0.288	3.069	0.010	1.246	0.310

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

Santa Susana Field Laboratory
Overall Site Cleanup - Mitigated

Boeing

Table 7-11: Offsite Overall - Boeing Haul Emissions (lbs/day)

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Non-Hazardous									
VCAPCD	10.29	64	659	0.042	0.691	0.284	0.023	4.758	1.172
SCAQMD	67.58	64	4,325	0.275	4.538	1.865	0.153	31.251	7.699
Other CA	37.13	64	2,376	0.151	2.493	1.025	0.084	17.170	4.230
Non-CA	0	64	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	115	64	7360	0.468	7.722	3.174	0.260	53.180	13.101
Hazardous									
VCAPCD	0.42	64	27	0.002	0.027	0.010	0.001	0.194	0.048
SCAQMD	124.58	64	7,973	0.469	7.879	2.941	0.281	57.609	14.192
Other CA	166	64	10,624	0.624	10.499	3.919	0.375	76.763	18.910
Non-CA	0	64	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	291	64	18624	1.095	18.404	6.871	0.657	134.567	33.150
Radiological Soil									
VCAPCD	0.42	64	27	0.002	0.026	0.009	0.001	0.194	0.048
SCAQMD	92.52	64	5,921	0.337	5.714	2.044	0.209	42.784	10.539
Other CA	162.93	64	10,428	0.593	10.062	3.599	0.368	75.343	18.560
Non-CA	442.13	64	28,296	1.610	27.305	9.767	0.998	204.453	50.365
Total	698	64	44672	2.542	43.108	15.419	1.576	322.774	79.513
Maximum Emissions									
VCAPCD				0.042	0.691	0.284	0.023	4.758	1.172
SCAQMD				0.469	7.879	2.941	0.281	57.609	14.192
Other CA				0.624	10.499	3.919	0.375	76.763	18.910
Non-CA				1.610	27.305	9.767	0.998	204.453	50.365
Total				2.745	46.374	16.912	1.677	343.584	84.639
Maximum Emissions by Air Basin									
SCCAB	10.29	64	659	0.042	0.691	0.284	0.023	4.758	1.172
SCAB	124.58	64	7,973	0.507	8.365	3.439	0.281	57.610	14.192
SSAB	48.40	64	3,098	0.197	3.250	1.336	0.109	22.382	5.514
MDAB	198.21	64	12,685	0.807	13.309	5.471	0.447	91.659	22.580
SJVAB	297.36	64	19,031	1.211	19.966	8.208	0.671	137.509	33.875
GBVAB	156.57	64	10,020	0.638	10.513	4.322	0.353	72.403	17.837
SACVAB	227.09	64	14,534	0.925	15.248	6.268	0.513	105.014	25.870
NEPAB	65.74	64	4,207	0.268	4.414	1.815	0.148	30.400	7.489
Outside CA	1495.00	64	95,680	6.090	100.382	41.266	3.375	691.337	170.311

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Cleanup - Mitigated

Boeing

Table 7-12: Offsite Overall - Boeing Haul Emissions (tons/year)

				Tons/year					
	Miles/trip	Trips	Miles	ROC/VOC	NOx	CO	SO_x	PM10	PM2.5
Non-Hazardous									
VCAPCD	10.29	7,616	78,369	0.002	0.041	0.017	0.001	0.283	0.069
SCAQMD	67.58	7,616	514,689	0.016	0.270	0.111	0.009	1.857	0.456
Other CA	37.13	7,616	282,782	0.009	0.148	0.061	0.005	1.020	0.250
Non-CA	0	7,616	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	115	7,616	875,840	0.028	0.459	0.189	0.015	3.160	0.776
Hazardous									
VCAPCD	0.42	7,040	2,957	8.7E-05	0.001	0.001	5.2E-05	0.011	0.003
SCAQMD	124.58	7,040	877,043	0.026	0.433	0.162	0.015	3.165	0.777
Other CA	166	7,040	1,168,640	0.034	0.577	0.216	0.021	4.217	1.035
Non-CA	0	7,040	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	291	7,040	2,048,640	0.060	1.012	0.378	0.036	7.392	1.814
Radiological Soil									
VCAPCD	0.42	1,984	833	2.4E-05	0.000	1.4E-04	1.5E-05	0.003	0.001
SCAQMD	92.52	1,984	183,560	0.005	0.089	0.032	0.003	0.662	0.163
Other CA	162.93	1,984	323,253	0.009	0.156	0.056	0.006	1.166	0.286
Non-CA	442.13	1,984	877,186	0.025	0.423	0.151	0.015	3.165	0.777
Total	698	1,984	1,384,832	0.039	0.668	0.239	0.024	4.997	1.226
Total Tons/year									
VCAPCD				0.003	0.043	0.018	0.001	0.296	0.073
SCAQMD				0.047	0.792	0.304	0.028	5.684	1.395
Other CA				0.053	0.882	0.332	0.031	6.403	1.572
Non-CA				0.025	0.423	0.151	0.015	3.165	0.777
Total				0.127	2.140	0.806	0.076	15.549	3.817
Maximum Emissions by Air Basin									
SCCAB				0.003	0.043	0.018	0.001	0.296	0.073
SCAB				0.047	0.792	0.304	0.028	5.684	1.395
SSAB				0.022	0.362	0.142	0.013	2.559	0.628
Non-Hazardous	48.40	7,616	368,614	0.012	0.193	0.079	0.007	1.330	0.326
Hazardous	48.40	7,040	340,736	0.010	0.168	0.063	0.006	1.229	0.302
Radiological	0.00	1,984	0	0.000	0.000	0.000	0.000	0.000	0.000
MDAB				0.100	1.671	0.651	0.058	11.901	2.921
Non-Hazardous	198.21	7,616	1,509,567	0.048	0.792	0.326	0.027	5.447	1.337
Hazardous	198.21	7,040	1,395,398	0.041	0.689	0.257	0.025	5.035	1.236
Radiological	198.21	1,984	393,249	0.011	0.190	0.068	0.007	1.419	0.348
SJVAB				0.150	2.507	0.976	0.087	17.854	4.382
Non-Hazardous	297.36	7,616	2,264,694	0.072	1.188	0.488	0.040	8.171	2.006
Hazardous	297.36	7,040	2,093,414	0.062	1.034	0.386	0.037	7.553	1.854
Radiological	297.36	1,984	589,962	0.017	0.285	0.102	0.010	2.129	0.523
GBVAB				0.079	1.320	0.514	0.046	9.401	2.307
Non-Hazardous	156.57	7,616	1,192,437	0.038	0.626	0.257	0.021	4.303	1.056
Hazardous	156.57	7,040	1,102,253	0.032	0.545	0.203	0.019	3.977	0.976
Radiological	156.57	1,984	310,635	0.009	0.150	0.054	0.005	1.121	0.275
SACVAB				0.115	1.915	0.746	0.067	13.635	3.347
Non-Hazardous	227.09	7,616	1,729,517	0.055	0.907	0.373	0.031	6.240	1.532
Hazardous	227.09	7,040	1,598,714	0.047	0.790	0.295	0.028	5.768	1.416
Radiological	227.09	1,984	450,547	0.013	0.217	0.078	0.008	1.626	0.399
NEPAB				0.033	0.554	0.216	0.019	3.947	0.969
Non-Hazardous	65.74	7,616	500,676	0.016	0.263	0.108	0.009	1.807	0.443
Hazardous	65.74	7,040	462,810	0.014	0.229	0.085	0.008	1.670	0.410
Radiological	65.74	1,984	130,428	0.004	0.063	0.023	0.002	0.471	0.116
Outside CA				0.720	11.999	4.692	0.417	85.236	20.921
Non-Hazardous	1495.00	7,616	11,385,920	0.362	5.973	2.455	0.201	41.083	10.084
Hazardous	1495.00	7,040	10,524,800	0.309	5.200	1.941	0.186	37.976	9.321
Radiological	862.88	1,984	1,711,954	0.049	0.826	0.295	0.030	6.177	1.516

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Cleanup - Mitigated

DOE

Table 7-13: Offsite Overall - DOE Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	100	3,132	0.150	0.579	6.161	0.021	2.502	0.622
SCAQMD	8.68	100	868	0.042	0.160	1.707	0.006	0.693	0.172
total[1]	40	100	4,000	0.192	0.739	7.868	0.027	3.195	0.795
VCAPCD	0.42	100	42	0.002	0.008	0.083	2.8E-04	0.034	0.008
SCAQMD	39.58	100	3,958	0.190	0.732	7.786	0.026	3.161	0.787
total[1]	40	100	4,000	0.192	0.739	7.868	0.027	3.195	0.795
				tons/year					
Worker Commute				**VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	26,000	814,320	0.020	0.075	0.801	0.003	0.325	0.081
SCAQMD	8.68	26,000	225,680	0.005	0.021	0.222	0.001	0.090	0.022
total[1]	40	26,000	1,040,000	0.025	0.096	1.023	0.003	0.415	0.103
VCAPCD	0.42	26,000	10,920	2.6E-04	0.001	0.011	3.6E-05	0.004	0.001
SCAQMD	39.58	26,000	1,029,080	0.025	0.095	1.012	0.003	0.411	0.102
total[1]	40	26,000	1,040,000	0.025	0.096	1.023	0.003	0.415	0.103

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

Santa Susana Field Laboratory
Overall Site Cleanup - Mitigated

DOE

Table 7-14: Offsite Overall - DOE Haul Emissions (lbs/day)

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Non-Hazardous									
VCAPCD	0.42	64	27	0.002	0.028	0.011	0.001	0.194	0.048
SCAQMD	67.58	64	4,325	0.273	4.503	1.830	0.153	31.251	7.699
Other CA	57	64	3,648	0.230	3.798	1.543	0.129	26.359	6.493
Non-CA	0	64	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	125	64	8,000	0.504	8.329	3.384	0.282	57.804	14.240
Hazardous									
VCAPCD	0.42	64	27	0.002	0.027	0.010	0.001	0.194	0.048
SCAQMD	124.58	64	7,973	0.476	7.967	3.031	0.281	57.609	14.192
Other CA	103	64	6,592	0.393	6.587	2.506	0.233	47.630	11.733
Non-CA	0	64	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	228	64	14,592	0.870	14.580	5.548	0.515	105.434	25.973
Radiological Soil									
VCAPCD	0.42	64	27	0.002	0.026	0.010	0.001	0.194	0.048
SCAQMD	45.78	64	2,930	0.171	2.879	1.065	0.103	21.170	5.215
Other CA	242.6	64	15,526	0.906	15.259	5.642	0.548	112.185	27.636
Non-CA	48.2	64	3,085	0.180	3.032	1.121	0.109	22.289	5.491
Total	337	64	21,568	1.258	21.196	7.837	0.761	155.838	38.390
Maximum Emissions									
VCAPCD				0.002	0.028	0.011	0.001	0.194	0.048
SCAQMD				0.476	7.967	3.031	0.281	57.609	14.192
Other CA				0.906	15.259	5.642	0.548	112.185	27.636
Non-CA				0.180	3.032	1.121	0.109	22.289	5.491
Total				1.258	21.196	7.837	0.761	155.838	38.390
Maximum Emissions by Air Basin									
SCCAB	17.84	64	1,142	0.072	1.189	0.483	0.040	8.250	2.032
SCAB	124.58	64	7,973	0.502	8.301	3.373	0.281	57.610	14.192
SSAB	138.00	64	8,832	0.556	9.195	3.736	0.312	63.816	15.721
MDAB	198.21	64	12,685	0.799	13.207	5.366	0.447	91.659	22.580
SJVAB	71.00	64	4,544	0.286	4.731	1.922	0.160	32.833	8.088
GBVAB	142.64	64	9,129	0.575	9.504	3.862	0.322	65.961	16.250
SACVAB	0.00	64	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB	0.00	64	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA	670.88	64	42,936	2.705	44.700	18.164	1.515	310.237	76.427

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Cleanup - Mitigated

DOE

Table 7-15: Offsite Overall - DOE Haul Emissions (tons/year)

				Tons/year					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Non-Hazardous									
VCAPCD	0.42	12,483	5,243	0.000	0.003	0.001	9.2E-05	0.019	0.005
SCAQMD	67.58	12,483	843,578	0.027	0.439	0.178	0.015	3.044	0.747
Other CA	57	12,483	711,511	0.022	0.370	0.150	0.013	2.567	0.630
Non-CA	0	12,483	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	125	12,483	1,560,331	0.049	0.812	0.330	0.028	5.630	1.382
Hazardous									
VCAPCD	0.42	545	229	0.000	0.000	4.4E-05	4.0E-06	0.001	0.000
SCAQMD	124.58	545	67,926	0.002	0.034	0.013	0.001	0.245	0.060
Other CA	103	545	56,160	0.002	0.028	0.011	0.001	0.203	0.050
Non-CA	0	545	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	228	545	124,315	0.004	0.062	0.024	0.002	0.449	0.110
Radiological Soil									
VCAPCD	0.42	1,012	425	0.000	0.000	7.7E-05	7.5E-06	0.002	0.000
SCAQMD	45.78	1,012	46,334	0.001	0.023	0.008	0.001	0.167	0.041
Other CA	242.6	1,012	245,537	0.007	0.121	0.045	0.004	0.886	0.217
Non-CA	48.2	1,012	48,784	0.001	0.024	0.009	0.001	0.176	0.043
Total	337	1,012	341,080	0.010	0.168	0.062	0.006	1.231	0.302
Total Tons/year									
VCAPCD				0.000	0.003	0.001	1.0E-04	2.1E-02	5.2E-03
SCAQMD				0.030	0.496	0.200	0.017	3.456	0.848
Other CA				0.031	0.519	0.206	0.018	3.656	0.897
Non-CA				0.001	0.024	0.009	0.001	0.176	0.043
Total				0.063	1.042	0.416	0.036	7.309	1.794
Maximum Emissions by Air Basin									
SCCAB				0.000	0.003	0.001	1.0E-04	2.1E-02	5.2E-03
SCAB				0.030	0.496	0.200	0.017	3.456	0.848
SSAB				0.056	0.925	0.375	0.031	6.418	1.575
Non-Hazardous	138.00	12,483	1,722,606	0.054	0.897	0.364	0.030	6.216	1.526
Hazardous	103.00	545	56,160	0.002	0.028	0.011	0.001	0.203	0.050
Radiological	0.00	1,012	0	0.000	0.000	0.000	0.000	0.000	0.000
MDAB				0.086	1.431	0.577	0.049	9.972	2.448
Non-Hazardous	198.21	12,483	2,474,186	0.078	1.288	0.523	0.044	8.927	2.191
Hazardous	162.93	545	88,836	0.003	0.044	0.017	0.002	0.321	0.079
Radiological	198.21	1,012	200,610	0.006	0.099	0.036	0.004	0.724	0.178
SJVAB				0.029	0.477	0.193	0.016	3.310	0.812
Non-Hazardous	71.00	12,483	886,268	0.028	0.461	0.187	0.016	3.198	0.785
Hazardous	57.00	545	31,079	0.001	0.016	0.006	0.001	0.112	0.028
Radiological	0.00	1,012	0	0.000	0.000	0.000	0.000	0.000	0.000
GBVAB				0.004	0.071	0.026	0.003	0.521	0.128
Non-Hazardous	0.00	12,483	0	0.000	0.000	0.000	0.000	0.000	0.000
Hazardous	0.00	545	0	0.000	0.000	0.000	0.000	0.000	0.000
Radiological	142.64	1,012	144,367	0.004	0.071	0.026	0.003	0.521	0.128
SACVAB				0.000	0.000	0.000	0.000	0.000	0.000
Non-Hazardous	0.00	12,483	0	0.000	0.000	0.000	0.000	0.000	0.000
Hazardous	0.00	545	0	0.000	0.000	0.000	0.000	0.000	0.000
Radiological	0.00	1,012	0	0.000	0.000	0.000	0.000	0.000	0.000
NEPAB				0.000	0.000	0.000	0.000	0.000	0.000
Non-Hazardous	0.00	12,483	0	0.000	0.000	0.000	0.000	0.000	0.000
Hazardous	0.00	545	0	0.000	0.000	0.000	0.000	0.000	0.000
Radiological	0.00	1,012	0	0.000	0.000	0.000	0.000	0.000	0.000
Outside CA				0.292	4.829	1.947	0.164	33.650	8.260
Non-Hazardous	670.88	12,483	8,374,361	0.264	4.359	1.771	0.148	30.216	7.417
Hazardous	499.91	545	272,572	0.008	0.136	0.052	0.005	0.983	0.241
Radiological	670.88	1,012	679,002	0.020	0.334	0.123	0.012	2.450	0.601

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Cleanup - Mitigated

NASA

Table 7-16: Offsite Overall - NASA Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	100	3,132	0.150	0.579	6.161	0.021	2.502	0.622
SCAQMD	8.68	100	868	0.042	0.160	1.707	0.006	0.693	0.172
total[1]	40	100	4,000	0.192	0.739	7.868	0.027	3.195	0.795
VCAPCD	0.42	100	42	0.002	0.008	0.083	0.000	0.034	0.008
SCAQMD	39.58	100	3,958	0.190	0.732	7.786	0.026	3.161	0.787
total[1]	40	100	4,000	0.192	0.739	7.868	0.027	3.195	0.795
				tons/year					
Worker Commute				**VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	26,000	814,320	0.020	0.075	0.801	0.003	0.325	0.081
SCAQMD	8.68	26,000	225,680	0.005	0.021	0.222	0.001	0.090	0.022
total[1]	40	26,000	1,040,000	0.025	0.096	1.023	0.003	0.415	0.103
VCAPCD	0.42	26,000	10,920	2.6E-04	0.001	0.011	3.6E-05	0.004	0.001
SCAQMD	39.58	26,000	1,029,080	0.025	0.095	1.012	0.003	0.411	0.102
total[1]	40	26,000	1,040,000	0.025	0.096	1.023	0.003	0.415	0.103

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

Santa Susana Field Laboratory
Overall Site Cleanup - Mitigated

NASA

Table 7-17: Offsite Overall - NASA Haul Emissions (lbs/day)

				lbs/day					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Non-Hazardous									
VCAPCD	10.29	64	659	0.043	0.702	0.296	0.023	4.758	1.172
SCAQMD	53.58	64	3,429	0.223	3.658	1.540	0.121	24.777	6.104
Other CA	34.13	64	2,184	0.142	2.330	0.981	0.077	15.783	3.888
Non-CA	0	64	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	98	64	6,272	0.408	6.690	2.817	0.221	45.319	11.164
Hazardous									
VCAPCD	0.42	64	27	0.002	0.026	0.010	0.001	0.194	0.048
SCAQMD	124.58	64	7,973	0.466	7.847	2.908	0.281	57.609	14.192
Other CA	172.39	64	11,033	0.645	10.858	4.025	0.389	79.718	19.638
Non-CA	26.61	64	1,703	0.100	1.676	0.621	0.060	12.305	3.031
Total	324	64	20,736	1.212	20.407	7.564	0.731	149.827	36.909
Radiological Soil									
VCAPCD	0.42	64	27	0.002	0.026	0.009	0.001	0.194	0.048
SCAQMD	92.52	64	5,921	0.337	5.714	2.044	0.209	42.784	10.539
Other CA	305.57	64	19,556	1.113	18.872	6.750	0.690	141.304	34.809
Non-CA	299.49	64	19,167	1.091	18.496	6.616	0.676	138.492	34.116
Total	698	64	44,672	2.542	43.108	15.419	1.576	322.774	79.513
Maximum Emissions									
VCAPCD				0.043	0.702	0.296	0.023	4.758	1.172
SCAQMD				0.466	7.847	2.908	0.281	57.609	14.192
Other CA				1.113	18.872	6.750	0.690	141.304	34.809
Non-CA				1.091	18.496	6.616	0.676	138.492	34.116
Total				2.713	45.917	16.570	1.670	342.164	84.290
Maximum Emissions by Air Basin									
SCCAB	0.42	64	27	0.002	0.029	0.012	0.001	0.194	0.048
SCAB	124.58	64	7,973	0.519	8.504	3.581	0.281	57.610	14.192
SSAB	48.40	64	3,098	0.202	3.304	1.391	0.109	22.382	5.514
MDAB	198.21	64	12,685	0.825	13.531	5.698	0.447	91.659	22.580
SJVAB	297.36	64	19,031	1.238	20.299	8.548	0.671	137.509	33.876
GBVAB	156.57	64	10,020	0.652	10.688	4.501	0.353	72.403	17.837
SACVAB	227.09	64	14,534	0.945	15.502	6.528	0.513	105.014	25.870
NEPAB	65.74	64	4,207	0.274	4.488	1.890	0.148	30.400	7.489
Outside CA	862.88	64	55,224	3.592	58.904	24.805	1.948	399.025	98.301

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Cleanup - Mitigated

NASA

Table 7-18: Offsite Overall - NASA Haul Emissions (tons/year)

				Tons/year					
	Miles/trip	**Trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
Non-Hazardous									
VCAPCD	10.29	2,299	23,657	0.001	0.013	0.005	4.2E-04	0.085	0.021
SCAQMD	53.58	2,299	123,180	0.004	0.066	0.028	0.002	0.444	0.109
Other CA	34.13	2,299	78,465	0.003	0.042	0.018	0.001	0.283	0.069
Non-CA	0	2,299	0	0.000	0.000	0.000	0.000	0.000	0.000
Total	98	2,299	225,302	0.007	0.120	0.051	0.004	0.813	0.200
Hazardous									
VCAPCD	0.42	10,816	4,543	1.3E-04	0.002	0.001	8.0E-05	0.016	0.004
SCAQMD	124.58	10,816	1,347,457	0.039	0.663	0.246	0.024	4.862	1.193
Other CA	172.39	10,816	1,864,570	0.054	0.918	0.340	0.033	6.728	1.651
Non-CA	26.61	10,816	287,814	0.008	0.142	0.052	0.005	1.038	0.255
Total	324	10,816	3,504,384	0.102	1.724	0.639	0.062	12.645	3.104
Radiological Soil									
VCAPCD	0.42	405	170	4.8E-06	0.000	2.9E-05	3.0E-06	0.001	0.000
SCAQMD	92.52	405	37,471	0.001	0.018	0.006	0.001	0.135	0.033
Other CA	305.57	405	123,757	0.004	0.060	0.021	0.002	0.447	0.110
Non-CA	299.49	405	121,295	0.003	0.059	0.021	0.002	0.438	0.107
Total	698	405	282,693	0.008	0.136	0.049	0.005	1.020	0.250
Total Tons/year									
VCAPCD				0.001	0.015	0.006	0.001	0.102	0.025
SCAQMD				0.044	0.747	0.280	0.027	5.442	1.336
Other CA				0.061	1.019	0.379	0.036	7.457	1.830
Non-CA				0.012	0.200	0.073	0.007	1.476	0.362
Total				0.118	1.981	0.739	0.071	14.478	3.554
Maximum Emissions by Air Basin									
SCCAB				0.001	0.015	0.006	0.001	0.102	0.025
SCAB				0.044	0.747	0.280	0.027	5.442	1.336
SSAB				0.019	0.317	0.120	0.011	2.290	0.562
Non-Hazardous	48.40	2,299	111,271	0.004	0.059	0.025	0.002	0.401	0.099
Hazardous	48.40	10,816	523,494	0.015	0.258	0.095	0.009	1.889	0.464
Radiological	0.00	405	0	0.000	0.000	0.000	0.000	0.000	0.000
MDAB				0.051	0.851	0.322	0.030	6.157	1.511
Non-Hazardous	123.99	2,299	285,052	0.009	0.152	0.064	0.005	1.029	0.252
Hazardous	123.99	10,816	1,341,076	0.039	0.660	0.245	0.024	4.839	1.188
Radiological	198.21	405	80,276	0.002	0.039	0.014	0.001	0.290	0.071
SJVAB				0.003	0.058	0.021	0.002	0.435	0.107
Non-Hazardous	0.00	2,299	0	0.000	0.000	0.000	0.000	0.000	0.000
Hazardous	0.00	10,816	0	0.000	0.000	0.000	0.000	0.000	0.000
Radiological	297.36	405	120,432	0.003	0.058	0.021	0.002	0.435	0.107
GBVAB				0.053	0.891	0.338	0.032	6.447	1.582
Non-Hazardous	131.40	2,299	302,088	0.010	0.161	0.068	0.005	1.090	0.268
Hazardous	131.40	10,816	1,421,222	0.042	0.699	0.259	0.025	5.128	1.259
Radiological	156.57	405	63,412	0.002	0.031	0.011	0.001	0.229	0.056
SACVAB				0.003	0.044	0.016	0.002	0.332	0.081
Non-Hazardous	0.00	2,299	0	0.000	0.000	0.000	0.000	0.000	0.000
Hazardous	0.00	10,816	0	0.000	0.000	0.000	0.000	0.000	0.000
Radiological	227.09	405	91,972	0.003	0.044	0.016	0.002	0.332	0.081
NEPAB				0.001	0.013	0.005	0.000	0.096	0.024
Non-Hazardous	0.00	2,299	0	0.000	0.000	0.000	0.000	0.000	0.000
Hazardous	0.00	10,816	0	0.000	0.000	0.000	0.000	0.000	0.000
Radiological	65.74	405	26,625	0.001	0.013	0.005	0.000	0.096	0.024
Outside CA				0.020	0.343	0.127	0.012	2.520	0.619
Non-Hazardous	26.61	2,299	61,176	0.002	0.033	0.014	0.001	0.221	0.054
Hazardous	26.61	10,816	287,814	0.008	0.142	0.052	0.005	1.038	0.255
Radiological	862.88	405	349,470	0.010	0.169	0.060	0.006	1.261	0.310

*Totals may not add exactly due to rounding.

Santa Susana Field Laboratory
Overall Site Cleanup - Mitigated

Monitoring and Maintenance

Table 7-19: Offsite Overall - Monitoring & Maintenance Commuter Emissions

				lbs/day					
	Miles/trip	**# trips**	**Miles**	**ROC/VOC**	**NOx**	**CO**	**SO_x**	**PM10[2]**	**PM2.5[2]**
Worker Commute									
VCAPCD	31.32	144	4,510	0.217	0.834	8.872	0.030	3.602	0.896
SCAQMD	8.68	144	1,250	0.060	0.231	2.459	0.008	0.998	0.248
total[1]	40	144	5,760	0.277	1.065	11.330	0.038	4.601	1.145
VCAPCD	0.42	144	60	0.003	0.011	0.119	4.0E-04	0.048	0.012
SCAQMD	39.58	144	5,700	0.274	1.053	11.211	0.038	4.552	1.133
total[1]	40	144	5,760	0.277	1.065	11.330	0.038	4.601	1.145
				tons/year					
Worker Commute				**VOC**	**NOx**	**CO**	**SO_x**	**PM10**	**PM2.5**
VCAPCD	31.32	37,440	1,172,621	0.028	0.108	1.153	0.004	0.468	0.117
SCAQMD	8.68	37,440	324,979	0.008	0.030	0.320	0.001	0.130	0.032
total[1]	40	37,440	1,497,600	0.036	0.138	1.473	0.005	0.598	0.149
VCAPCD	0.42	37,440	15,725	3.8E-04	0.001	0.015	5.3E-05	0.006	0.002
SCAQMD	39.58	37,440	1,481,875	0.036	0.137	1.457	0.005	0.592	0.147
total[1]	40	37,440	1,497,600	0.036	0.138	1.473	0.005	0.598	0.149

*Totals may not add exactly due to rounding.

[1] Because it is unknown how many workers come from the SCAQMD jurisdiction and how many would come from the VCAPCD jurisdiction, assumptions on travel to the site based on potential maximum distance within each jurisdiction based on site location. 40 miles per trip was the average trip length assumed for workers. The table takes the potential routes to the site into account and proveds two scenarios, the maximum within the VCAPCD and the maximum within the SCAQMD. Only the maximum for each air district is reported as a worst case scenario.

[2] PM10 and PM2.5 emissions include fugitive road dust

Santa Susana Field Laboratory
Air Quality Appendix
Section 8
EMFAC2014 Output Files

Section 8

Commuter Vehicles

Santa Susana Field Laboratory
EMFAC2014 Emission Rates for Commuter Vehicles

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Ventura
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, trips/day for Trips, g/mile for RUNEX, PMBW and PMTW, g/trip for STREX, HTSK and RUNLS, g/vehicle/day for IDLEX, RESTL and DIURN

Region	CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT	Trips	ROG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX
Ventura	2017	LDA	Aggregated	Aggregated	GAS	287278.899	10294775.7	1806917.98	0.021785396	0.892253947	0.083839671	301.9987168

PM10_RUNEX	PM2_5_RUNEX	SOx_RUNEX
0.001801873	0.00165847	0.003029361

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Ventura
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX
Ventura	2017	LDA	Aggregated	15	GAS	141005.283	0.055925044	1.355542485	0.111489765	556.1074444

PM10_RUNEX	PM2_5_RUNEX	SOx_RUNEX
0.004880879	0.004491339	0.003029361

Section 8

Standard (Aggregated) Fleet Mix

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Ventura
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
Ventura	2017	HHDT	Aggregated	5	DSL	887.001275	1.48580156	9.8739028	13.7971237	23.3261447	5677.35609	0.07706576	0.07373193
Ventura	2017	HHDT	Aggregated	10	DSL	2304.63981	1.16280096	7.24646071	10.6352826	19.1164909	4928.59009	0.07118266	0.06810333
Ventura	2017	HHDT	Aggregated	15	DSL	2555.65701	0.7514372	2.34369791	4.64569566	12.7153371	3125.87054	0.08151461	0.07798832
Ventura	2017	HHDT	Aggregated	20	DSL	14892.0955	0.54374019	0.76251847	2.21300678	10.0003301	2268.4725	0.12067874	0.11545823
Ventura	2017	HHDT	Aggregated	25	DSL	13312.8451	0.35684727	0.57439643	1.7198405	7.57602849	2069.04745	0.06138724	0.05873165
Ventura	2017	HHDT	Aggregated	30	DSL	23785.4714	0.27419582	0.39185338	1.24312338	6.60382181	1894.89129	0.05595988	0.05353908
Ventura	2017	HHDT	Aggregated	35	DSL	24422.0101	0.20580136	0.37960176	1.08448775	6.21870777	1895.29085	0.04866502	0.0465598
Ventura	2017	HHDT	Aggregated	40	DSL	32740.9369	0.16216554	0.24453595	0.76800519	5.62757479	1731.21793	0.04772666	0.04566202
Ventura	2017	HHDT	Aggregated	45	DSL	29778.4411	0.12884297	0.18918789	0.6013381	5.30594136	1653.16537	0.04683221	0.04480627
Ventura	2017	HHDT	Aggregated	50	DSL	28019.7961	0.10678627	0.13467224	0.46398518	4.95672682	1548.09729	0.04873274	0.04662458
Ventura	2017	HHDT	Aggregated	55	DSL	30354.8915	0.09261669	0.10543706	0.38305636	4.73482042	1479.25462	0.05207256	0.04981993
Ventura	2017	HHDT	Aggregated	60	DSL	47746.5361	0.08843046	0.10067135	0.35868199	4.68687275	1461.62139	0.05401728	0.05168051
Ventura	2017	HHDT	Aggregated	65	DSL	60087.9091	0.08843046	0.10067135	0.35868199	4.70845383	1461.62139	0.05401728	0.05168051
Ventura	2017	HHDT	Aggregated	70	DSL	0	0	0	0	0	0	0	0
Ventura	2017	HHDT	Aggregated	75	DSL	0	0	0	0	0	0	0	0
Ventura	2017	HHDT	Aggregated	80	DSL	0	0	0	0	0	0	0	0
Ventura	2017	HHDT	Aggregated	85	DSL	0	0	0	0	0	0	0	0
Ventura	2017	HHDT	Aggregated	90	DSL	0	0	0	0	0	0	0	0

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Los Angeles
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
Los Angeles	2017	HHDT	Aggregated	5	DSL	45104.7382	1.35699201	3.58200326	8.28438337	20.4479755	4058.39811	0.05954718	0.05697119
Los Angeles	2017	HHDT	Aggregated	10	DSL	100069.975	1.06858796	2.97068987	6.90072186	17.0464842	3666.68513	0.05678543	0.05432891
Los Angeles	2017	HHDT	Aggregated	15	DSL	143726.299	0.75106205	1.22121483	3.32947983	12.0599904	2651.77496	0.05637069	0.05393212
Los Angeles	2017	HHDT	Aggregated	20	DSL	338699.609	0.49834846	0.6636789	2.06256312	9.07554659	2200.53785	0.07104963	0.06797605
Los Angeles	2017	HHDT	Aggregated	25	DSL	480141.975	0.34582361	0.46600156	1.51127504	7.15056256	1992.30932	0.04450467	0.04257942
Los Angeles	2017	HHDT	Aggregated	30	DSL	655763.528	0.2610506	0.34190923	1.12361071	6.22385001	1857.87027	0.04018584	0.03844741
Los Angeles	2017	HHDT	Aggregated	35	DSL	536422.329	0.19377814	0.32255721	0.98497813	5.7899427	1842.18039	0.03550577	0.03396981
Los Angeles	2017	HHDT	Aggregated	40	DSL	542431.145	0.14914736	0.22486478	0.70801786	5.29399403	1724.43329	0.03385105	0.03238667
Los Angeles	2017	HHDT	Aggregated	45	DSL	531906.314	0.1161429	0.1673051	0.53345654	4.99731297	1644.09438	0.03317538	0.03174023
Los Angeles	2017	HHDT	Aggregated	50	DSL	469883.293	0.09205977	0.11555566	0.39442713	4.63942124	1542.914	0.03449461	0.03300238
Los Angeles	2017	HHDT	Aggregated	55	DSL	600019.018	0.07531911	0.08574508	0.29414994	4.63530672	1488.51955	0.03369308	0.03223553
Los Angeles	2017	HHDT	Aggregated	60	DSL	1127654.14	0.06974329	0.07939743	0.27912061	4.43665618	1459.95398	0.03668844	0.03510132
Los Angeles	2017	HHDT	Aggregated	65	DSL	654520.465	0.07141081	0.08129577	0.2967293	4.21540421	1446.13345	0.03997298	0.03824377
Los Angeles	2017	HHDT	Aggregated	70	DSL	6795.85409	0.06010741	0.06842771	0.26134328	3.4685934	1428.19705	0.03153274	0.03016865
Los Angeles	2017	HHDT	Aggregated	75	DSL	0	0	0	0	0	0	0	0
Los Angeles	2017	HHDT	Aggregated	80	DSL	0	0	0	0	0	0	0	0
Los Angeles	2017	HHDT	Aggregated	85	DSL	0	0	0	0	0	0	0	0
Los Angeles	2017	HHDT	Aggregated	90	DSL	0	0	0	0	0	0	0	0

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Imperial
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
Imperial	2017	HHDT	Aggregated	5	DSL	121.97327	0.45661594	1.75464651	4.8890048	18.0335298	6206.25187	0.03640542	0.03483054
Imperial	2017	HHDT	Aggregated	10	DSL	234.944973	0.20612287	1.48241694	4.05972697	14.6820028	6226.24653	0.02246603	0.02149416
Imperial	2017	HHDT	Aggregated	15	DSL	107.299601	0.14133239	1.04027945	2.85886401	10.6454176	5181.21435	0.01749562	0.01673877
Imperial	2017	HHDT	Aggregated	20	DSL	3468.23946	0.51401691	0.60325048	1.85626936	9.50808623	2268.94279	0.1007556	0.09639696
Imperial	2017	HHDT	Aggregated	25	DSL	3129.05923	0.31477503	0.37956951	1.34882916	6.63102114	2009.62018	0.03605191	0.03449232
Imperial	2017	HHDT	Aggregated	30	DSL	12419.0396	0.24224344	0.28020172	1.01188614	5.61502733	1818.90682	0.03351378	0.03206398
Imperial	2017	HHDT	Aggregated	35	DSL	18214.3017	0.18095783	0.2115025	0.7670425	4.97627005	1737.90201	0.03094551	0.02960682
Imperial	2017	HHDT	Aggregated	40	DSL	31277.2709	0.13833383	0.15918025	0.58516259	4.50040741	1633.85153	0.02971011	0.02842487
Imperial	2017	HHDT	Aggregated	45	DSL	45580.0026	0.10622583	0.12163028	0.45225775	4.16359238	1559.2824	0.02914386	0.02788311
Imperial	2017	HHDT	Aggregated	50	DSL	52656.4426	0.08314022	0.09480429	0.35601615	3.90851094	1495.71653	0.02940546	0.02813339
Imperial	2017	HHDT	Aggregated	55	DSL	120747.524	0.06698744	0.07626011	0.28773767	3.72367692	1451.61437	0.03046609	0.02914814
Imperial	2017	HHDT	Aggregated	60	DSL	60459.2168	0.06114587	0.06960992	0.26176785	3.64722368	1433.20186	0.03125911	0.02990686
Imperial	2017	HHDT	Aggregated	65	DSL	317640.4	0.06114587	0.06960992	0.26176785	3.65263333	1433.20186	0.03125911	0.02990686
Imperial	2017	HHDT	Aggregated	70	DSL	6409.60765	0.06114587	0.06960992	0.26176785	3.66617892	1433.20186	0.03125911	0.02990686
Imperial	2017	HHDT	Aggregated	75	DSL	0	0	0	0	0	0	0	0
Imperial	2017	HHDT	Aggregated	80	DSL	0	0	0	0	0	0	0	0
Imperial	2017	HHDT	Aggregated	85	DSL	0	0	0	0	0	0	0	0
Imperial	2017	HHDT	Aggregated	90	DSL	0	0	0	0	0	0	0	0

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Inyo
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
Inyo	2017	HHDT	Aggregated	5	DSL	268.971269	1.45451608	1.65585584	4.42143198	21.5336118	3470.70732	0.14177296	0.13563992
Inyo	2017	HHDT	Aggregated	10	DSL	1006.52177	1.17180226	1.33400767	3.68789261	17.314718	3007.14295	0.12426535	0.11888968
Inyo	2017	HHDT	Aggregated	15	DSL	1203.74946	0.75113708	0.85511239	2.65929282	12.0057497	2437.68189	0.09467509	0.09057949
Inyo	2017	HHDT	Aggregated	20	DSL	3052.40563	0.50496671	0.57486617	1.97093257	9.258464	2112.81466	0.08675724	0.08300416
Inyo	2017	HHDT	Aggregated	25	DSL	2703.72561	0.34910245	0.39742657	1.46387759	6.90379365	1923.35555	0.06261414	0.05990548
Inyo	2017	HHDT	Aggregated	30	DSL	4552.45344	0.26730112	0.30430198	1.1308442	5.87592208	1795.75904	0.05666991	0.0542184
Inyo	2017	HHDT	Aggregated	35	DSL	8206.26482	0.20497986	0.23335397	0.87694165	5.22803683	1703.52317	0.05228047	0.05001884
Inyo	2017	HHDT	Aggregated	40	DSL	7730.92485	0.15949962	0.18157818	0.69063095	4.75600769	1619.71684	0.0497562	0.04760377
Inyo	2017	HHDT	Aggregated	45	DSL	10798.608	0.12661693	0.14414373	0.55371802	4.41351495	1547.84087	0.04893096	0.04681423
Inyo	2017	HHDT	Aggregated	50	DSL	11205.9628	0.10368742	0.11804024	0.45507172	4.15655004	1486.7582	0.04977882	0.04762541
Inyo	2017	HHDT	Aggregated	55	DSL	13650.0644	0.08873939	0.10102304	0.38666767	3.97436322	1444.76478	0.05228571	0.05002386
Inyo	2017	HHDT	Aggregated	60	DSL	4158.28648	0.08398755	0.09561343	0.36153604	3.91425887	1427.36811	0.05409151	0.05175153
Inyo	2017	HHDT	Aggregated	65	DSL	2277.57701	0.08398755	0.09561343	0.36153604	3.91436556	1427.36811	0.05409151	0.05175153
Inyo	2017	HHDT	Aggregated	70	DSL	0	0	0	0	0	0	0	0
Inyo	2017	HHDT	Aggregated	75	DSL	0	0	0	0	0	0	0	0
Inyo	2017	HHDT	Aggregated	80	DSL	0	0	0	0	0	0	0	0
Inyo	2017	HHDT	Aggregated	85	DSL	0	0	0	0	0	0	0	0
Inyo	2017	HHDT	Aggregated	90	DSL	0	0	0	0	0	0	0	0

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Kern
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
Kern	2017	HHDT	Aggregated	5	DSL	13455.5863	1.3145557	1.7606211	4.41574927	20.492022	3505.407	0.09036974	0.08646039
Kern	2017	HHDT	Aggregated	10	DSL	49959.0396	1.05674071	1.33497254	3.61464917	16.5718049	3030.91931	0.07938741	0.07595314
Kern	2017	HHDT	Aggregated	15	DSL	64984.809	0.69643591	0.81973619	2.5590773	11.6441319	2450.79558	0.06155437	0.05889156
Kern	2017	HHDT	Aggregated	20	DSL	172325.687	0.47652299	0.54795381	1.86723503	8.74713445	2123.29368	0.05912436	0.05656667
Kern	2017	HHDT	Aggregated	25	DSL	134701.076	0.33913563	0.39370008	1.376852	6.78526206	1942.11332	0.04192469	0.04011105
Kern	2017	HHDT	Aggregated	30	DSL	242479.247	0.25531248	0.29444709	1.04224994	5.78720113	1810.80179	0.03794029	0.03629901
Kern	2017	HHDT	Aggregated	35	DSL	444001.881	0.19233253	0.22307004	0.79253259	5.15221878	1717.30458	0.03501397	0.03349928
Kern	2017	HHDT	Aggregated	40	DSL	441329.143	0.14642616	0.1691128	0.6091572	4.69509877	1631.89642	0.03332731	0.03188558
Kern	2017	HHDT	Aggregated	45	DSL	647001.384	0.11293541	0.12967515	0.47432722	4.36130839	1558.85941	0.03263171	0.03122008
Kern	2017	HHDT	Aggregated	50	DSL	683896.599	0.08917456	0.10182427	0.37689829	4.10566885	1496.93898	0.03298413	0.03155725
Kern	2017	HHDT	Aggregated	55	DSL	808069.116	0.07283377	0.08291571	0.30769175	3.90840437	1453.2148	0.03425195	0.03277023
Kern	2017	HHDT	Aggregated	60	DSL	253382.512	0.06730216	0.07661839	0.28206364	3.84740706	1434.91863	0.03532516	0.03379701
Kern	2017	HHDT	Aggregated	65	DSL	136422.422	0.0672721	0.07658417	0.28196593	3.84656177	1434.88756	0.0353043	0.03377705
Kern	2017	HHDT	Aggregated	70	DSL	0	0	0	0	0	0	0	0
Kern	2017	HHDT	Aggregated	75	DSL	0	0	0	0	0	0	0	0
Kern	2017	HHDT	Aggregated	80	DSL	0	0	0	0	0	0	0	0
Kern	2017	HHDT	Aggregated	85	DSL	0	0	0	0	0	0	0	0
Kern	2017	HHDT	Aggregated	90	DSL	0	0	0	0	0	0	0	0

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Kings
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
Kings	2017	HHDT	Aggregated	5	DSL	2589.5372	1.37342865	1.72675648	4.50100944	20.4338716	3388.96254	0.099279	0.09498424
Kings	2017	HHDT	Aggregated	10	DSL	9747.68232	1.09852451	1.33084322	3.67909176	16.5695856	2962.70791	0.08649067	0.08274912
Kings	2017	HHDT	Aggregated	15	DSL	11733.7834	0.71683208	0.83355822	2.59922699	11.6969829	2435.42559	0.06602759	0.06317127
Kings	2017	HHDT	Aggregated	20	DSL	27874.6105	0.48594655	0.55713144	1.9227831	8.72340887	2111.52439	0.06292223	0.06020024
Kings	2017	HHDT	Aggregated	25	DSL	26398.3	0.34680667	0.39932834	1.40097068	6.85195457	1934.35228	0.04438163	0.0424617
Kings	2017	HHDT	Aggregated	30	DSL	44483.6754	0.26117085	0.29973717	1.0621359	5.86568415	1807.47268	0.04008364	0.03834964
Kings	2017	HHDT	Aggregated	35	DSL	80139.5014	0.19702807	0.22697681	0.80922941	5.22834135	1712.46484	0.03691205	0.03531526
Kings	2017	HHDT	Aggregated	40	DSL	75536.0158	0.14999226	0.17242173	0.62251039	4.77191022	1629.18891	0.03495211	0.0334401
Kings	2017	HHDT	Aggregated	45	DSL	105581.715	0.11584377	0.13268409	0.48537354	4.44397993	1558.11314	0.03410517	0.0326298
Kings	2017	HHDT	Aggregated	50	DSL	109634.739	0.09167299	0.10459039	0.38610576	4.18792063	1497.41038	0.03434823	0.03286234
Kings	2017	HHDT	Aggregated	55	DSL	133590.01	0.07531213	0.08573713	0.31615628	3.99454528	1454.32716	0.03567466	0.03413139
Kings	2017	HHDT	Aggregated	60	DSL	40696.1842	0.06970576	0.0793547	0.28979073	3.92884118	1435.87257	0.0366891	0.03510195
Kings	2017	HHDT	Aggregated	65	DSL	22290.1173	0.06970576	0.0793547	0.28979073	3.92948594	1435.87257	0.0366891	0.03510195
Kings	2017	HHDT	Aggregated	70	DSL	0	0	0	0	0	0	0	0
Kings	2017	HHDT	Aggregated	75	DSL	0	0	0	0	0	0	0	0
Kings	2017	HHDT	Aggregated	80	DSL	0	0	0	0	0	0	0	0
Kings	2017	HHDT	Aggregated	85	DSL	0	0	0	0	0	0	0	0
Kings	2017	HHDT	Aggregated	90	DSL	0	0	0	0	0	0	0	0

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: San Bernardino
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
San Bernardino	2017	HHDT	Aggregated	5	DSL	11228.502	1.36249556	3.26067216	7.74960897	20.4395269	4029.20768	0.0539067	0.05157472
San Bernardino	2017	HHDT	Aggregated	10	DSL	33427.8202	1.08326644	2.33068783	5.68055775	16.9037091	3443.5375	0.06361289	0.06086102
San Bernardino	2017	HHDT	Aggregated	15	DSL	33659.4705	0.76235379	1.19515043	3.27049854	12.1066264	2662.52987	0.05274182	0.05046023
San Bernardino	2017	HHDT	Aggregated	20	DSL	72975.9336	0.49028923	0.6518989	1.98299068	8.86552535	2213.76324	0.07696663	0.07363709
San Bernardino	2017	HHDT	Aggregated	25	DSL	102366.156	0.34374927	0.46242493	1.4937778	7.06424001	1997.61639	0.04201815	0.04020046
San Bernardino	2017	HHDT	Aggregated	30	DSL	156144.703	0.2565041	0.33136452	1.09457461	6.0560184	1853.92166	0.03735252	0.03573667
San Bernardino	2017	HHDT	Aggregated	35	DSL	154068.64	0.19083387	0.29159092	0.91694709	5.60044552	1816.08175	0.03425301	0.03277124
San Bernardino	2017	HHDT	Aggregated	40	DSL	167174.501	0.14636007	0.20401948	0.66315082	5.096195	1700.27908	0.0327109	0.03129584
San Bernardino	2017	HHDT	Aggregated	45	DSL	214534.399	0.11058362	0.14408305	0.48737183	4.58613532	1604.30424	0.03087359	0.02953802
San Bernardino	2017	HHDT	Aggregated	50	DSL	232336.65	0.08559498	0.10198617	0.36647597	4.16150769	1514.82669	0.03116283	0.02981474
San Bernardino	2017	HHDT	Aggregated	55	DSL	248469.763	0.0718376	0.08178164	0.28926464	4.29917333	1476.39489	0.03251528	0.03110868
San Bernardino	2017	HHDT	Aggregated	60	DSL	480659.775	0.06338153	0.07215505	0.26260748	3.96261759	1445.8773	0.03270922	0.03129423
San Bernardino	2017	HHDT	Aggregated	65	DSL	663412.137	0.0589547	0.06711544	0.25661431	3.48193954	1427.3107	0.03051529	0.02919521
San Bernardino	2017	HHDT	Aggregated	70	DSL	1036029.23	0.05371781	0.06115363	0.23928018	3.18837505	1418.84273	0.02618733	0.02505448
San Bernardino	2017	HHDT	Aggregated	75	DSL	0	0	0	0	0	0	0	0
San Bernardino	2017	HHDT	Aggregated	80	DSL	0	0	0	0	0	0	0	0
San Bernardino	2017	HHDT	Aggregated	85	DSL	0	0	0	0	0	0	0	0
San Bernardino	2017	HHDT	Aggregated	90	DSL	0	0	0	0	0	0	0	0

Section 8

2014 Vehicle Fleet

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Ventura
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW,

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_ RUNEX	TOG_ RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
Ventura	2017	HHDT	2014	5	DSL	58.1767601	0.267456064	9.04723003	32.9678125	5.50080345	4402.31132	0.00608741	0.00582407
Ventura	2017	HHDT	2014	10	DSL	150.275619	0.229207089	6.84868668	25.0050021	4.78170142	3807.54728	0.00566079	0.0054159
Ventura	2017	HHDT	2014	15	DSL	159.561318	0.228948563	2.25763392	8.5215668	5.4936865	2582.03112	0.00607376	0.00581101
Ventura	2017	HHDT	2014	20	DSL	678.227058	0.176203116	0.5128369	2.16146492	3.4732499	1944.79773	0.00529709	0.00506794
Ventura	2017	HHDT	2014	25	DSL	811.909179	0.141372982	0.43714176	1.82639572	2.24569566	1805.99781	0.00547771	0.00524075
Ventura	2017	HHDT	2014	30	DSL	1446.2298	0.106102967	0.24913874	1.08731516	1.47676354	1670.01523	0.00510942	0.00488839
Ventura	2017	HHDT	2014	35	DSL	1495.62689	0.074831828	0.31121017	1.25332921	0.97255768	1668.06733	0.00459837	0.00439945
Ventura	2017	HHDT	2014	40	DSL	1993.72828	0.057103445	0.15494848	0.66009044	0.74934583	1539.65688	0.00440142	0.00421102
Ventura	2017	HHDT	2014	45	DSL	1812.09393	0.042254859	0.10758461	0.46305481	0.5796424	1475.91944	0.00414097	0.00396183
Ventura	2017	HHDT	2014	50	DSL	1698.70755	0.031842942	0.05252593	0.24645685	0.47160306	1389.44942	0.00396068	0.00378934
Ventura	2017	HHDT	2014	55	DSL	1836.22302	0.023772416	0.02706309	0.14037059	0.39023436	1330.62896	0.00377351	0.00361027
Ventura	2017	HHDT	2014	60	DSL	2888.27547	0.020407315	0.02323217	0.12050045	0.35578596	1313.88791	0.00366931	0.00351058
Ventura	2017	HHDT	2014	65	DSL	3634.82774	0.020407315	0.02323217	0.12050045	0.35742421	1313.88791	0.00366931	0.00351058
Ventura	2017	HHDT	2014	70	DSL	0	0	0	0	0	0	0	0
Ventura	2017	HHDT	2014	75	DSL	0	0	0	0	0	0	0	0
Ventura	2017	HHDT	2014	80	DSL	0	0	0	0	0	0	0	0
Ventura	2017	HHDT	2014	85	DSL	0	0	0	0	0	0	0	0
Ventura	2017	HHDT	2014	90	DSL	0	0	0	0	0	0	0	0

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Los Angeles
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
Los Angeles	2017	HHDT	2014	5	DSL	2834.4608	0.41542401	3.17125547	12.1403521	12.4534653	3341.34626	0.00797569	0.00763066
Los Angeles	2017	HHDT	2014	10	DSL	6317.00975	0.3337204	2.73649181	10.4309799	9.38649262	2993.98121	0.00715611	0.00684654
Los Angeles	2017	HHDT	2014	15	DSL	9055.33153	0.26545932	0.83134112	3.46714729	6.86469359	2246.95832	0.00671411	0.00642366
Los Angeles	2017	HHDT	2014	20	DSL	20397.96	0.19151377	0.37414024	1.69132392	3.93081022	1898.41361	0.0058551	0.00560181
Los Angeles	2017	HHDT	2014	25	DSL	30521.4826	0.14681986	0.27762531	1.26358324	2.36209506	1747.54984	0.00565684	0.00541213
Los Angeles	2017	HHDT	2014	30	DSL	41706.4406	0.10858207	0.19053807	0.88142431	1.52323103	1641.92316	0.00522215	0.00499624
Los Angeles	2017	HHDT	2014	35	DSL	34192.9671	0.07741307	0.23679102	0.99082397	1.0160062	1622.68429	0.004734	0.00452921
Los Angeles	2017	HHDT	2014	40	DSL	34644.7293	0.05788441	0.14372783	0.62121753	0.76225269	1531.18593	0.00446764	0.00427437
Los Angeles	2017	HHDT	2014	45	DSL	33860.8307	0.04282725	0.09662147	0.42473025	0.5880714	1466.27848	0.00419834	0.00401672
Los Angeles	2017	HHDT	2014	50	DSL	29891.47	0.03214481	0.0505024	0.23973921	0.47752128	1387.3056	0.0040066	0.00383328
Los Angeles	2017	HHDT	2014	55	DSL	37834.3353	0.02377267	0.02706337	0.14037207	0.39043238	1339.7428	0.00377356	0.00361032
Los Angeles	2017	HHDT	2014	60	DSL	71332.3988	0.0204999	0.02333758	0.12104715	0.35846862	1317.44782	0.00369173	0.00353202
Los Angeles	2017	HHDT	2014	65	DSL	41734.1266	0.02065774	0.02351726	0.12197915	0.36266035	1309.12647	0.00372994	0.00356858
Los Angeles	2017	HHDT	2014	70	DSL	481.390089	0.02127286	0.02421753	0.12561129	0.38174756	1303.74961	0.00387884	0.00371105
Los Angeles	2017	HHDT	2014	75	DSL	0	0	0	0	0	0	0	0
Los Angeles	2017	HHDT	2014	80	DSL	0	0	0	0	0	0	0	0
Los Angeles	2017	HHDT	2014	85	DSL	0	0	0	0	0	0	0	0
Los Angeles	2017	HHDT	2014	90	DSL	0	0	0	0	0	0	0	0

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Imperial
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
Imperial	2017	HHDT	2014	5	DSL	11.3366509	0.20979442	2.26568775	8.24540447	4.38989339	5571.55931	0.0105323	0.01007668
Imperial	2017	HHDT	2014	10	DSL	23.4010518	0.12914323	2.05819133	7.36928022	1.77776556	5337.49104	0.00960169	0.00918633
Imperial	2017	HHDT	2014	15	DSL	10.6897961	0.09085839	1.45005245	5.19161152	1.18055024	4479.20648	0.00825114	0.0078942
Imperial	2017	HHDT	2014	20	DSL	132.125269	0.17254484	0.26883796	1.26914681	3.43643452	2011.21403	0.00549628	0.00525852
Imperial	2017	HHDT	2014	25	DSL	211.482204	0.14886869	0.21737899	1.04463176	2.46531285	1833.57445	0.00610864	0.00584439
Imperial	2017	HHDT	2014	30	DSL	825.753785	0.11350755	0.13937487	0.70534107	1.64474343	1642.04416	0.00559679	0.00535468
Imperial	2017	HHDT	2014	35	DSL	1216.48145	0.08288031	0.10690668	0.53278597	1.13149537	1584.31903	0.00520281	0.00497774
Imperial	2017	HHDT	2014	40	DSL	2075.68345	0.0618855	0.07435467	0.37891088	0.84459257	1485.26033	0.0048494	0.00463962
Imperial	2017	HHDT	2014	45	DSL	3018.73969	0.04579613	0.05374843	0.27599155	0.65197839	1418.74887	0.00454628	0.00434961
Imperial	2017	HHDT	2014	50	DSL	3481.11882	0.03387393	0.03892168	0.20125797	0.51930658	1361.12968	0.00427722	0.00409219
Imperial	2017	HHDT	2014	55	DSL	7976.40257	0.02500263	0.02846359	0.1476347	0.42401217	1320.98074	0.00403642	0.0038618
Imperial	2017	HHDT	2014	60	DSL	3993.84632	0.02146338	0.02443443	0.12673629	0.38558402	1304.36108	0.00392496	0.00375517
Imperial	2017	HHDT	2014	65	DSL	20982.8543	0.02146338	0.02443443	0.12673629	0.38615593	1304.36108	0.00392496	0.00375517
Imperial	2017	HHDT	2014	70	DSL	423.409188	0.02146338	0.02443443	0.12673629	0.38758797	1304.36108	0.00392496	0.00375517
Imperial	2017	HHDT	2014	75	DSL	0	0	0	0	0	0	0	0
Imperial	2017	HHDT	2014	80	DSL	0	0	0	0	0	0	0	0
Imperial	2017	HHDT	2014	85	DSL	0	0	0	0	0	0	0	0
Imperial	2017	HHDT	2014	90	DSL	0	0	0	0	0	0	0	0

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Inyo
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
Inyo	2017	HHDT	2014	5	DSL	17.8344264	0.52053359	0.59258787	3.07362995	17.6488823	2841.70047	0.009776	0.0093531
Inyo	2017	HHDT	2014	10	DSL	68.1283336	0.42157733	0.4799337	2.48931619	13.4399815	2519.68664	0.00879393	0.00841351
Inyo	2017	HHDT	2014	15	DSL	83.3215094	0.29690718	0.33800622	1.75316792	8.17345275	2113.99719	0.00755666	0.00722976
Inyo	2017	HHDT	2014	20	DSL	191.389867	0.21260835	0.24203842	1.2554029	4.64048038	1847.52221	0.00665133	0.00636359
Inyo	2017	HHDT	2014	25	DSL	188.194699	0.1574069	0.17919578	0.9294512	2.64272763	1704.45487	0.00613299	0.00586768
Inyo	2017	HHDT	2014	30	DSL	317.725049	0.11599756	0.1320544	0.68493867	1.69334721	1605.1508	0.00564694	0.00540266
Inyo	2017	HHDT	2014	35	DSL	571.595308	0.08548186	0.09731459	0.50475053	1.17661936	1525.4812	0.00524232	0.00501554
Inyo	2017	HHDT	2014	40	DSL	539.419926	0.06299398	0.07171385	0.37196483	0.86621277	1459.20469	0.00489572	0.00468393
Inyo	2017	HHDT	2014	45	DSL	755.222854	0.04642203	0.05284795	0.27411132	0.66619879	1402.59644	0.00459256	0.00439389
Inyo	2017	HHDT	2014	50	DSL	785.413207	0.0342097	0.03894514	0.20200032	0.52862984	1353.26685	0.00432316	0.00413615
Inyo	2017	HHDT	2014	55	DSL	957.763332	0.02521009	0.02869977	0.14885971	0.43017824	1316.90244	0.00408075	0.00390422
Inyo	2017	HHDT	2014	60	DSL	291.768171	0.02164148	0.02463717	0.12778789	0.39190039	1300.33409	0.00396808	0.00379642
Inyo	2017	HHDT	2014	65	DSL	159.807286	0.02164148	0.02463717	0.12778789	0.39191107	1300.33409	0.00396808	0.00379642
Inyo	2017	HHDT	2014	70	DSL	0	0	0	0	0	0	0	0
Inyo	2017	HHDT	2014	75	DSL	0	0	0	0	0	0	0	0
Inyo	2017	HHDT	2014	80	DSL	0	0	0	0	0	0	0	0
Inyo	2017	HHDT	2014	85	DSL	0	0	0	0	0	0	0	0
Inyo	2017	HHDT	2014	90	DSL	0	0	0	0	0	0	0	0

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Kern
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
Kern	2017	HHDT	2014	5	DSL	855.297919	0.48997057	0.66323811	3.25219285	16.2511223	3033.14765	0.00961771	0.00920165
Kern	2017	HHDT	2014	10	DSL	3190.1055	0.40280972	0.51359345	2.56585561	12.60196	2629.54572	0.00862456	0.00825146
Kern	2017	HHDT	2014	15	DSL	4170.6145	0.28864185	0.34214385	1.75049007	7.83825919	2146.95856	0.00738331	0.00706391
Kern	2017	HHDT	2014	20	DSL	10175.5711	0.20817336	0.24067973	1.24178029	4.49512126	1858.88393	0.00650261	0.00622131
Kern	2017	HHDT	2014	25	DSL	8650.86942	0.15352615	0.17937417	0.9221865	2.54507121	1721.79496	0.00598757	0.00572855
Kern	2017	HHDT	2014	30	DSL	15596.7327	0.11340404	0.13121212	0.67680981	1.6359593	1616.28618	0.00551135	0.00527293
Kern	2017	HHDT	2014	35	DSL	28553.3099	0.08346603	0.09711892	0.49999517	1.13540239	1539.94234	0.00511808	0.00489668
Kern	2017	HHDT	2014	40	DSL	28371.8203	0.06158517	0.0712307	0.36746194	0.83731115	1470.31861	0.00477753	0.00457086
Kern	2017	HHDT	2014	45	DSL	41605.6481	0.04545452	0.05220586	0.26996245	0.64552594	1410.06257	0.00447995	0.00428615
Kern	2017	HHDT	2014	50	DSL	43960.1436	0.03353716	0.03829101	0.19840881	0.51274824	1357.90476	0.00421522	0.00403287
Kern	2017	HHDT	2014	55	DSL	51974.7706	0.02473228	0.02815582	0.14603837	0.41735786	1319.92114	0.00397864	0.00380653
Kern	2017	HHDT	2014	60	DSL	16275.6713	0.02122695	0.02416526	0.12534019	0.38025041	1303.3394	0.00386773	0.00370041
Kern	2017	HHDT	2014	65	DSL	8765.37692	0.02122787	0.02416631	0.12534562	0.38032535	1303.33422	0.00386795	0.00370063
Kern	2017	HHDT	2014	70	DSL	0	0	0	0	0	0	0	0
Kern	2017	HHDT	2014	75	DSL	0	0	0	0	0	0	0	0
Kern	2017	HHDT	2014	80	DSL	0	0	0	0	0	0	0	0
Kern	2017	HHDT	2014	85	DSL	0	0	0	0	0	0	0	0
Kern	2017	HHDT	2014	90	DSL	0	0	0	0	0	0	0	0

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: Kings
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
Kings	2017	HHDT	2014	5	DSL	163.446615	0.49615014	0.62660247	3.13963304	16.5071209	2957.82231	0.0095329	0.00912051
Kings	2017	HHDT	2014	10	DSL	616.571969	0.40546858	0.49346798	2.50254101	12.700606	2585.8554	0.00855745	0.00818726
Kings	2017	HHDT	2014	15	DSL	743.935729	0.28835717	0.33677522	1.73158417	7.8199013	2135.84832	0.00733679	0.0070194
Kings	2017	HHDT	2014	20	DSL	1693.04227	0.20757098	0.23878678	1.23409877	4.47409187	1855.80011	0.00646686	0.00618711
Kings	2017	HHDT	2014	25	DSL	1674.66364	0.15324478	0.17711567	0.91391051	2.53751855	1715.28258	0.00595115	0.00569371
Kings	2017	HHDT	2014	30	DSL	2822.76205	0.11306136	0.13001712	0.67203832	1.62797085	1612.97877	0.00547803	0.00524105
Kings	2017	HHDT	2014	35	DSL	5084.28164	0.08324636	0.09608948	0.49603684	1.13012783	1535.79779	0.00508654	0.0048665
Kings	2017	HHDT	2014	40	DSL	4793.09547	0.06139267	0.07063354	0.36503391	0.8327176	1467.88222	0.0047494	0.00454394
Kings	2017	HHDT	2014	45	DSL	6701.26937	0.04528768	0.05187586	0.26849856	0.64176527	1409.14218	0.00445424	0.00426155
Kings	2017	HHDT	2014	50	DSL	6960.10203	0.03340512	0.03810804	0.1975175	0.50956193	1357.97465	0.00419203	0.00401068
Kings	2017	HHDT	2014	55	DSL	8481.86465	0.02462882	0.02803803	0.14542744	0.41457903	1320.40387	0.00395653	0.00378537
Kings	2017	HHDT	2014	60	DSL	2583.87229	0.02114249	0.02406911	0.12484148	0.37795503	1303.79146	0.00384728	0.00368085
Kings	2017	HHDT	2014	65	DSL	1415.23874	0.02114249	0.02406911	0.12484148	0.37801705	1303.79146	0.00384728	0.00368085
Kings	2017	HHDT	2014	70	DSL	0	0	0	0	0	0	0	0
Kings	2017	HHDT	2014	75	DSL	0	0	0	0	0	0	0	0
Kings	2017	HHDT	2014	80	DSL	0	0	0	0	0	0	0	0
Kings	2017	HHDT	2014	85	DSL	0	0	0	0	0	0	0	0
Kings	2017	HHDT	2014	90	DSL	0	0	0	0	0	0	0	0

EMFAC2014 (v1.0.7) Emission Rates
Region Type: County
Region: San Bernardino
Calendar Year: 2017
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for VMT, g/mile for RUNEX, PMBW and PMTW

Region	CalYr	VehClass	MdlYr	Speed	Fuel	VMT	ROG_RUNEX	TOG_RUNEX	CO_RUNEX	NOx_RUNEX	CO2_RUNEX	PM10_RUNEX	PM2_5_RUNEX
San Bernardino	2017	HHDT	2014	5	DSL	698.557596	0.41961649	2.79459062	10.7918452	12.7358368	3309.60362	0.00807765	0.00772822
San Bernardino	2017	HHDT	2014	10	DSL	2125.05366	0.3530966	1.88437449	7.40451726	10.3029143	2846.03051	0.00747928	0.00715573
San Bernardino	2017	HHDT	2014	15	DSL	2138.60037	0.2638837	0.77452729	3.25952629	6.83288418	2245.17379	0.00666994	0.0063814
San Bernardino	2017	HHDT	2014	20	DSL	5030.0588	0.17891122	0.33764591	1.53717446	3.56332784	1900.14547	0.00533261	0.00510193
San Bernardino	2017	HHDT	2014	25	DSL	6760.92303	0.14604782	0.27180843	1.24112122	2.35438774	1749.58972	0.00562464	0.00538132
San Bernardino	2017	HHDT	2014	30	DSL	10403.7501	0.10870862	0.18053034	0.8456309	1.53334885	1639.89989	0.00522953	0.0050033
San Bernardino	2017	HHDT	2014	35	DSL	10208.1409	0.07817919	0.19437494	0.83976188	1.03325173	1602.43764	0.00477044	0.00456407
San Bernardino	2017	HHDT	2014	40	DSL	11101.5954	0.05839438	0.11787552	0.52924573	0.77420307	1513.9679	0.00449757	0.00430301
San Bernardino	2017	HHDT	2014	45	DSL	14474.5221	0.04378953	0.07354635	0.34359708	0.60933921	1440.4853	0.00429203	0.00410636
San Bernardino	2017	HHDT	2014	50	DSL	15851.1817	0.03275855	0.0428431	0.21334762	0.49313559	1372.13109	0.004094	0.0039169
San Bernardino	2017	HHDT	2014	55	DSL	16484.2082	0.0239407	0.02725467	0.1413643	0.39610369	1335.02921	0.00380947	0.00364468
San Bernardino	2017	HHDT	2014	60	DSL	32663.1228	0.02079054	0.02366845	0.12276333	0.367651	1312.63038	0.00376209	0.00359934
San Bernardino	2017	HHDT	2014	65	DSL	47073.3808	0.02122183	0.02415944	0.12530998	0.37940495	1304.09111	0.00386649	0.00369923
San Bernardino	2017	HHDT	2014	70	DSL	75797.0709	0.02155033	0.02453341	0.12724967	0.38936559	1300.94267	0.00394601	0.00377531
San Bernardino	2017	HHDT	2014	75	DSL	0	0	0	0	0	0	0	0
San Bernardino	2017	HHDT	2014	80	DSL	0	0	0	0	0	0	0	0
San Bernardino	2017	HHDT	2014	85	DSL	0	0	0	0	0	0	0	0
San Bernardino	2017	HHDT	2014	90	DSL	0	0	0	0	0	0	0	0

Santa Susana Field Laboratory
Air Quality Appendix
Section 9
Santa Susana Field Laboratory Project EIR Feasibility of Alternative-Fueled Construction Equipment and Trucks Memorandum

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memorandum

date March 24, 2016

to California Environmental Protection Agency, Department of Toxic Substance Control (DTSC)

from Heidi Rous, Environmental Science Associates (ESA)

subject Santa Susana Field Laboratories Project EIR
Feasibility of Alternative-Fueled Cleanup Equipment and Trucks

Introduction and Project Background

Environmental Science Associates (ESA) is providing this Technical Memorandum in support of the California Environmental Quality Act (CEQA) document development for consideration by the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) in assessing the remedial action to be undertaken at the approximately 2,850-acre Santa Susana Field Laboratories (SSFL) site and adjacent offsite areas (the project site). Roughly 541 acres at the project site have been targeted for some level of remedial action. The project site is located in the southeastern-most part of Ventura County and adjacent to Los Angeles County, approximately 29 miles northwest of downtown Los Angeles and approximately one mile south of the City of Simi Valley.

This memorandum discusses the feasibility of alternative-fueled cleanup equipment and trucks for the removal of impacted material from the SSFL site and adjacent offsite areas. The remedial technologies considered to address the multiple affected media, the variety of contaminants present, and the unique and various conditions at the site includes: excavation and offsite disposal; soil vapor extraction; biological treatment; capping and onsite management; phytoremediation (the use of plants to remediate chemicals of concern in contaminated media); and physical remediation methods (soil washing/partitioning; soil solidification/stabilization; thermal desorption).

The DTSC's proposed remedy for the project site would generate a daily maximum number of 96 round trips (resulting in 192 total trips) for trucks visiting the site for export and import of materials for all Responsible Parties (RPs) combined. This maximum would represent all types of truck trips, including: equipment deliveries; excavation spoils; building demolition debris; and delivery of backfill soil. For planning purposes, it is assumed that the actual number of trucks would range between approximately 48 round trips and a maximum of 96 round trips. This predicted variability is based on factors such as funding, the complexity of various projects stages (i.e., building removal, excavation, backfilling, confirmation sampling, etc.), coordination between multiple RPs, determination of final soil excavation volumes, and project initiation and ability to ramp up overall production given the nature of the SSFL project as a whole. Reclamation would consist of limited backfilling, grading, and revegetation as necessary.

Equipment Exhaust

Implementation of the project Cleanup Plan has the potential to generate short-term emissions of criteria pollutants, toxic air contaminants (TAC), and greenhouse gases (GHGs) through the operation of diesel-fueled heavy-duty equipment, vehicle trips generated from workers and visitors traveling to and from the project site, haul trucks importing and exporting material, and vehicles bringing supplies and equipment. Mobile source emissions, primarily oxides of nitrogen (NO_X), particulate matter (PM), and carbon dioxide (CO_2) would result from the use of this on- and off-road equipment. The project site is located in the South Central Coast Air Basin (SCCAB) and adjacent to the South Coast Air Basin (SoCAB), which are designated as state and federal non-attainment area for ozone and a state non-attainment area for PM10. The SoCAB is also designated as a state and federal non-attainment area for PM2.5. A non-attainment designation means that the area does not meet the health-based ambient air quality standards for these pollutants. Emissions of NO_X are a precursor to the formation of ground-level ozone, which occurs due to complex photo-chemical reactions of these pollutants in the atmosphere in the presence of sunlight. Additionally, the use of diesel fuel would generate diesel particulate matter (DPM) exhaust, which is classified as a TAC, and a carcinogen by the State of California.

To estimate the emissions associated with the heavy-duty diesel-fueled equipment required for the project cleanup activities, the types and number of equipment, and hours of operation per day must be determined based on the maximum daily throughput or rate of cleanup. Emission factors are based on U.S. Environmental Protection Agency (USEPA) off-road emissions standards applicable to the equipment assumed to be used during the project cleanup activities. USEPA emissions standards are classified as Tiers 1-4, with a higher tiered engine (Tier 4) applying to newer engine model years, resulting in lower emissions (cleaner). The DTSC is committed to using the higher tiered engines (Tier 4) to reduce diesel exhaust emissions.

On-road vehicles, such as personal automobiles, delivery trucks, and haul trucks, are calculated based on vehicle miles traveled (VMT), average speed, and engine model year. Although the project is located in the Ventura County portion of the SCCAB, which is under the jurisdiction of the Ventura County Air Pollution Control District (VCAPCD) for air quality planning, and directly adjacent to the SoCAB, which is under the jurisdiction of the South Coast Air Quality Management District (SCAQMD) for air quality planning, haul trucks exporting soil may travel (i.e., VMT) to a receiver landfill located outside of the SCCAB. The selection of the receiver site (landfill) would depend on the characterization of the impacted soil. Export haul truck trip lengths (i.e., VMT per one-way trip) from the project site to receiver sites would be up to approximately 18 miles in the SCCAB, approximately 12 to 125 miles within the SoCAB, up to approximately 300 miles within in the San Joaquin Valley Air Basin (SJVAB), up to approximately 140 miles within the Salton Sea Air Basin (SSAB), up to approximately 200 miles in the Mojave Desert Air Basin (MDAB), up to approximately 160 miles in the Great Basin Valleys Air Basin (GBVAB), up to approximately 230 miles in the Sacramento Valley Air Basin (SACVAB), and up to approximately 66 miles in the Northeast Plateau Air Basin (NEPAB). The VMT anticipated from implementation of the remedy at the project site is expected to result in non-negligible emissions in these air basins.

In 2008, CARB approved the Truck and Bus regulation to reduce PM and NO_X emissions from existing diesel vehicles operating in California, which was amended in December 2010 to apply to nearly all diesel fueled trucks and busses with a gross vehicle weight rating (GVWR) greater than 14,000 pounds. For the largest trucks in the fleet, i.e. a GVWR greater than 26,000 pounds, there are two options to comply with the requirements. For option one, the fleet owner retrofits or replaces engines, starting with the oldest engine model year, to meet the 2010

engine standards, or better. This option would be phased over 8 years, starting in 2015 and would be fully implemented by 2023. Therefore, all trucks operating in the State subject to this option would meet or exceed the 2010 engine emission standards for NO_X and PM by 2023. Method two required fleet owners, starting in 2012, to retrofit a portion of their fleet with DPM filters (DPFs) to achieve at least 85 percent removal efficiency, such that by January 1, 2016 their entire fleet is equipped with DPFs. However, DPFs do not lower NO_X emissions; thus, fleet owners choosing the second option must still comply with the 2010 engine emission standards for their trucks and busses by 2020.

Emission Control Strategies

The project would implement a number of mitigation measures to reduce fugitive dust, and equipment and truck exhaust emissions. To account for control measures when preparing an emissions inventory, the VCAPCD *Ventura County Air Quality Assessment Guidelines*, SCAQMD CEQA *Air Quality Handbook* and *Air Quality Analysis Handbook* and CARB regulations provide control efficiency percentages, which are supported by peer reviewed scientific studies. The control efficiency percentages apply to fugitive dust or engine exhaust emissions sources in order to reduce emissions. Based on the control measures discussed below, such control measures (and results) for equipment exhaust included in the analysis are, as follows:

- Use of USEPA Tier 4 emissions compliant equipment for cleanup activities (cleaner engines, i.e., lower DPM and NO_X emissions up to 95 and 90 percent, respectively).
- Use of newer model year trucks for export (cleaner engines, i.e., lower DPM and NO_X emissions up to 90 and 80 percent, respectively, compared to pre-2010 models).
- Limit idling of all equipment and trucks to five minutes per instance (which reduces DPM and NO_X emissions, although difficult to reliably quantify).

Although implementation of these control measures would reduce emissions, project-related air pollutant emissions are predicted to exceed applicable thresholds. Specifically, regional emissions of NO_X would likely exceed the VCAPCD and SCAQMD's daily significance thresholds. Emissions of TACs, specifically DPM, could also exceed the health risk significance threshold of 10 in one million. As is required by CEQA, DTSC must consider all feasible mitigation measures to reduce significant impacts, and has requested ESA to investigate the feasibility of additional emission reducing technologies including alternative-fueled engines.

The following discussion considers the feasibility of alternative-fueled equipment and trucks, as mitigation to further reduce project emissions of NO_X and other pollutants, including the feasibility of: :

1. Biodiesel Fuel;
2. Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG); and
3. Electric Engines (plug-in or hybrid).

1. Biodiesel Fuel

Biodiesel Basics

Biodiesel is a cleaner burning diesel replacement fuel, produced from a renewable diverse mix of resources including agricultural oils, recycled cooking oil, and animal fats. Meeting strict technical fuel quality and engine performance specifications (American Society of Testing & Materials (ASTM) D6751), biodiesel can be used in existing diesel engines without modification, and is covered by all major engine manufacturers' warranties, most

often in blends of 5 percent up to 20 percent (known as B20) biodiesel. Biodiesel is produced in nearly every state in the country. Biodiesel is the only alternative fuel to have fully completed the health effects testing requirements of the 1990 Amendments to the federal Clean Air Act. Health testing was performed based on inhalation of biodiesel exhaust at different concentrations. Results of the testing concluded that biodiesel exhaust concentrations expected to be observed on the field would not pose a threat to human health (Sharp, 1998)

Biodiesel that meets ASTM D6751 and is legally registered with the USEPA, is a legal motor fuel for sale and distribution (Biodiesel.org 2016). The use of biodiesel in a conventional diesel engine, not equipped with new diesel after treatment, results in substantial reduction of unburned hydrocarbons, carbon monoxide (CO), and PM compared to emissions from diesel fuel. In addition, the exhaust emissions of sulfur oxides and sulfates (major components of acid rain) from biodiesel are essentially eliminated compared to higher sulfur diesel (Biodiesel.org 2016).

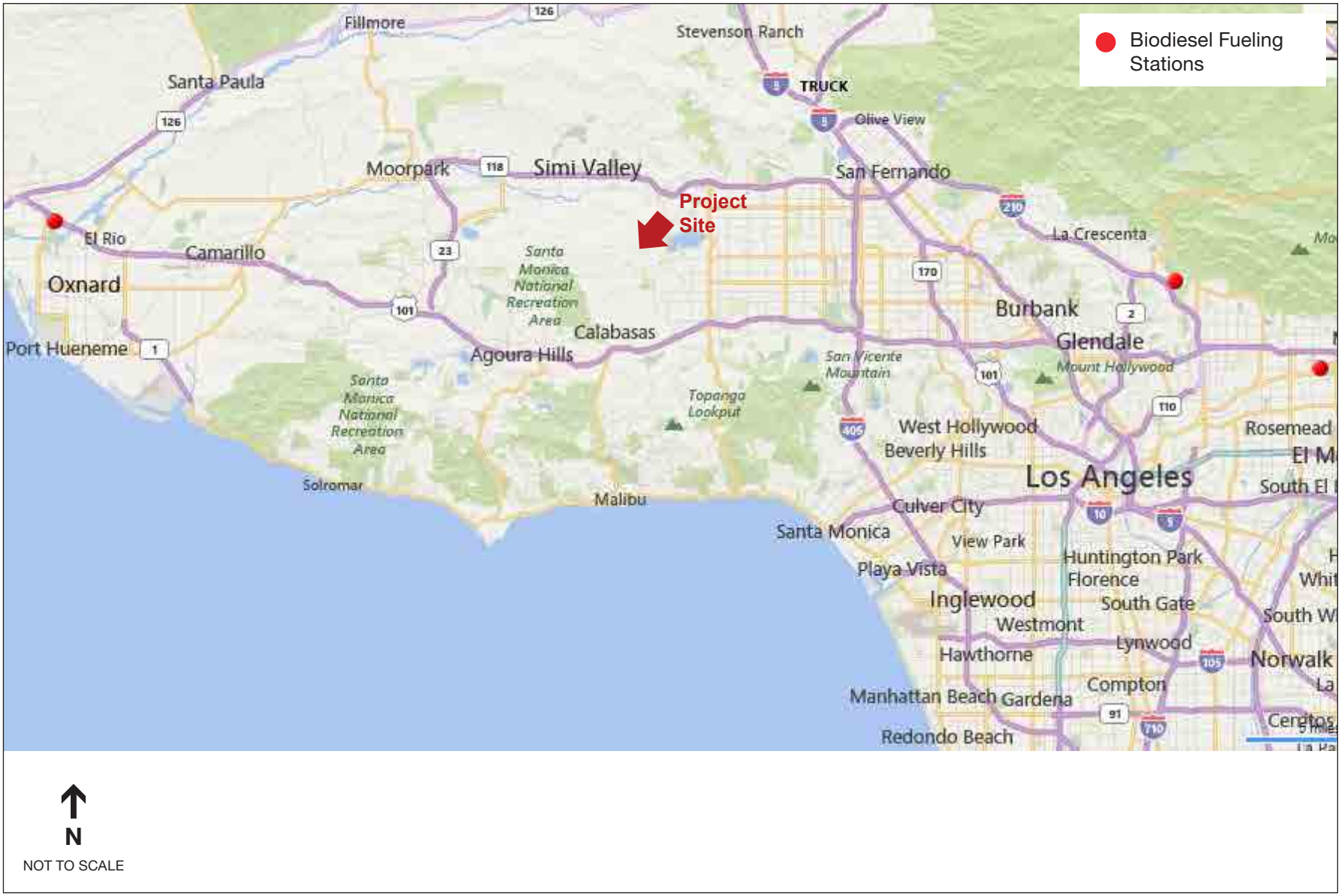
Of the major exhaust pollutants, both unburned hydrocarbons and NO_X are ozone (or smog) forming precursors. The use of biodiesel in a conventional diesel engine results in substantial reduction of unburned hydrocarbons, CO, and PM. However, emissions of NO_X are either slightly reduced or slightly increased depending on the duty cycle of the engine and testing methods used. Biodiesel further enhances the advantages of diesel by reducing vehicle emissions. B20, a 20 percent blend of biodiesel and conventional diesel, reduces emissions of hydrocarbons by 20 percent and CO and PM emissions by 12 percent. Based on engine testing, using the most stringent emissions testing protocols required by USEPA for certification of fuels or fuel additives in the U.S., the overall ozone forming potential of the hydrocarbon emissions from biodiesel was nearly 50 percent less than that measured for diesel fuel. New Technology Diesel Engines (NTDE) (i.e. those with PM traps and selective catalytic reduction, SCR, technology required for on-road applications in the US after 2010) reduce emissions of both PM and NO_X with B20 by over 90 percent compared to a conventional diesel engine based on model year 2004 emissions standards. This makes NTDEs as clean as or cleaner than either gasoline or natural gas fueled engines (Biodiesel.org 2016).

Biodiesel Availability

Biodiesel is available nationwide, and can be purchased directly from biodiesel producers and marketers, petroleum distributors, or at a few public retailers throughout the nation (Biodiesel.org 2016). Biodiesel fuel is available at fueling stations within 25 miles of the SSFL site, as shown in **Figure 1**, *Biodiesel Fueling Stations near Santa Susana Field Laboratories Site*, below.

Biodiesel Usage

Biodiesel usage is growing rapidly in every market segment where conventional diesel fuel is used. Some of the leading types of consumers of biodiesel fuels include state and municipal governments, school districts, U.S. Department of Defense, agriculture, cruise ships, mining, commercial trucking and truck stop operators. Many cities and states have started to require that their trucks and buses use biodiesel fuels. Notable examples of municipal users in California include the cities of San Francisco, San Jose, and Santa Monica. Some states such as Washington, Louisiana and Minnesota now also mandate that a certain percentage of all diesel fuel sold must be biodiesel.



SOURCE: http://biodiesel.org/using-biodiesel/finding-biodiesel/retail-locations/retail-map

Santa Susana Field Laboratories Memo . D120894

Figure 1

Biodiesel Fueling Stations near Santa Susana Field Laboratories

Use of biodiesel is diverse, with a variety of users (e.g., municipalities, agencies, and utilities) and equipment and vehicle fleets, such as the following examples (Berkeleybioddiesel.org 2016):

- New common rail engines use biodiesel fuel, B5 or B20, depending on manufacturer.
- Automobile manufacturer acceptance and vehicular usage of biodiesel fuel began when Chrysler released the Jeep Liberty CRD diesels into the American market with B5, which was an indication of at least partial acceptance of biodiesel fuel usage in the automotive industry.
- The City of Halifax, Nova Scotia updated its bus system to allow the fleet of city buses to run completely on a fish-oil based biodiesel fuel.
- The McDonalds Corporation in United Kingdom produced biodiesel from the waste oil of its restaurants and use as biodiesel fuel to run its vehicle fleet. The British Train Operating Company, Virgin Trains was transformed to run on B20. The Royal Train runs onB100.
- The Disneyland Theme Park operates its park trains on B98 biodiesel blends.
- Caterpillar Corporation uses of blends up to B20 in its off-road Tier 4 938K wheel loader. Caterpillar has approved the use of B20 biodiesel across its range of compact and mid-range engines.
- Komatsu Corporation announced that an acceptable biodiesel fuel blend of up to B20 can be used for all Komatsu engines.
- The Volvo Corporation warranty statement for Volvo Trucks' D11, D13, and D16 engines that the use of biodiesel up to a maximum of B20 in and of itself, will not affect the manufacturer's mechanical warranty as to engine and emissions system related components, provided the bio fuel used in the blend conforms to ASTM standards.
- The John Deere Corporation announced that all John Deere engines can use biodiesel blends. B5 blends are preferred, but concentrations up to B20 can be used providing the biodiesel used in the fuel blend meets the ASTM standards.

Applications of biodiesel fuel can also be seen as a heating fuel in domestic and commercial boilers, using a blend of heating oil and standardized biofuel, known as "bio heat" (Berkeleybioddiesel.org 2016).

As of 2015, the annual U.S. production of biodiesel was 1,263 million gallons (U.S. Energy Information Administration (EIA 2016), and 32 million gallons in California (California Biodiesel Alliance 2016).

U.S. Environmental Protection Agency Policy on Biofuels:

The USEPA has set a target of 18.8 billion (bn) gallons blended into the U.S.' fuel supply in 2017, up 4 percent from the 18.1 bn gallons set for this year, which includes 14.8 bn for conventional biofuels, mainly ethanol, up from 14.5 bn for this year. This figure is still far below the 24 bn gallon target in the Renewable Fuel Standard set in 2007 by Congress, which was aimed at cutting US oil imports and increasing renewable fuel use. In addition:

- Total renewable fuel volumes would grow by nearly 700 million gallons between 2016 and 2017.
- Biomass-based biodiesel, which must achieve at least 50 percent lifecycle emissions reductions, would grow by 100 million gallons between 2017 and 2018.
- Cellulosic biofuel, which requires 60 percent lifecycle carbon emissions reductions, would grow by 82 million gallons, or 35 percent, between 2016 and 2017.

Biodiesel Benefits and Drawbacks

The use of biodiesel has benefits and drawbacks. According to a USEPA study, the use of B20 can reduce emissions of hydrocarbons by 20 percent, CO by 11 percent, and PM by 10 percent; however it can increase NO_X emissions by 2 percent. The use of biodiesel does not contribute substantial amounts of GHGs to the global climate change problem since they only emit back to the environment the CO_2 that their source plants absorbed from the atmosphere as part of the natural carbon cycle. A benefit of biodiesel is that it can be used in existing diesel engines with no physical changes needed.

Many producers have been unable to produce biodiesel that meets ASTM 6751 quality due primarily to their inability to remove all impurities and water during the washing and refining processes. The USEPA found that the use of B20 can reduce fuel efficiency by 1 to 2 percent. B100, and other diesel/biodiesel blends, are more expensive to consumers than standard diesel fuel, as a result of the rapidly rising feedstock prices and production problems of producers.

2. Compressed Natural Gas (CNG) and Liquefied Natural Gas (LNG)

CNG/LNG Basics

CNG and LNG are two forms of natural gas currently used in vehicles. CNG is produced by compressing natural gas to less than 1 percent of its volume at standard atmospheric pressure. To provide adequate driving range, CNG is stored onboard a vehicle in a compressed gaseous state within cylinders at a pressure of 3,000 to 3,600 pounds per square inch. CNG is used in light-, medium-, and heavy-duty applications. A CNG-powered vehicle gets about the same fuel economy as a conventional gasoline vehicle on a gallon of gasoline equivalent (GGE) basis. GGE is the typical way CNG is sold at public fueling stations. One GGE equals about 5.66 pounds of CNG.

LNG is natural gas that has been converted to liquid form for easier storage and transport. LNG is produced by purifying natural gas and super-cooling it to approximately -260 °F to turn it into a liquid. During the process known as liquefaction, natural gas is cooled below its boiling point, removing most of the compounds found in the fuel. The remaining natural gas is primarily methane with small amounts of other hydrocarbons. LNG must be kept at cold temperatures and stored in double-walled, vacuum-insulated pressure vessels. Because of LNG's relatively high production cost as well as the need to store it in expensive cryogenic tanks, the fuel's widespread use in commercial applications has been limited. One GGE equals about 1.5 gallons of LNG (U.S. Department of Energy, 2016).

There are three types of natural gas vehicles (NGVs):

- **Dedicated:** designed to run only on natural gas.
- **Bi-fuel**: have two separate fueling systems that enable them to run on either natural gas or gasoline.
- **Dual-fuel**: traditionally limited to heavy-duty applications have fuel systems that run on natural gas, and use diesel fuel for ignition assistance.

Light-duty vehicles are typically equipped with dedicated or bi-fuel systems, while heavy-duty vehicles use dedicated or dual-fuel systems. On the vehicle, natural gas is stored in tanks as CNG. Dedicated NGVs only have

one fuel tank, and are not as heavy as bi-fuel NGVs and can offer more cargo capacity. The driving range of NGVs is generally less than that of comparable conventional vehicles because of the lower energy density of natural gas. Extra storage tanks can increase range, but the additional weight may displace cargo capacity.

LNG, a more expensive option, is used in some heavy-duty vehicles. The form of natural gas used is typically chosen based on the range an application needs. Because it is a liquid, the energy density of LNG is greater than CNG, so more fuel can be stored onboard the vehicle. As a result, LNG is more suitable than CNG for trucks that require longer ranges because liquid is more dense than gas, and, therefore, more energy can be stored by volume in a given tank. LNG is typically used in medium- and heavy-duty vehicles, such as Class 7 and 8 trucks requiring a greater range.

CNG/LNG Availability

Natural gas powers approximately 150,000 vehicles in the United States and approximately 15.2 million vehicles worldwide. Both CNG and LNG are domestically produced, relatively low priced, and commercially available. Considered alternative fuels under the Energy Policy Act of 1992, CNG and LNG are sold in units of GGEs or diesel gallon equivalents (DGEs) based on the energy content of a gallon of gasoline or diesel fuel. CNG/LNG fueling stations are available within 2 miles of the SSFL site, as shown in **Figure 2**, *CNG/LNG Fueling Stations near Santa Susana Field Laboratories Site,* below.

CNG/LNG Usage

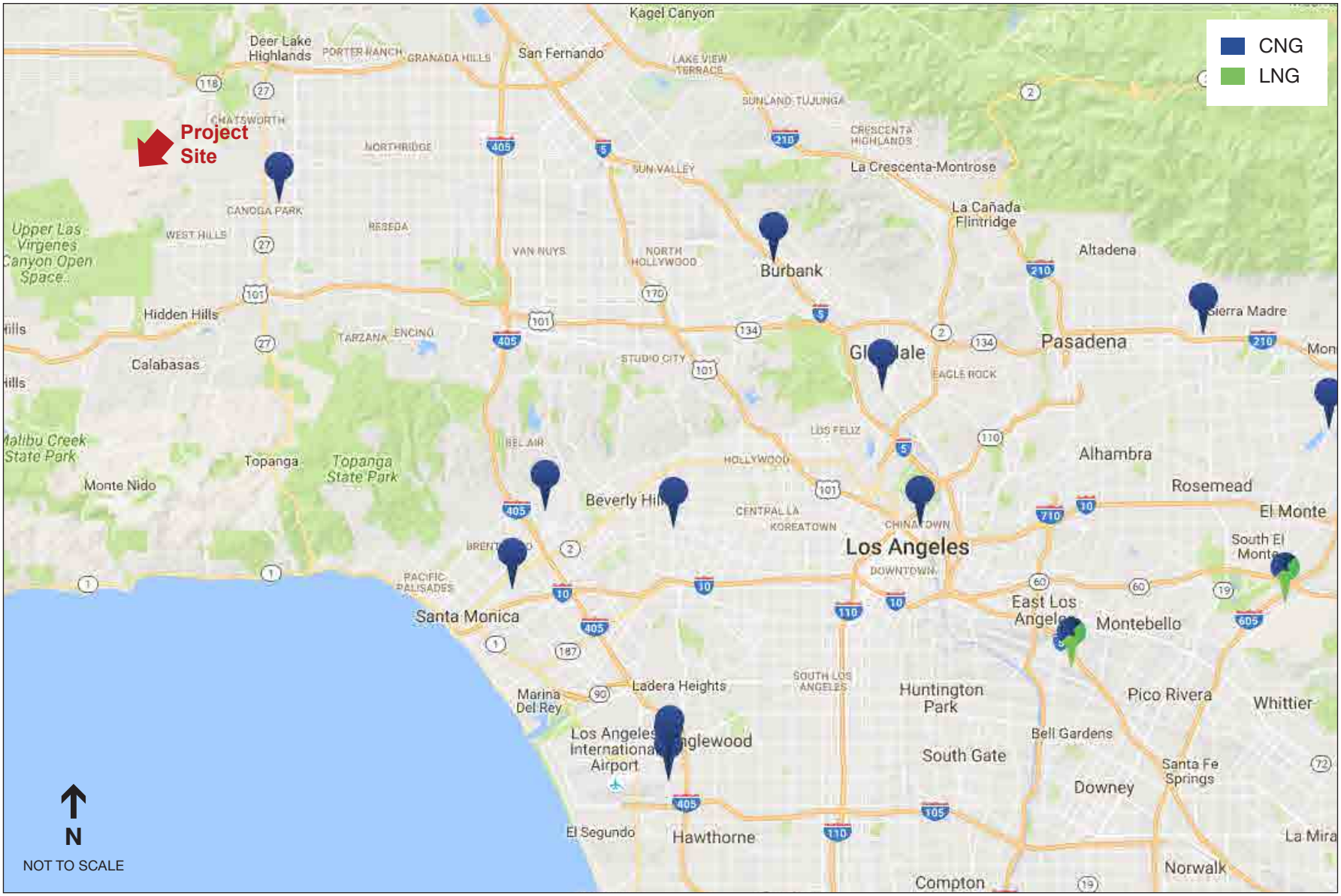
CNG and LNG usage has been supported by various companies in the past for off-road construction trucks and on-road heavy duty trucks, such as the following:

- With regard to off-road construction trucks, Caterpillar is expected to produce three large CNG powered mining trucks: the Cat 793, 795 and 797, which will be available by 2017. These trucks would be used mainly for hauling mining ore, debris, and soil.
- For on-road trucks, Volvo offers two CNG-powered on-road heavy duty day cabs (Model VNL and VNM) equipped with a factory-installed Cummins ISL G engine (available 2013). The larger, more robust VNL model features a 12-liter Cummins- Westport ISX12 G gas engine. As of November 2016, Volvo VNL models are commercially available with the ISX12 natural gas engine.
- Terex introduced its first natural-gas-fueled mixer truck -- the front-discharge FD5000 “Great Lakes” --with a new 12-liter Cummins ISX12G engine available in ratings up to 400 hp and 1450 ft. lb. of torque, in 2014.
- Freightliner Trucks showcased its first 114SD concrete mixer with CNG technology at the 2013 World of Concrete in Las Vegas. In addition, there are other Freightliner trucks that run off of natural gas.

These engines discussed above are also incorporated into a number of mass transit uses. CNG/LNG is used in a variety of heavy-duty sources, such as school buses, transit buses, capacity trucks, tractors, and freightliners.

CNG/LNG Benefits and Drawbacks

Natural gas vehicles are good choices for centrally fueled fleets. CNG tank technology and safety are improving, and in many cases CNG can provide operators with adequate range (less than 250 miles/day) for their operations. For vehicles needing to travel long distances (greater than 250 miles/day), LNG is a better choice. The advantages of natural gas as a transportation fuel include its domestic availability, widespread distribution infrastructure, low cost, and inherently clean-burning qualities.



SOURCE: http://www.cnglngstations.com/

Figure 2

CNG/LNG Fueling Stations near Santa Susana Field Laboratories

The horsepower, acceleration, and cruise speed of NGVs are comparable to those of equivalent conventional vehicles. However, torque levels are slightly lower compared to diesel fueled engines. The Cummins ISL G natural gas engine has a diesel counterpart, the ISL 9 engine. The ISL G (natural gas) provides torque levels of up to 1,000 lb-ft, while the ISL 9 (diesel) provides torque levels of up to 1,300 lb-ft. Although the ISL G and ISL 9 engines are rated for 80,000 lb line haul applications, the deficiency in torque result in trucks travelling slower to the receiver destination. As torque is required for hauling heavy loads upgrade, use of natural gas engines may not be feasible for hauling heavy loads.

Compared with conventional diesel and gasoline vehicles, NGVs can produce some emissions benefits. When used as a vehicle fuel, natural gas can offer life cycle GHG emissions benefits over conventional fuels, depending on vehicle type, drive cycle, and engine calibration. In addition, using natural gas may reduce some types of tailpipe emissions from fuel combustion in a vehicle's engine. The emissions of primary concern include the regulated emissions of hydrocarbons, NO_X, CO, as well as CO_2. Due to increasingly stringent emissions regulations, the gap has narrowed between tailpipe emissions benefits from NGVs and conventional vehicles with modern emissions controls. USEPA is requiring all fuels and vehicle types to meet increasingly lower, near zero, thresholds for tailpipe emissions of air pollutants. Still, NGVs continue to provide emissions benefits, especially when replacing older conventional vehicles or when considering life cycle emissions (ADFC 2016).

There are many heavy-duty NVGs —as well as a number of light-duty NGVs—available from original equipment manufacturers. Qualified system retrofitters can also economically, safely, and reliably convert many vehicles for natural gas operation.

However, unlike biodiesel, which is a fuel which can be used interchangeably with conventional diesel with no physical alteration of the engine needed, powering heavy duty equipment with CNG or LNG requires a major engine retrofit or for new equipment to be purchased with a CNG/LNG compatible engine to be installed by the original engine manufacturer (OEM). Thus, the use of CNG or LNG can prove to be costly.

3. Electric Engines (EVs, Plug-In, or Hybrid)

Electric Engine Basics

Electricity can be produced from a variety of energy sources, including oil, coal, nuclear energy, hydropower, natural gas, wind energy, solar energy, and stored hydrogen. Plug-in electric vehicles are capable of drawing electricity from electrical power sources (generally the electricity grid) and storing electricity in batteries. Though not yet widely available, fuel cell vehicles use hydrogen to generate electricity onboard the vehicle. Electric vehicles discussed here include all-electric vehicles (EV), plug-in hybrid electric vehicles (PHEV), and hybrid electric vehicles (HEV).

Plug-in All-Electric Vehicles (EV)

All-electric vehicles (EVs) use a battery to store the electrical energy from a plug-in source that powers the electric motor (there is no internal combustion motor). EVs are sometimes referred to as battery electric vehicles (BEVs). EV batteries are charged by plugging the vehicle into an electric power source. Although most U.S. electricity production contributes to air pollution, the USEPA categorizes all-electric vehicles as zero-emission vehicles because they produce no direct exhaust or emissions. Because EVs use no fuel, widespread use of these vehicles could dramatically reduce petroleum consumption.

Currently available EVs have a shorter driving range per charge than most conventional vehicles have per tank of gas. EV manufacturers typically target a range of 100 miles on a fully charged EV. According to the U.S. Department of Transportation, Federal Highway Administration, 100 miles is sufficient for more than 90 percent of all household vehicle trips in the United States. For longer trips, it is necessary to recharge the vehicle or swap the battery.

The efficiency and driving range of EVs varies substantially based on driving conditions and driving habits. Extreme outside temperatures tend to reduce range, because more energy must be used to heat or cool the cabin. High driving speeds reduce range because of the energy required to overcome increased drag. Compared with gradual acceleration, rapid acceleration reduces range. Hauling heavy loads or driving up significant inclines also reduces range.

Plug-in Hybrid Electric Vehicles (PHEV)

Plug-in hybrid electric vehicles (PHEVs) are powered by both an electric motor using electricity stored in batteries, or an internal combustion engine or other propulsion source, using a fuel such as gasoline or diesel. Using electricity from the grid to run the vehicle some or all of the time reduces operating costs and petroleum consumption, relative to conventional vehicles. PHEVs might also produce lower levels of emissions, depending on the electricity source.

PHEVs generally have larger battery packs than non-plug-in hybrid electric vehicles (discussed below). This makes it possible to drive moderate distances using just electricity (about 10 to 40-plus miles in current models), commonly referred to as the "all-electric range" of the vehicle.

During urban driving, most of a PHEV's power comes from stored electricity, if the battery is charged. For example, a light-duty PHEV driver might drive to and from work on all-electric power, plug in the vehicle to charge it at night, and be ready for another all-electric commute the next day. The internal combustion engine powers the vehicle when the battery is mostly depleted, during rapid acceleration, or when intensive heating or air conditioning is required. Some heavy-duty PHEVs work the opposite way, with the internal combustion engine used for driving to and from a job site and electricity used to power the vehicle's equipment or control the cab's climate while at the job site. The PHEV fuel consumption depends on the distance driven between battery charges. For example, if the PHEV is never plugged in to charge, the fuel economy will be about the same as a similarly sized non-plug-in hybrid electric vehicle. If the PHEV is driven a shorter distance than its all-electric range, and plugged in to charge between trips, it may be possible to use only electric power.

PHEV batteries can be charged by an outside electric power source, by the internal combustion engine, or through regenerative braking. During braking, the electric motor acts as a generator, using the energy to charge the battery (U.S. Department of Energy, 2016)

Hybrid Electric Vehicles (HEVs)

Like PHEVs, hybrid electric vehicles (HEVs) are powered by an internal combustion engine or other propulsion source that can be run on conventional or alternative fuel, and an electric motor that uses energy stored in a battery (however, not recharged from a plug-in source). The extra power provided by the electric motor allows for a smaller combustion engine. Additionally, the battery can power auxiliary loads like sound systems and headlights, and reduce engine idling when stopped. Together, HEVs combine the benefits of high fuel economy and low emissions with the power and range of conventional vehicles.

A HEV cannot plug into off-board sources of electricity to charge the battery. Instead, the HEV uses regenerative braking and the internal combustion engine to charge the battery. The HEV captures energy normally lost during braking by using the electric motor as a generator, and storing the captured energy in the battery. The energy from the battery provides extra power during acceleration.

Charging Stations

Charging equipment for plug-in electric vehicles (PHEVs or EVs) is classified by the rate at which the batteries are charged. Charging times vary based on how depleted the battery is, how much energy it holds, the type of battery, and the type of EV. The charging time can range from 15 minutes to 20 hours or more, depending on these factors.

Many plug-in electric vehicle owners may do the majority of their charging at home (or at fleet facilities, in the case of fleets). Some employers offer access to charging at the workplace. In many states, plug-in electric vehicle drivers also have access to public charging stations at libraries, shopping centers, hospitals, and businesses. The charging infrastructure is rapidly expanding, providing drivers with the convenience, range, and confidence to meet more of their transportation needs with plug-in vehicles. PHEVs have added flexibility, because they can also refuel with gasoline or diesel (or possibly other fuels in the future) when necessary (U.S. Department of Energy, 2016).

Electric Engines and Charging Station Availability

A number of light-, medium-, and heavy-duty HEVs, PHEVs, and EVs are available from a variety of automakers. Heavy-duty vehicles can also be converted to PHEVs. Nevertheless, as shown in **Table 1**, various types of heavy-duty HEVs have limited commercial availability.

TABLE 1
SUMMARY OF HEAVY-DUTY EV TECHNOLOGY READINESS

Vehicle	Technology Readiness	Number in Service	Notes
Transit Bus	Commercially Available	Approximately 40 in California, and > 2,500 worldwide	3 models commercially available in U.S.
School Bus	Limited Commercial Availability	4 in California	3 new buses ordered in SCAQMD 6 repowers underway with V2G
Medium-Duty (8,501 to 14,000 lbs.)	Limited Commercial Availability	300+	Focused on delivery service
Heavy-Duty (> 14,000 lbs.)	Demonstration Phase	2 Drayage 1 Refuse	13 Class-8 Trucks under construction

Source: CARB, 2015

Public charging stations are not as ubiquitous as gas stations, but charging equipment manufacturers, automakers, utilities, Clean Cities coalitions, municipalities, and government agencies are establishing a rapidly expanding network of charging infrastructure. Plug-in electric vehicles can be recharged at stations available within close distance of the SSFL site, as shown in **Figure 3**, *Electric Vehicle Charging Stations near Santa Susana Field Laboratories Site*, below. The cost of charging stations is variable depending upon the type of charging station (DC fast charging) and location (curbside or garage). Component cost of charging stations vary based on

hardware, electrical materials and labor, other materials and labor, transformer, mobilization, and permitting. Depending on these factors, a charging station for the project is estimated at approximately $5,300 to $13,150 for a curbside station, and $29,650 to $91,200 for a DC fast charging station (Greenbiz.com 2016).

Electric Engines Usage

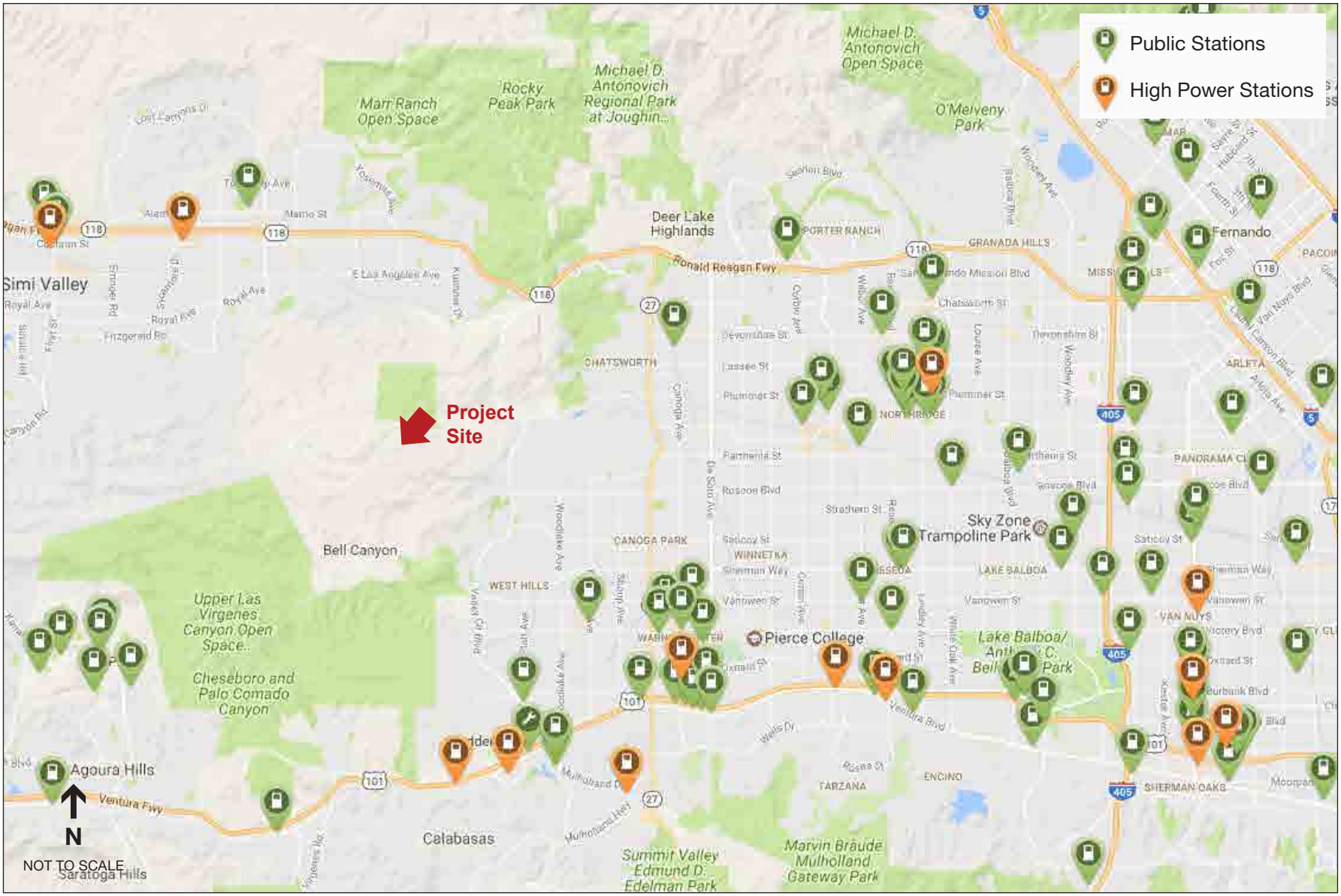
The need to reduce diesel exhaust emissions has led to the development of electric engines in construction equipment and vehicles. The new technology trend for heavy equipment is the merger of diesel engines with electric drive trains. Diesel-electric and hybrid drive systems provide slightly smaller engines operating at a lower rpm, which results in fuel savings. **Table 2** summarizes examples of heavy duty EV/Hybrid vehicles.

TABLE 2
EXAMPLES OF HEAVY-DUTY HYBRID ELECTRIC VEHICLES

Vehicle	Type	Purpose
Autocar E3 Hybrid	Hybrid Electric	Refuse
Peterbilt Motors 320 HLA	Hybrid - Hydraulic	Refuse
Collins Bus Corp. NexBus Gasoline Hybrid	Hybrid Electric	School Bus
Daimler Buses North America Orion VII Hybrid Low-Floor	Hybrid Electric	Transit Bus

Source: U.S. Department of Energy, Alternative Fuel Data Center, 2016

At the request of partner agencies, the Los Angeles County Metropolitan Transportation Authority (Metro) has taken the lead in forming a Countywide Zero-Emission Trucks Collaborative to promote development and deployment of zero-emission trucks in Los Angeles County. The Collaborative will include ports of Long Beach and Los Angeles, Caltrans, Southern California Association of Governments (SCAG), and SCAQMD. The Collaborative is currently developing pilot projects as well as demonstration projects for zero-emission trucks. Advancing zero-emission truck technology and implementation will help achieve the air quality objectives of Metro’s Long Range Transportation Plan, goods movement program, and the agency’s over-arching goal of creating a more sustainable transportation system. The collective efforts will be critical to meeting the stringent, federal health-based air standards proposed by the USEPA. The SDAQMD believes that should the new standards be adopted by USEPA, then a significant percentage of vehicles will need to achieve zero or near-zero-emissions by 2023. However, to date, the focus has been on dedicated zero-emission electric truck technology along the I-710. As part of the I-710 Corridor Project EIR/EIS, Metro has explored the feasibility of zero-emission trucks, including an Alternative with a 17-mile zero-emission, dedicated freight corridor in response to community air quality concerns. Metro has been investigating vehicle technologies that could meet the zero-emission requirement of the corridor. However, there are a series of challenges to overcome and critical stages in the development process to be completed before commercialization of zero-emission trucks will be realized. Establishing a coalition focused on technology advancement and implementation will help align Metro’s policies and leverage its investments with those of partner agencies to realize our common vision for zero-emission trucks, clean air, and sustainable communities (Metro 2016).



SOURCE: https://www.plugshare.com/

Santa Susana Field Laboratories Memo . D120894

Figure 3

Electric Vehicle Charging Stations near Santa Susana Field Laboratories

Electric Engines Benefits and Drawbacks

Overall, electric equipment results in lower PM and NO_X emissions when compared to conventional diesel engines. However, electric equipment can cost 20 to 40 percent more than its internal combustion counterpart. Electric equipment has a downtime for recharging. The batteries typically provide enough power for one standard eight-hour shift or approximately 6 hours of constant use. After that, 8 to 16 hours are required to recharge batteries, followed by 8 hours for batteries to cool before using. Faster charging batteries can restore batteries from 20 to 100 percent in 60 to 90 minutes, though more expensive than a standard battery. In addition, battery charging stations and battery transporters are required. Although PHEVs are generally more expensive than similar conventional and hybrid vehicles, some cost can be recovered through fuel savings, a federal tax credit, or state incentives. Plug-in EVs and PHEVs use electricity from the grid to run some or all of the time reducing operating costs and petroleum consumption, relative to conventional vehicles and PHEVs. PHEVs may produce lower levels of emissions, depending on the electricity source. PHEVs generally have larger battery packs than HEVs, which makes it possible to drive moderate distances using just electricity (approximately 10 to 40-plus miles in current models). The PHEV fuel consumption depends on the distance driven between battery charges. PHEV batteries can be charged by an outside electric power source, by the internal combustion engine, or through regenerative braking. HEVs combine the benefits of high fuel economy and low emissions with the power and range of conventional vehicles, without requiring a plug-in to charge the batteries.

Conclusion

The three alternative strategies for reducing air pollutant emissions, above and beyond those reductions to be achieved with implementation of the mitigation measures listed above, were analyzed for availability, feasibility (i.e. ability to meet the project needs), and efficiency. As shown in this memorandum, while alternative fuels and associated alternative-fueled equipment are available, such fuels and equipment are not feasible for implementation in this project. The use of biodiesel would not decrease, and may in fact slightly increase NOx, the pollutant for which project emissions exceed the regional threshold for the SCCAB and SoCAB. Emissions of NO_X contribute to the formation of ground-level ozone and the SCCAB and SoCAB are designated as non-attainment for the federal and state ozone standards. Therefore, biodiesel would not be feasible for this project. Natural gas (CNG/LNG) is available in sufficient quantities, but the equipment available is currently limited to a few manufacturers or still in the prototype stage. Therefore, there is insufficient availability of natural gas (CNG/LNG)-fueled trucks available for the hauling of materials from the SSFL site to appropriate receiver facilities and would not be feasible for this project. In addition, electric engines were considered; however, due to the daily relocation of equipment throughout the SSFL site and the need for trucks to travel long distances away from the SSFL site, lack of charging stations in proximity to daily cleanup locations, and downtime for recharging, electric equipment was determined to be not feasible for this project.

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Santa Susana Field Laboratory
Air Quality Appendix
Section 10
SCAQMD's Fact Sheet for Applying CalEEMod to LSTs

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
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Fact Sheet for Applying CalEEMod to Localized Significance Thresholds

This fact sheet describes how construction mitigation measures from the new CalEEMod Land Use Model may be applied to the SCAQMD Localized Significance Threshold (LST) Methodology. The LST Methodology uses lookup tables based on site acreage to determine the significance of emissions for CEQA purposes. However, CalEEMod does not allow the user to mitigate construction emissions by directly modifying acreage disturbed.

CalEEMod calculates construction emissions (off-road exhaust and fugitive dust) based on the number of equipment hours and the maximum daily soil disturbance activity possible for each piece of equipment. In order to compare CalEEMod reported emissions against the LST lookup tables, the CEQA document should contain in its project design features or its mitigation measures the following parameters:

1) The off-road equipment list (including type of equipment, horsepower, and hours of operation) assumed for the day of construction activity with maximum emissions
2) The maximum number of acres disturbed on the peak day using the equipment list from above and the following table from the CalEEMod appendix

Equipment Type	Acres/8hr-day
Crawler Tractors	0.5
Graders	0.5
Rubber Tired Dozers	0.5
Scrapers	1

3) Any emission control devices added onto off-road equipment
4) Specific dust suppression techniques used on the day of construction activity with maximum emissions

Example 1
A 15-acre development proposes to use one grader, one scraper, and one tractor for eight hours each during Site Preparation activities (the peak day in this case). As the maximum daily disturbed acreage for this equipment is 2 acres (0.5+1+0.5=2), the project proponent should compare CalEEMod reported emissions against the 2-acre LST lookup tables.

Example 2
A 1-acre development proposes to use 2 dozers and 2 tractors for eight hours per day each during Grading activities. The total acreage disturbed is 2 acres per day occurring on a 1-acre site (meaning the site is graded twice in one day). In this case, the CalEEMod reported emissions should be compared against the 1-acre LST lookup tables.